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# Energy-Aware System Design

Algorithms and Architectures

 Springer

# Energy Aware System Design Algorithms And Architectures

**Suresh Chandra Satapathy, P S  
Avadhani, Ajith Abraham**



## **Energy Aware System Design Algorithms And Architectures:**

**Energy-Aware System Design** Chong-Min Kyung, Sungjoo Yoo, 2011-06-17 Power consumption becomes the most important design goal in a wide range of electronic systems There are two driving forces towards this trend continuing device scaling and ever increasing demand of higher computing power First device scaling continues to satisfy Moore's law via a conventional way of scaling More Moore and a new way of exploiting the vertical integration More than Moore Second mobile and IT convergence requires more computing power on the silicon chip than ever Cell phones are now evolving towards mobile PC PCs and data centers are becoming commodities in house and a must in industry Both supply enabled by device scaling and demand triggered by the convergence trend realize more computation on chip via multi core integration of diverse functionalities on mobile SoCs etc and finally more power consumption incurring power related issues and constraints Energy Aware System Design Algorithms and Architectures provides state of the art ideas for low power design methods from circuit architecture to software level and offers design case studies in three fast growing areas of mobile storage biomedical and security Important topics and features Describes very recent advanced issues and methods for energy aware design at each design level from circuit and architecture to algorithm level and also covering important blocks including low power main memory subsystem and on chip network at architecture level Explains efficient power conversion and delivery which is becoming important as heterogeneous power sources are adopted for digital and non digital parts Investigates 3D die stacking emphasizing temperature awareness for better perspective on energy efficiency Presents three practical energy aware design case studies novel storage device e.g solid state disk biomedical electronics e.g cochlear and retina implants and wireless surveillance camera systems Researchers and engineers in the field of hardware and software design will find this book an excellent starting point to catch up with the state of the art ideas of low power design

*Algorithms and Architectures for Parallel Processing* Guojun Wang, Albert Zomaya, Gregorio Martinez, Kenli Li, 2015-11-16 This four volume set LNCS 9528 9529 9530 and 9531 constitutes the refereed proceedings of the 15th International Conference on Algorithms and Architectures for Parallel Processing ICA3PP 2015 held in Zhangjiajie China in November 2015 The 219 revised full papers presented together with 77 workshop papers in these four volumes were carefully reviewed and selected from 807 submissions 602 full papers and 205 workshop papers The first volume comprises the following topics parallel and distributed architectures distributed and network based computing and internet of things and cyber physical social computing The second volume comprises topics such as big data and its applications and parallel and distributed algorithms The topics of the third volume are applications of parallel and distributed computing and service dependability and security in distributed and parallel systems The covered topics of the fourth volume are software systems and programming models and performance modeling and evaluation **Architecture of Computing Systems - ARCS 2015**

Luís Miguel Pinho Pinho, Wolfgang Karl, Albert Cohen, Uwe Brinkschulte, 2015-03-10 This book constitutes the proceedings of

the 28th International Conference on Architecture of Computing Systems ARCS 2015 held in Porto Portugal in March 2015 The 19 papers presented together with three invited papers were carefully reviewed and selected from 45 submissions The papers are organized in six sessions covering the topics hardware design applications trust and privacy real time issues and a best papers session

**Hardware Design for 3D Video Coding** Vladimir Afonso, Murilo Perleberg, Bruno Zatt, Marcelo Porto, Luciano Agostini, Altamiro Susin, 2025-02-19 This book focuses on the research and development challenges posed by 3D video systems based on multi view plus depth MVD technology This technology can produce a realistic immersive experience generating synthetic video views on the decoder side reducing the amount of information on the encoder side The discussion presented in this book explores the MVD characteristics to propose high throughput and energy efficient architectures systems focusing on 3D HEVC the state of the art standard for exploiting the MVD concept The book includes an extensive discussion of the 3D HEVC video encoding followed by an in depth evaluation of the 3D HEVC reference software behavior Then the book presents in detail a set of high throughput and energy efficient architectures targeting the three main prediction steps inside the 3D HEVC intra frame prediction inter frame prediction and inter view prediction

**Design and Test Strategies for 2D/3D Integration for NoC-based Multicore Architectures** Kanchan Manna, Jimson Mathew, 2019-12-20 This book covers various aspects of optimization in design and testing of Network on Chip NoC based multicore systems It gives a complete account of the state of the art and emerging techniques for near optimal mapping and test scheduling for NoC based multicores The authors describe the use of the Integer Line Programming ILP technique for smaller benchmarks and a Particle Swarm Optimization PSO to get a near optimal mapping and test schedule for bigger benchmarks The PSO based approach is also augmented with several innovative techniques to get the best possible solution The tradeoff between performance communication or test time of the system and thermal safety is also discussed based on designer specifications Provides a single source reference to design and test for circuit and system level approaches to NoC based multicore systems Gives a complete account of the state of the art and emerging techniques for near optimal mapping and test scheduling in NoC based multicore systems Organizes chapters systematically and hierarchically rather than in an ad hoc manner covering aspects of optimization in design and testing of Network on Chip NoC based multicore systems

**Parallel Architecture, Algorithm and Programming** Guoliang Chen, Hong Shen, Mingrui Chen, 2017-10-05 This book constitutes the refereed proceedings of the 8th International Symposium on Parallel Architecture Algorithm and Programming PAAP 2017 held in Haikou China in June 2017 The 50 revised full papers and 7 revised short papers presented were carefully reviewed and selected from 192 submissions The papers deal with research results and development activities in all aspects of parallel architectures algorithms and programming techniques

**Proceedings of the 15th International Conference on Ubiquitous Computing & Ambient Intelligence (UCAmI 2023)** José Bravo, Gabriel Urzáiz, 2023-11-25 This book serves as a comprehensive compilation of groundbreaking research

endeavors within the realms of ambient intelligence and ubiquitous computing These initiatives are pivotal in enabling both researchers and practitioners to discern recent breakthroughs and emerging frontiers in these fields Encompassing a wide array of domains including Ambient Active and Assisted Living A3L the Internet of Things IoT Smart Environments Data Science and Human Ambient Interaction acts as a valuable resource for scholars professionals and graduate students alike The primary aim of this book is to empower individuals within the academic and professional community to harness this wealth of knowledge It equips them to tackle innovative challenges and engineer smart and ubiquitous solutions that will shape the landscape of the next decade By amalgamating insights from various facets of ambient intelligence and ubiquitous computing this book encourages cross disciplinary collaboration and fosters a holistic understanding of the field Thus it not only highlights the recent strides in these areas but also serves as a roadmap for future exploration and innovation paving the way for a smarter and more interconnected world

**Parallel Problem Solving from Nature - PPSN XIV** Julia Handl, Emma Hart, Peter R. Lewis, Manuel López-Ibáñez, Gabriela Ochoa, Ben Paechter, 2016-08-30 This book constitutes the refereed proceedings of the 14th International Conference on Parallel Problem Solving from Nature PPSN 2016 held in Edinburgh UK in September 2016 The total of 93 revised full papers were carefully reviewed and selected from 224 submissions The meeting began with four workshops which offered an ideal opportunity to explore specific topics in intelligent transportation Workshop landscape aware heuristic search natural computing in scheduling and timetabling and advances in multi modal optimization PPSN XIV also included sixteen free tutorials to give us all the opportunity to learn about new aspects gray box optimization in theory theory of evolutionary computation graph based and cartesian genetic programming theory of parallel evolutionary algorithms promoting diversity in evolutionary optimization why and how evolutionary multi objective optimization intelligent systems for smart cities advances on multi modal optimization evolutionary computation in cryptography evolutionary robotics a practical guide to experiment with real hardware evolutionary algorithms and hyper heuristics a bridge between optimization over manifolds and evolutionary computation implementing evolutionary algorithms in the cloud the attainment function approach to performance evaluation in EMO runtime analysis of evolutionary algorithms basic introduction meta model assisted evolutionary optimization The papers are organized in topical sections on adaption self adaption and parameter tuning differential evolution and swarm intelligence dynamic uncertain and constrained environments genetic programming multi objective many objective and multi level optimization parallel algorithms and hardware issues real word applications and modeling theory diversity and landscape analysis

**Architecture of Computing Systems - ARCS 2012** Andreas Herkersdorf, Kay Römer, Uwe Brinkschulte, 2012-02-09 This book constitutes the refereed proceedings of the 25th International Conference on Architecture of Computing Systems ARCS 2012 held in Munich Germany in February March 2012 The 20 revised full papers presented in 7 technical sessions were carefully reviewed and selected from 65 submissions The papers are organized in topical sections on robustness and

fault tolerance power aware processing parallel processing processor cores optimization and communication and memory

**Artificial Intelligence and Sustainability** Mohamed Ahmed Alloghani,2023-11-25 This book gives readers the tools to craft AI systems that don't just thrive today but endure sustainably into the future Whether a trailblazer or an aspiring innovator this book enables readers to resonate with the ambitions of software developers data scientists and AI practitioners The author covers the latest techniques and best practices for energy efficiency reducing carbon footprints and ensuring fair and ethical AI The book also addresses important issues such as AI governance managing risks and ensuring transparency Topics covered include understanding the relationship between AI and sustainable development strategies for building efficient AI systems and ethical considerations in AI development among others The author includes case studies of companies and organizations that have successfully implemented sustainable AI software development practices Therefore this book will be of interest to AI practitioners academics researchers and lecturers in computer science artificial intelligence machine learning and data sciences

**Advancing Embedded Systems and Real-Time Communications with Emerging Technologies** Virtanen, Seppo,2014-04-30 Embedded systems and real time computing can be useful tools for a variety of applications Further research developments in this field can assist in promoting the future development of these technologies for various applications Advancing Embedded Systems and Real Time Communications with Emerging Technologies discusses embedded systems communication system engineering and real time systems in an integrated manner This research book includes advancements in the fields of computer science computer engineering and telecommunication engineering in regard to how they are used in embedded and real time systems for communications purposes With its practical and theoretical research this book is an essential reference for academicians students researchers practitioners and IT professionals

*Encyclopedia of Information Science and Technology* Mehdi Khosrow-Pour,Mehdi Khosrowpour,2009 This set of books represents a detailed compendium of authoritative research based entries that define the contemporary state of knowledge on technology Provided by publisher

**Innovations in Embedded and Real-Time Systems Engineering for Communication** Virtanen, Seppo,2012-04-30 This book has collected the latest research within the field of real time systems engineering and will serve as a vital reference compendium for practitioners and academics Provided by publisher

**Memory Design Techniques for Low Energy Embedded Systems** Alberto Macii, Luca Benini,Massimo Poncino,2013-03-14 Memory Design Techniques for Low Energy Embedded Systems centers one of the most outstanding problems in chip design for embedded application It guides the reader through different memory organizations and technologies and it reviews the most successful strategies for optimizing them in the power and performance plane

**Advances in Computer Systems Architecture** Chris Jesshope,Colin Egan,2006-08-29 This book constitutes the refereed proceedings of the 11th Asia Pacific Computer Systems Architecture Conference ACSAC 2006 The book presents 60 revised full papers together with 3 invited lectures addressing such issues as processor and network design reconfigurable

computing and operating systems and low level design issues in both hardware and systems Coverage includes large and significant computer based infrastructure projects the challenges of stricter budgets in power dissipation and more

**Pervasive Communications Handbook** Syed Ijlal Ali Shah, Mohammad Ilyas, Hussein T. Mouftah, 2017-09-29 In an emergency availability of the pervasive communications environment could mean the difference between life and death Possibly one of the first guides to comprehensively explore these futuristic omnipresent communications networks the Pervasive Communications Handbook addresses current technology i e MAC protocols and P2P based VoD architecture and developments expected in the very near future when most people and places will be virtually connected through a constant and perpetual exchange of information This monumental advance in communications is set to dramatically change daily life in areas ranging from healthcare transportation and education to commerce and socialization With contributions from dozens of pioneering experts this important reference discusses one to one one to many and many to one exchanges of information Organized by the three key aspects technology architecture and applications the book explores enabling technologies applications and services location and mobility management and privacy and trust Citing the technology s importance to energy distribution home automation and telecare among other areas it delves into topics such as quality of service security efficiency and reliability in mobile network design and environment interoperability

**MULTICORE SYSTEMS ON-CHIP** Ben Abadallah Abderazek, 2010-08-01 Conventional on chip communication design mostly use ad hoc approaches that fail to meet the challenges posed by the next generation MultiCore Systems on chip MCSoC designs These major challenges include wiring delay predictability diverse interconnection architectures and power dissipation A Network on Chip NoC paradigm is emerging as the solution for the problems of interconnecting dozens of cores into a single system on chip However there are many problems associated with the design of such systems These problems arise from non scalable global wire delays failure to achieve global synchronization and difficulties associated with non scalable bus based functional interconnects The book consists of three parts with each part being subdivided into four chapters The first part deals with design and methodology issues The architectures used in conventional methods of MCSoCs design and custom multiprocessor architectures are not flexible enough to meet the requirements of different application domains and not scalable enough to meet different computation needs and different complexities of various applications Several chapters of the first part will emphasize on the design techniques and methodologies The second part covers the most critical part of MCSoCs design the interconnections One approach to addressing the design methodologies is to adopt the so called reusability feature to boost design productivity In the past years the primitive design units evolved from transistors to gates finite state machines and processor cores The network on chip paradigm offers this attractive property for the future and will be able to close the productivity gap The last part of this book delves into MCSoCs validations and optimizations A more qualitative approach of system validation is based on the use of formal techniques for hardware design The main advantage of formal methods is the

possibility to prove the validity of essential design requirements As formal languages have a mathematical foundation it is possible to formally extract and verify these desired properties of the complete abstract state space Online testing techniques for identifying faults that can lead to system failure are also surveyed Emphasis is given to analytical redundancy based techniques that have been developed for fault detection and isolation in the automatic control area **Integrated Circuit**

**and System Design. Power and Timing Modeling, Optimization and Simulation** Johan Vounckx, Nadine Azemard, 2006-09-08 This book constitutes the refereed proceedings of the 16th International Workshop on Power and Timing Modeling Optimization and Simulation PATMOS 2006 The book presents 41 revised full papers and 23 revised poster papers together with 4 key notes and 3 industrial abstracts Topical sections include high level design power estimation and modeling memory and register files low power digital circuits busses and interconnects low power techniques applications and SoC design modeling and more *Proceedings of the International Conference on Information Systems Design and*

*Intelligent Applications 2012 (India 2012) held in Visakhapatnam, India, January 2012* Suresh Chandra Satapathy, P S Avadhani, Ajith Abraham, 2011-12-14 This volume contains the papers presented at INDIA 2012 International conference on Information system Design and Intelligent Applications held on January 5 7 2012 in Vishakhapatnam India This conference was organized by Computer Society of India CSI Vishakhapatnam chapter well supported by Vishakhapatnam Steel RINL Govt of India It contains 108 papers contributed by authors from six different countries across four continents These research papers mainly focused on intelligent applications and various system design issues The papers cover a wide range of topics of computer science and information technology discipline ranging from image processing data base application data mining grid and cloud computing bioinformatics among many others The various intelligent tools like swarm intelligence artificial intelligence evolutionary algorithms bio inspired algorithms have been applied in different papers for solving various challenging IT related problems Massive MIMO Detection Algorithm and VLSI Architecture Leibo Liu, Guiqiang

Peng, Shaojun Wei, 2019-02-20 This book introduces readers to a reconfigurable chip architecture for future wireless communication systems such as 5G and beyond The proposed architecture perfectly meets the demands for future mobile communication solutions to support different standards algorithms and antenna sizes and to accommodate the evolution of standards and algorithms It employs massive MIMO detection algorithms which combine the advantages of low complexity and high parallelism and can fully meet the requirements for detection accuracy Further the architecture is implemented using ASIC which offers high energy efficiency high area efficiency and low detection error After introducing massive MIMO detection algorithms and circuit architectures the book describes the ASIC implementation for verifying the massive MIMO detection In turn it provides detailed information on the proposed reconfigurable architecture the data path and configuration path for massive MIMO detection algorithms including the processing unit interconnections storage mechanism configuration information format and configuration method



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