Embedded Systems Springer

This comprehensive introduction describes embedded systems for smart appliances and energy management. The text combines a multidisciplinary blend of topics from embedded systems, information technology and power engineering. This volume introduces innovative power estimation and optimization methodologies to support the design of low power embedded systems based on high-performance VLIW microprocessors. A VLIW processor is a (generally) pipelined processor that can execute, in each clock cycle, a set of explicitly parallel operations.

This Open Access book presents the results of the "Collaborative Embedded Systems" (CrESt) project, aimed at adapting and complementing the methodology underlying modeling techniques developed to cope with the challenges of the dynamic structures of collaborative embedded systems (CESs) based on the SPES development methodology. In order to manage the high complexity of the individual systems and the dynamically formed interaction structures at runtime, advanced and powerful development methods are required that extend the current state of the art in the development of embedded systems and cyber-physical systems. The methodological contributions of the project support the effective and efficient development of CESs in dynamic and uncertain contexts, with special emphasis on the reliability and variability of individual systems and the creation of networks of such systems at runtime. The project was funded by the German Federal Ministry of Education and Research (BMBF), and the case studies are therefore selected from areas that are highly relevant for Germany's economy (automotive, industrial production, power generation, and robotics). It also supports the digitalization of complex and transformable industrial plants in the context of the German government's "Industry 4.0" initiative, and the project results provide a solid foundation for implementing the German government's high-tech strategy "Innovations for Germany" in the coming years.

This book focuses on the outcome of the European research project "FP7-ICT-2011-8 / 317882: Embedded Engineering Learning Platform" E2LP. Additionally, some experiences and researches outside this project have been included. This book provides information about the achieved results of the E2LP project as well as some broader views about the embedded engineering education. It captures project results and applications, methodologies, and evaluations. It leads to the history of computer architectures, brings a touch of the future in education tools and provides a valuable resource for anyone interested in embedded engineering education concepts, experiences and material. The book contents 12 original contributions and will open a broader discussion about the necessary knowledge and appropriate learning methods for the new profile of embedded engineers. As a result, the proposed Embedded Computer Engineering Learning Platform will help to educate a sufficient number of future engineers in Europe, capable of designing complex systems and maintaining a leadership in the area of embedded systems, thereby ensuring that our strongholds in automotive, avionics, industrial automation, mobile communications, telecoms and medical systems are able to develop.

This book constitutes the refereed proceedings of the Third International Conference on Embedded Software and Systems, ICESS 2007, held in Daegu, Korea, May 2007. The 75 revised full papers cover embedded architecture, embedded hardware, embedded software, HW-SW co-design and SoC, multimedia and HCI, pervasive/ubiquitous computing and sensor network, power-aware computing, real-time systems, security and dependability, and wireless communication.

This book constitutes the refereed proceedings of the 13th National Conference on Embedded System Technology, ESTC 2015, held in Beijing, China, in October 2015. The 18 revised full papers presented were carefully reviewed and selected from 63 papers. The topics cover a broad range of fields focusing on research about embedded system technologies, such as smart hardware, system and network, applications and algorithm.

CHES 2009, the 11th workshop on Cryptographic Hardware and Embedded Systems, was held in Lausanne, Switzerland, September 6–9, 2009. The wo- shop was sponsored by the International Association for Cryptologic Research (IACR). The workshop attracted a record number of 148 submissions from 29 co- tries, of which the Program Committee selected 29 for publication in the wo- shop proceedings, resulting in an acceptance rate of 19.6%, the lowest in the history of CHES. The review process followed strict standards: each paper - ceived at least four reviews, and some asmanyaseightreviews.Membersofthe Program Committee were restricted to co-authoring at most two submissions, and their papers were evaluated by an extended number of reviewers. The ProgramCommittee included 53 members representing 20 countries and ?ve continents. These members were carefully selected to represent academia, industry, and government, as well as to include world-class experts in various research ?elds of interest to CHES. The Program Committee was supported by 148 external reviewers. The total number of people contributing to the - view process, including Program Committee members, external reviewers, and Program Co-chairs, exceeded 200. The papers collected in this volume represent cutting-edge worldwide - search in the rapidly growing and evolving area of cryptographic engineering.

Embedded systems have long become essential in application areas in which human control is impossible or infeasible. The development of modern embedded systems is becoming increasingly difficult and challenging because of their overall system complexity, their tighter and cross-functional integration, the increasing requirements concerning safety and real-time behavior, and the need to reduce development and operation costs. This book provides a comprehensive overview of the Software Platform Embedded Systems (SPES) modeling framework and demonstrates its applicability in embedded system development in various industry domains such as automation, automotive, avionics, energy, and healthcare. In SPES 2020, twenty-one partners from academia and industry have joined forces in order to develop and evaluate in different industrial domains a modeling framework that reflects the current state of the art in embedded systems engineering. The content of this book is structured in four parts. Part I "Starting Point" discusses the status quo of embedded systems development and model-based engineering, and summarizes the key requirements faced when

developing embedded systems in different application domains. Part II "The SPES Modeling Framework" describes the SPES modeling framework. Part III "Application and Evaluation of the SPES Modeling Framework" reports on the validation steps taken to ensure that the framework met the requirements discussed in Part I. Finally, Part IV "Impact of the SPES Modeling Framework" summarizes the results achieved and provides an outlook on future work. The book is mainly aimed at professionals and practitioners who deal with the development of embedded systems on a daily basis. Researchers in academia and industry may use it as a compendium for the requirements and state-of-the-art solution concepts for embedded systems development.

This book constitutes the thoroughly refereed post-proceedings of the Second International Workshop on Cryptographic Hardware and Embedded Systems, CHES 2000, held in Worcester, MA, USA in August 2000. The 25 revised full papers presented together with two invited contributions were carefully reviewed and selected from 51 submissions. The papers are organized in topical sections on implementation of elliptic curve cryptosystems, power and timing analysis attacks, hardware implementation of block ciphers, hardware architectures, power analysis attacks, arithmetic architectures, physical security and cryptanalysis, and new schemes and algorithms.

This book gathers selected research papers presented at the First International Conference on Embedded Systems and Artificial Intelligence (ESAI 2019), held at Sidi Mohamed Ben Abdellah University, Fez, Morocco, on 2–3 May 2019. Highlighting the latest innovations in Computer Science, Artificial Intelligence, Information Technologies, and Embedded Systems, the respective papers will encourage and inspire researchers, industry professionals, and policymakers to put these methods into practice.

This book is open access under a CC BY 4.0 license. Technical Systems-of-Systems (SoS) – in the form of networked, independent constituent computing systems temporarily collaborating to achieve a well-defined objective – form the backbone of most of today's infrastructure. The energy grid, most transportation systems, the global banking industry, the water-supply system, the military equipment, many embedded systems, and a great number more, strongly depend on systems-of-systems. The correct operation and continuous availability of these underlying systems-of-systems are fundamental for the functioning of our modern society. The 8 papers presented in this book document the main insights on Cyber-Physical System of Systems (CPSoSs) that were gained during the work in the FP7-610535 European Research Project AMADEOS (acronym for Architecture for Multi-criticality Agile Dependable Evolutionary Open System-of-Systems). It is the objective of this book to present, in a single consistent body, the foundational concepts and their relationships. These form a conceptual basis for the description and understanding of SoSs and go deeper in what we consider the characterizing and distinguishing elements of SoSs: time, emergence, evolution and dynamicity.

A unique feature of this textbook is to provide a comprehensive introduction to the fundamental knowledge in embedded systems, with applications in cyber-physical systems and the Internet of things. It starts with an introduction to the field and a survey of specification models and languages for embedded and cyber-physical systems. It provides a brief overview of hardware devices used for such systems and presents the essentials of system software for embedded systems, including real-time operating systems. The author also discusses evaluation and validation techniques for embedded systems and provides an overview of techniques for mapping applications to execution platforms, including multi-core platforms. Embedded systems have to operate under tight constraints and, hence, the book also contains a selected set of optimization techniques, including software optimization techniques. The book closes with a brief survey on testing. This third edition has been updated and revised to reflect new trends and technologies, such as the importance of cyber-physical systems and the Internet of things, the evolution of single-core processors to multi-core processors, and the increased importance of energy efficiency and thermal issues.

This book makes powerful Field Programmable Gate Array (FPGA) and reconfigurable technology accessible to software engineers by covering different state-of-the-art high-level synthesis approaches (e.g., OpenCL and several C-to-gates compilers). It introduces FPGA technology, its programming model, and how various applications can be implemented on FPGAs without going through low-level hardware design phases. Readers will get a realistic sense for problems that are suited for FPGAs and how to implement them from a software designer's point of view. The authors demonstrate that FPGAs and their programming model reflect the needs of stream processing problems much better than traditional CPU or GPU architectures, making them well-suited for a wide variety of systems, from embedded systems performing sensor processing to large setups for Big Data number crunching. This book serves as an invaluable tool for software designers and FPGA design engineers who are interested in high design productivity through behavioural synthesis, domain-specific compilation, and FPGA overlays. Introduces FPGA technology to software developers by giving an overview of FPGA programming models and design tools, as well as various application examples; Provides a holistic analysis of the topic and enables developers to tackle the architectural needs for Big Data processing with FPGAs; Explains the reasons for the energy efficiency and performance benefits of FPGA processing; Provides a user-oriented approach and a sense for where and how to apply FPGA technology.

Embedded System Design: Modeling, Synthesis and Verification introduces a model-based approach to system level design. It presents modeling techniques for both computation and communication at different levels of abstraction, such as specification, transaction level and cycle-accurate level. It discusses synthesis methods for system level architectures, embedded software and hardware components. Using these methods, designers can develop applications with high level models, which are automatically translatable to low level implementations. This book, furthermore, describes simulation-based and formal verification methods that are essential for achieving design confidence. The book concludes with an overview of existing tools along with a design case study outlining the practice of embedded system design. Specifically, this book addresses the following topics in detail: . System modeling at different abstraction levels . Model-based system design . Hardware/Software codesign . Software and Hardware component synthesis . System verification This book is

for groups within the embedded system community: students in courses on embedded systems, embedded application developers, system designers and managers, CAD tool developers, design automation, and system engineering.

The increased complexity of embedded systems coupled with quickdesign cycles to accommodate faster time-to-market requiresincreased system design productivity that involves both model-baseddesign and tool-supported methodologies. Formal methods are mathematically-based techniques and provide aclean framework in which to express requirements and models of thesystems, taking into account discrete, stochastic and continuous(timed or hybrid) parameters with increasingly efficient tools. This book deals with these formal methods applied tocommunicating embedded systems by presenting the related industrialchallenges and the issues of modeling, model-checking, diagnosisand control synthesis, and by describing the main associatedautomated tools.

This book provides comprehensive coverage of verification and debugging techniques for embedded software, which is frequently used in safety critical applications (e.g., automotive), where failures are unacceptable. Since the verification of complex systems needs to encompass the verification of both hardware and embedded software modules, this book focuses on verification and debugging approaches for embedded software with hardware dependencies. Coverage includes the entire flow of design, verification and debugging of embedded software and all key approaches to debugging, dynamic, static, and hybrid verification. This book discusses the current, industrial embedded software verification flow, as well as emerging trends with focus on formal and hybrid verification and debugging approaches.

This book provides an overview of current Intellectual Property (IP) based System-on-Chip (SoC) design methodology and highlights how security of IP can be compromised at various stages in the overall SoC design-fabrication-deployment cycle. Readers will gain a comprehensive understanding of the security vulnerabilities of different types of IPs. This book would enable readers to overcome these vulnerabilities through an efficient combination of proactive countermeasures and design-for-security solutions, as well as a wide variety of IP security and trust assessment and validation techniques. This book serves as a single-source of reference for system designers and practitioners for designing secure, reliable and trustworthy SoCs.

Without correct timing, there is no safe and reliable embedded software. This book shows how to consider timing early in the development process for embedded systems, how to solve acute timing problems, how to perform timing optimization, and how to address the aspect of timing verification. The book is organized in twelve chapters. The first three cover various basics of microprocessor technologies and the operating systems used therein. The next four chapters cover timing problems both in theory and practice, covering also various timing analysis techniques as well as special issues like multi- and many-core timing. Chapter 8 deals with aspects of timing optimization, followed by chapter 9 that highlights various methodological issues of the actual development process. Chapter 10 presents timing analysis in AUTOSAR in detail, while chapter 11 focuses on safety aspects and timing verification. Finally, chapter 12 provides an outlook on upcoming and future developments in software timing. The number of embedded systems that we encounter in everyday life is growing steadily. At the same time, the complexity of the software is constantly increasing. This book is mainly written for software developers and project leaders in industry. It is enriched by many practical examples mostly from the automotive domain, yet the vast majority of the book is relevant for any embedded software project. This way it is also well-suited as a textbook for academic courses with a strong practical emphasis, e.g. at applied sciences universities. Features and Benefits * Shows how to consider timing in the development process for embedded systems, how to solve timing problems, and how to address timing verification * Enriched by many practical examples mostly from the automotive domain * Mainly written for software developers and project leaders in industry

Christian Köhler covers the connection between ?C and simulation, the interface abstraction as well as the analysis and optimization of coupling systems with the Chip-Hardware-in-the-Loop Simulation (CHILS) approach. He develops the hardware to simulation coupling system with a focus on less hardware effort, the capabilities to couple with different simulation environments, and the efficiency of coupling. Furthermore, the author presents existing concepts to simulate complex systems and compares them with the new approach.

This book constitutes the proceedings of the 16th International Workshop on Cryptographic Hardware and Embedded Systems, CHES 2014, held in Busan, South Korea, in September 2014. The 33 full papers included in this volume were carefully reviewed and selected from 127 submissions. They are organized in topical sections named: side-channel attacks; new attacks and constructions; countermeasures; algorithm specific SCA; ECC implementations; implementations; hardware implementations of symmetric cryptosystems; PUFs; and RNGs and SCA issues in hardware.

Embedded systems now include a very large proportion of the advanced products designed in the world, spanning transport (avionics, space, automotive, trains), electrical and electronic appliances (cameras, toys, televisions, home appliances, audio systems, and cellular phones), process control (energy production and distribution, factory automation and optimization), telecommunications (satellites, mobile phones and telecom networks), and security (e-commerce, smart cards), etc. The extensive and increasing use of embedded systems and their integration in everyday products marks a significant evolution in information science and technology. We expect that within a short timeframe embedded systems will be a part of nearly all equipment designed or manufactured in Europe, the USA, and Asia. There is now a strategic shift in emphasis for embedded systems designers: from simply achieving feasibility, to achieving optimality. Optimal design of embedded systems means targeting a given market segment at the lowest cost and delivery time possible. Optimality implies seamless integration with the physical and electronic environment while respecting real-world constraints such as hard deadlines, reliability, availability, robustness, power consumption, and cost. In our view, optimality can only be achieved through the emergence of embedded systems as a discipline in its own right.

This book constitutes the proceedings of the 15th International Workshop on Cryptographic Hardware and Embedded Systems, CHES 2013, held in Santa Barbara, CA, USA, in August 2013. The 27 papers presented were carefully

reviewed and selected from 132 submissions. The papers are organized in the following topical sections: side-channel attacks; physical unclonable function; lightweight cryptography; hardware implementations and fault attacks; efficient and secure implementations; elliptic curve cryptography; masking; side-channel attacks and countermeasures.

Welcome to the post proceedings of the First International Conference on Embedded Software and Systems (ICESS 2004), which was held in Hangzhou, P. R. China, 9–10 December 2004. Embedded Software and Systems technology is of increasing importance for a wide range of industrial areas, such as aerospace, automotive, telecommunication, and manufacturing automation. Embedded technology is playing an increasingly dominant role in modern society. This is a natural outcome of amazingly fast developments in the embedded field. The ICESS 2004 conference brought together researchers and developers from academia, industry, and government to advance the science, engineering, and technology in embedded software and systems development, and provided them with a forum to present and exchange their ideas, results, work in progress, and experience in all areas of embedded systems research and development. The ICESS 2004 conference attracted much more interest than expected. The total number of paper submissions to the main conference and its three workshops, namely, Pervasive Computing, Automobile Electronics and Tele-communication, was almost 400, from nearly 20 countries and regions. All submissions were reviewed by at least three Program or Technical Committee members or external reviewers. It was extremely difficult to make the final decision on paper acceptance because there were so many excellent, foreseeing, and interesting submissions with brilliant ideas.

Appropriate for use as a graduate text or a professional reference, Languages for Digital Embedded Systems is the first detailed, broad survey of hardware and software description languages for embedded system design. Instead of promoting the one language that will solve all design problems (which does not and will not ever exist), this book takes the view that different problems demand different languages, and a designer who knows the spectrum of available languages has the advantage over one who is trapped using the wrong language. Languages for Digital Embedded Systems concentrates on successful, widely-used design languages, with a secondary emphasis on those with significant theoretical value. The syntax, semantics, and implementation of each language is discussed, since although hardware synthesis and software compilation technology have steadily improved, coding style still matters, and a thorough understanding of how a language is synthesized or compiled is generally necessary to take full advantage of a language. Practicing designers, graduate students, and advanced undergraduates will all benefit from this book. It assumes familiarity with some hardware or software languages, but takes a practical, descriptive view that avoids formalism.

It is well known that embedded systems have to be implemented efficiently. This requires that processors optimized for certain application domains are used in embedded systems. Such an optimization requires a careful exploration of the design space, including a detailed study of cost/performance tradeoffs. In order to avoid time-consuming assembly language programming during design space exploration, compilers are needed. In order to analyze the effect of various software or hardware configurations on the performance, retargetable compilers are needed that can generate code for numerous different potential hardware configurations. This book provides a comprehensive and up-to-date overview of the fast developing area of retargetable compilers for embedded systems. It describes a large set important tools as well as applications of retargetable compilers at different levels in the design flow. Retargetable Compiler Technology for Embedded Systems is mostly self-contained and requires only fundamental knowledge in software and compiler design. It is intended to be a key reference for researchers and designers working on software, compilers, and processor optimization for embedded systems.

This book presents the technical program of the International Embedded Systems Symposium (IESS) 2009. Timely topics, techniques and trends in embedded system design are covered by the chapters in this volume, including modelling, simulation, verification, test, scheduling, platforms and processors. Particular emphasis is paid to automotive systems and wireless sensor networks. Sets of actual case studies in the area of embedded system design are also included. Over recent years, embedded systems have gained an enormous amount of proce- ing power and functionality and now enter numerous application areas, due to the fact that many of the formerly external components can now be integrated into a single System-on-Chip. This tendency has resulted in a dramatic reduction in the size and cost of embedded systems. As a unique technology, the design of embedded systems is an essential element of many innovations. Embedded systems meet their performance goals, including real-time constraints, through a combination of special-purpose hardware and software components tailored to the system requirements. Both the development of new features and the reuse of existing intellectual property components are essential to keeping up with ever more demanding customer requirements. Furthermore, design complexities are steadily growing with an increasing number of components that have to cooperate properly. Embedded system designers have to cope with multiple goals and constraints simul- neously, including timing, power, reliability, dependability, maintenance, packaging and, last but not least, price.

The International Conference on Industrial Engineering and Engineering Management is sponsored by the Chinese Industrial Engineering Institution, CMES, which is the only national-level academic society for Industrial Engineering. The conference is held annually as the major event in this arena. Being the largest and the most authoritative international academic conference held in China, it provides an academic platform for experts and entrepreneurs in the areas of international industrial engineering and management to exchange their research findings. Many experts in various fields from China and around the world gather together at the conference to review, exchange, summarize and promote their achievements in the fields of industrial engineering and engineering management. For example, some experts pay special attention to the current state of the application of related techniques in China as well as their future prospects, such as green product design, quality control and management, supply chain and logistics management to address the need for, amongst other things low-carbon, energy-saving and emission-reduction. They also offer opinions on the outlook for the development of related techniques. The proceedings offers impressive methods and concrete applications for experts from colleges and universities, research institutions and enterprises who are engaged in theoretical research into industrial engineering and engineering management and its applications. As all the papers are of great value from both an academic and a practical point of view, they also provide research data for international scholars who are investigating Chinese style enterprises and engineering management.

Transactions on HiPEAC aims at the timely dissemination of research contributions in computer architecture and compilation methods for high-performance embedded computer systems. Recognizing the convergence of embedded and general-purpose computer systems, this journal publishes original research on systems targeted at specific computing tasks as well as systems with broad application bases. The scope of the journal therefore covers all aspects of computer architecture, code generation and compiler optimization methods of interest to researchers and practitioners designing future embedded systems. This 5th issue contains extended versions of papers by the best paper award candidates of IC-SAMOS 2009 and the SAMOS 2009 Workshop, colocated events of the 9th International Symposium on Systems, Architectures, Modeling and Simulation, SAMOS 2009, held in Samos, Greece, in 2009. The 7 papers included in this volume were carefully reviewed and selected. The papers cover research on embedded processor hardware/software design and integration and present

challenging research trends.

This textbook serves as an introduction to the subject of embedded systems design, using microcontrollers as core components. It develops concepts from the ground up, covering the development of embedded systems technology, architectural and organizational aspects of controllers and systems, processor models, and peripheral devices. Since microprocessor-based embedded systems tightly blend hardware and software components in a single application, the book also introduces the subjects of data representation formats, data operations, and programming styles. The practical component of the book is tailored around the architecture of a widely used Texas Instrument's microcontroller, the MSP430 and a companion web site offers for download an experimenter's kit and lab manual, along with Powerpoint slides and solutions for instructors.

This book is a compilation of the recent technologies and innovations in the field of automotive embedded systems with a special mention to the role of Internet of Things in automotive systems. The book provides easy interpretable explanations for the key technologies involved in automotive embedded systems. The authors illustrate various diagnostics over internet protocol and over-the-air update process, present advanced driver assistance systems, discuss various cyber security issues involved in connected cars, and provide necessary information about Autosar and Misra coding standards. The book is relevant to academics, professionals, and researchers.

This practically-oriented textbook provides a clear introduction to the different component parts of an operating system and how these work together. The easy-to-follow text covers the bootloader, kernel, filesystem, shared libraries, start-up scripts, configuration files and system utilities. The procedure for building each component is described in detail, guiding the reader through the process of creating a fully functional GNU/Linux embedded OS. Features: presents a concise overview of the GNU/Linux system, and a detailed review of GNU/Linux filesystems; describes how to build an embedded system to run on a virtual machine, and to run natively on an actual processor; introduces the concept of the compiler toolchain, demonstrating how to develop a cross toolchain so that programs can be built on a range of different architectures; discusses the ARM-based platforms BeagleBone and Raspberry Pi; explains how to build OpenWRT firmware images for OMxP Open-mesh devices and the Dragino MS14 series.

This year, the IFIP Working Conference on Distributed and Parallel Embedded Sys tems (DIPES 2008) is held as part of the IFIP World Computer Congress, held in Milan on September 7 10, 2008. The embedded systems world has a great deal of experience with parallel and distributed computing. Many embedded computing systems require the high performance that can be delivered by parallel computing. Parallel and distributed computing are often the only ways to deliver adequate real time performance at low power levels. This year's conference attracted 30 submissions, of which 21 were accepted. Prof. Jor ? g Henkel of the University of Karlsruhe graciously contributed a keynote address on embedded computing and reliability. We would like to thank all of the program committee members for their diligence. Wayne Wolf, Bernd Kleinjohann, and Lisa Kleinjohann Acknowledgements We would like to thank all people involved in the organization of the IFIP World Computer Congress 2008, especially the IPC Co Chairs Judith Bishop and Ivo De Lotto, the Organization Chair Giulio Occhini, as well as the Publications Chair John Impagliazzo. Further thanks go to the authors for their valuable contributions to DIPES 2008. Last but not least we would like to acknowledge the considerable amount of work and enthusiasm spent by our colleague Claudius Stern in preparing theproceedingsofDIPES2008. Hemadeitpossibletoproducethemintheircurrent professional and homogeneous style.

This extensive and increasing use of embedded systems and their integration in everyday products mark a significant evolution in information science and technology. Nowadays embedded systems design is subject to seamless integration with the physical and electronic environment while meeting requirements like reliability, availability, robustness, power consumption, cost, and deadlines. Thus, embedded systems design raises challenging problems for research, such as security, reliable and mobile services, large-scale heterogeneous distributed systems, adaptation, component-based development, and validation and tool-based certification. This book results from the ARTIST FP5 project funded by the European Commision. By integration 28 leading European research institutions with many top researchers in the area, this book assesses and strategically advances the state of the art in embedded systems. The coherently written monograph-like book is a valuable source of reference for researchers active in the field and serves well as an introduction to scientists and professionals interested in learning about embedded systems design.

This book constitutes the thoroughly refereed post-proceedings of the Third International Workshop on Cryptoanalysis Hardware and Embedded Systems, CHES 2001, held in Paris, France in Mai 2001. The 31 revised full papers presented were carefully reviewed and selected from 66 submissions. The papers are organized in topical sections on side channel attacks, Rijndael hardware implementation, random number generators, elliptic curve algorithms, arithmetic architectures, cryptanalysis, embedded implementations of ciphers, and side channel attacks on elliptic curve cryptosystems.

This volume presents the technical program of the 2007 International Embedded Systems Symposium held in Irvine, California. It covers timely topics, techniques and trends in embedded system design, including design methodology, networks-on-chip, distributed and networked systems, and system verification. It places emphasis on automotive and medical applications and includes case studies and special aspects in embedded system design.

This book constitutes the refereed proceedings of the 5th International Workshop on Cryptographic Hardware and Embedded Systems, CHES 2003, held in Cologne, Germany in September 2003. The 32 revised full papers presented were carefully reviewed and selected from 111 submissions. The papers are organized in topical sections on side channel attack methodology, hardware factorization, symmetric cypher attacks and countermeasures, secure hardware logic, random number generators, efficient multiplication, efficient arithmetics, attacks on asymmetric cryptosystems, implementation of symmetric cyphers, hyperelliptic curve cryptography, countermeasures to side channel leakage, and security of standards.

The book provides a bottom-up approach to understanding how a computer works and how to use computing to solve real-world problems. It covers the basics of digital logic through the lens of computer organization and programming. The reader should be able to design his or her own computer from the ground up at the end of the book. Logic simulation with Verilog is used throughout, assembly languages are introduced and discussed, and the fundamentals of computer architecture and embedded systems are touched upon, all in a cohesive design-driven framework suitable for class or self-study.

This book introduces the state-of-the-art in research in parallel and distributed embedded systems, which have been enabled by developments in silicon technology, micro-electro-mechanical systems (MEMS), wireless communications, computer networking, and digital electronics. These systems have diverse applications in domains including military and defense, medical, automotive, and unmanned autonomous vehicles. The emphasis of the book is on the modeling and optimization of emerging parallel and distributed embedded systems in relation to the three key design metrics of performance, power and dependability. Key features: Includes an embedded wireless sensor networks case study to help illustrate the modeling and optimization of distributed embedded systems. Provides an analysis of multi-core/many-core based embedded systems to explain the modeling and optimization of parallel embedded systems. Features an application metrics estimation model; Markov modeling for fault tolerance

and analysis; and queueing theoretic modeling for performance evaluation. Discusses optimization approaches for distributed wireless sensor networks; high-performance and energy-efficient techniques at the architecture, middleware and software levels for parallel multicore-based embedded systems; and dynamic optimization methodologies. Highlights research challenges and future research directions. The book is primarily aimed at researchers in embedded systems; however, it will also serve as an invaluable reference to senior undergraduate and graduate students with an interest in embedded systems research.

Although framework technology has proven its worth as a software reuse technique in many domains, there have been reservations regarding its application in embedded systems, mostly due to limited CPU and memory resources. Recent hardware advances, however, have changed this picture. This book shows how object-oriented software frameworks can be applied to embedded control systems. A case study of a framework using a set of application dependent design patterns for the orbit control system of satellites is presented.