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Algorithms and Protocols for Wireless Sensor

Networks Azzedine Boukerche 2008-11-03 A one-stop resource for the use of algorithms and protocols in wireless sensor networks From an established international researcher in the field, this edited volume provides readers with comprehensive coverage of the fundamental algorithms and protocols for wireless sensor networks. It identifies the research that needs to be conducted on a number of levels to design and assess the deployment of wireless sensor networks, and provides an in-depth analysis of the development of the next generation of heterogeneous wireless sensor networks. Divided into nineteen succinct chapters, the book covers: mobility management and resource allocation algorithms; communication models; energy and power consumption algorithms; performance modeling and simulation; authentication and reputation mechanisms; algorithms for wireless sensor and mesh networks; and algorithm methods for pervasive and ubiquitous computing; among other topics. Complete with a set of challenging exercises, this book is a valuable resource for electrical engineers, computer engineers, network engineers, and computer science specialists. Useful for instructors and students alike, Algorithms and Protocols for Wireless Sensor Networks is an ideal textbook for advanced undergraduate and graduate courses in computer science, electrical engineering,and network engineering.

Decentralized Spatial Computing Matt Duckham 2012-07-27 Computing increasingly happens somewhere, with that geographic location important to the computational process itself. Many new and evolving spatial technologies, such as geosensor networks and smartphones, embody this trend. Conventional approaches to spatial computing are centralized, and do not account for the

inherently decentralized nature of "computing somewhere": the limited, local knowledge of individual system components, and the interaction between those components at different locations. On the other hand, despite being an established topic in distributed systems, decentralized computing is not concerned with geographical constraints to the generation and movement of information. In this context, of (centralized) spatial computing and decentralized (non-spatial) computing, the key question becomes: "What makes decentralized spatial computing special?" In Part I of the book the author covers the foundational concepts, structures, and design techniques for decentralized computing with spatial and spatiotemporal information. In Part II he applies those concepts and techniques to the development of algorithms for decentralized spatial computing, stepping through a suite of increasingly sophisticated algorithms: from algorithms with minimal spatial information about their neighborhoods; to algorithms with access to more detailed spatial information, such as direction, distance, or coordinate location; to truly spatiotemporal algorithms that monitor environments that are dynamic, even using networks that are mobile or volatile. Finally, in Part III the author shows how decentralized spatial and spatiotemporal algorithms designed using the techniques explored in Part II can be simulated and tested. In particular, he investigates empirically the important properties of a decentralized spatial algorithm: its computational efficiency and its robustness to unavoidable uncertainty. Part III concludes with a survey of the opportunities for connecting decentralized spatial computing to ongoing research and emerging hot topics in related fields, such as biologically inspired computing, geovisualization, and stream computing. The book is

written for students and researchers of computer science and geographic information science. Throughout the book the author's style is characterized by a focus on the broader message, explaining the process of decentralized spatial algorithm design rather than the technical details. Each chapter ends with review questions designed to test the reader's understanding of the material and to point to further work or research. The book includes short appendices on discrete mathematics and SQL. Simulation models written in NetLogo and associated source code for all the algorithms presented in the book can be found on the author's accompanying website.

Architecture-Independent Programming for Wireless Sensor Networks Amol B. Bakshi 2008-06-02 New automated, application-independent methodology for designing and deploying sensor networks Following this book's clear explanations, examples, and illustrations, domain experts can design and deploy nontrivial networked sensing applications without much knowledge of the low-level networking aspects of deployment. This new approach is based on the Abstract Task Graph (ATaG), a data-driven programming model and an innovative methodology forarchitecture-independent programming and automatic software synthesis for sensor networks. ATaG programs are concise, understandable, and network-independent descriptions of global application functionality that can be automatically compiled onto any target deployment. The book begins with an overview chapter that addresses the important issues of programming methodologies and compares various programming models for sensor networks. Next, the authors set forth everything you need for designing and deploying sensor networks using

ATaG, including: Detailed description of the ATaG model's features System-level support for architecture-independent programming Examination of the graphical programming and software synthesis environment for ATaG Case study illustrating the process of end-to-end application development and software synthesis using ATaG Throughout the book, the authors provide code excerpts and figures to help clarify key concepts and explain each step. For programmers, the graphical formalism of the ATaG program, coupled with the fact it uses an existing language (Java), means that no special training is needed to start developing and deploying applications in ATaG. Everything you need to know is clearly set forth in this book. *Synchronous data acquisition with wireless sensor networks* Funck, Jürgen Helmut 2018-07-19 Wireless sensor networks (WSN) are predicted to

play a key role in future technological developments like the internet of things. Already they are beginning to be used in many applications not only in the scientific and industrial domains. One of the biggest challenges, when using WSN, is to fuse and evaluate data from different sensor nodes. Synchronizing the data acquisition of the nodes is a key enabling factor for this. So far research has been focused on synchronizing the clocks of the nodes, largely neglecting the implications for the actual measurement results. This thesis investigates the relation between synchronization accuracy and quality of measurement results. Two different classes of time synchronous data acquisition are investigated: event detection and waveform sampling. A model is developed that describes a WSN as a generic multi-channel data acquisition system, thus enabling direct comparison to other existing systems. With the help

of this model it is shown, that synchronization accuracy should best be expressed as uncertainty of the acquired timing information. This way, not only the contribution of the synchronization to the overall measurement uncertainty can be assessed, but also the synchronization accuracy required for an application can be estimated. The insights from the uncertainty analysis are used to develop two distinct approaches to synchronous data acquisition: a proactive and a reactive one. It is shown that the reactive approach can also be used to efficiently implement synchronous angular sampling, i.e. data acquisition synchronous to the rotation of a machine's shaft. Furthermore, testing methods are suggested, that evaluate the synchronized data acquisition of an existing WSN as a whole. These methods can be applied to other data acquisition systems without changes, thus enabling direct comparisons. The practical realization of a WSN is described, on which the developed data acquisition methods have been implemented. All implementations were thoroughly tested in experiments, using the suggested testing methods. This way it was revealed, that a system's interrupt handling procedures may have a strong influence on the data acquisition. Furthermore, it was shown that the effective use of fixed-point arithmetic enables synchronous angular sampling in real-time during a streaming measurement. Finally, two application examples are used to illustrate the utility of the implemented data acquisition: the acoustic localization of two sensor nodes on a straight line and a simple order tracking at an induction motor test bench. Diese Dissertation untersucht die Zusammenhänge zwischen Synchronisationsgenauigkeit und Qualität der Messergebnisse. Zwei Klassen von zeitsynchroner Datenerfassung werden dabei betrachtet: die

Detektion von Ereignissen und die Aufnahme von Kurvenformen. Es wird ein Modell entwickelt, welches ein WSN als ein allgemeines mehrkanaliges Datenerfassungssystem beschreibt. Dies ermöglicht den direkten Vergleich zwischen WSN und anderen Messsystemen. Weiter wird mit Hilfe des Modells gezeigt, dass die Synchronisationsgenauigkeit vorzugsweise als Unsicherheit der Zeitinformation angegeben werden sollte. Hierdurch kann nicht nur der Beitrag der Synchronisation zur gesamten Messunsicherheit bestimmt sondern auch die von einer Anwendung tatsächlich benötigte Synchronisationsgenauigkeit abgeschätzt werden. Ausgehend von den durch die Unsicherheitsbetrachtung gewonnenen Erkenntnissen werden ein proaktiver und ein reaktiver Ansatz zur synchronen Datenaufnahme entwickelt. Mit dem reaktiven Ansatz können

Messdaten auch effizient drehwinkelsynchron, d. h. synchron zur Drehbewegung einer Maschinenwelle, aufgenommen werden. Es werden Testverfahren vorgeschlagen, mit denen sich die Synchronizität der Datenerfassung für ein WSN als Ganzes überprüfen lässt. Diese Verfahren lassen sich unverändert auf andere Messsysteme anwenden und ermöglichen somit direkte Vergleiche. Es wird die praktische Umsetzung eines WSN beschrieben, auf dem die entwickelten Methoden zur Datenerfassung implementiert wurden. Alle Implementierungen wurden mit den vorgeschlagenen Testverfahren untersucht. Hierdurch konnte gezeigt werden, dass die Interrupt-Bearbeitung der Sensorknoten entscheidenden Einfluss auf die Messdatenerfassung hat. Weiter konnte durch den Einsatz von Fixed-Punkt-Arithmetik die drehwinkelsynchrone Datenerfassung in Echtzeit realisiert werden.

Schließlich wird die Nützlichkeit der implementierten Datenerfassung an zwei Anwendungen gezeigt: der akustischen Ortung zweier Sensorknoten sowie einer einfachen Ordnungsanalyse.

Wireless Sensor Networks and Energy Efficiency: Protocols, Routing and Management Zaman, Noor 2012-01-31 "This book focuses on wireless sensor networks and their operation, covering topics including routing, energy efficiency and management"--

Cognitive Sensors and IoT Fadi Al-Turjman 2017-09-22 This book presents the Cognitive Information Centric Sensor Network (CICSN) framework for the IoT. This framework is built on top of cognitive nodes, capable of knowledge representation, learning, and reasoning, along with an information-centric approach for data delivery. It also discusses the most appropriate deployment strategy for these cognitive nodes under realistic assumptions that cares about the Quality of Information (QoI). In addition, it uses a QoI aware data delivery strategy, with Analytic Hierarchy Process (AHP) as the reasoning technique to identify data delivery paths that dynamically adapt to changing network conditions and user requirements.

Algorithmic Aspects of Wireless Sensor Networks Sotiris Nikoletseas 2007-01-26 This book constitutes the reviewed proceedings of the Second International Workshop on Algorithmic Aspects of Wireless Sensor Networks, ALGOSENSORS 2006, held in Venice, Italy in July 2006, in association with ICALP 2006. Topics addressed are foundational and algorithmic aspects of the wireless sensor networks research. In particular, ALGOSENSORS focuses on abstract models, complexity-theoretic results and lower-bounds.

SCADA Security Abdulmohsen Almalawi 2020-12-10 Examines the design and use of Intrusion Detection Systems (IDS) to secure Supervisory Control and Data Acquisition (SCADA) systems Cyber-attacks on SCADA systems—the control system architecture that uses computers, networked data communications, and graphical user interfaces for high-level process supervisory management—can lead to costly financial consequences or even result in loss of life. Minimizing potential risks and responding to malicious actions requires innovative approaches for monitoring SCADA systems and protecting them from targeted attacks. SCADA Security: Machine Learning Concepts for Intrusion Detection and Prevention is designed to help security and networking professionals develop and deploy accurate and effective Intrusion Detection Systems (IDS) for SCADA systems that leverage autonomous machine learning. Providing expert insights, practical advice, and up-to-date coverage of developments in SCADA security, this authoritative guide presents a new approach for efficient unsupervised IDS driven by SCADA-specific data. Organized into eight in-depth chapters, the text first discusses how traditional IT attacks can also be possible against SCADA, and describes essential SCADA concepts, systems, architectures, and main components. Following chapters introduce various SCADA security frameworks and approaches, including evaluating security with virtualization-based SCADAVT, using SDAD to extract proximity-based detection, finding a global and efficient anomaly threshold with GATUD, and more. This important book: Provides diverse perspectives on establishing an efficient IDS approach that can be implemented in SCADA systems Describes the relationship between main components and three

generations of SCADA systems Explains the classification of a SCADA IDS based on its architecture and implementation Surveys the current literature in the field and suggests possible directions for future research SCADA Security: Machine Learning Concepts for Intrusion Detection and Prevention is a must-read for all SCADA security and networking researchers, engineers, system architects, developers, managers, lecturers, and other SCADA security industry practitioners. *Wireless Sensor Networks* Jun Zheng 2009-10-27 Learn the fundamental concepts, major challenges, and effective solutions in wireless sensor networking This book provides a comprehensive and systematic introduction to the fundamental concepts, major challenges, and effective solutions in wireless sensor networking (WSN). Distinguished from other books, it focuses on the networking aspects of WSNs and covers the most important networking issues, including network architecture design, medium access control, routing and data dissemination, node clustering, node localization, query processing, data aggregation, transport and quality of service, time synchronization, network security, and sensor network standards. With contributions from internationally renowned researchers, Wireless Sensor Networks expertly strikes a balance between fundamental concepts and state-of-the-art technologies, providing readers with unprecedented insights into WSNs from a networking perspective. It is essential reading for a broad audience, including academic researchers, research engineers, and practitioners in industry. It is also suitable as a textbook or supplementary reading for electrical engineering, computer engineering, and computer science courses at the graduate level.

Design and Analysis of Distributed Algorithms

Nicola Santoro 2006-11-03 This text is based on a simple and fully reactive computational model that allows for intuitive comprehension and logical designs. The principles and techniques presented can be applied to any distributed computing environment (e.g., distributed systems, communication networks, data networks, grid networks, internet, etc.). The text provides a wealth of unique material for learning how to design algorithms and protocols perform tasks efficiently in a distributed computing environment.
Wireless Sensor And Robot Networks: From Topology Control To Communication Aspects Nathalie Mitton 2013-12-19 Wireless sensor networks have gained much attention these last years thanks to the great set of applications that accelerated the technological advances. Such networks have been widely investigated and many books and articles have been published about the new challenges they pose and how to address them. One of these challenges is node mobility: sensors could be moved unexpectedly if deployed in an uncontrolled environment or hold by moving object/animals.Beyond all this, a new dimension arises when this mobility is controlled, i.e. if these sensors are embedded in robots. These robots cohabit with sensors and cooperate together to perform a given task collectively by presenting hardware constraints: they still rely on batteries; they communicate through short radio links and have limited capacities.In this book, we propose to review new challenges brought about by controlled mobility for different goals and how they are addressed in the literature in wireless sensor and Robot networks, ranging from deployment to communications.
Multi-Objective Optimization in Computational Intelligence: Theory and Practice Thu Bui, Lam

2008-05-31 Multi-objective optimization (MO) is a fast-developing field in computational intelligence research. Giving decision makers more options to choose from using some post-analysis preference information, there are a number of competitive MO techniques with an increasingly large number of MO real-world applications. Multi-Objective Optimization in Computational Intelligence: Theory and Practice explores the theoretical, as well as empirical, performance of MOs on a wide range of optimization issues including combinatorial, real-valued, dynamic, and noisy problems. This book provides scholars, academics, and practitioners with a fundamental, comprehensive collection of research on multi-objective optimization techniques, applications, and practices.

The Internet of Things Hakima Chaouchi 2013-02-04 Internet of Things: Connecting Objects puts forward the technologies and the networking architectures which make it possible to support the Internet of Things. Amongst these technologies, RFID, sensor and PLC technologies are described and a clear view on how they enable the Internet of Things is given. This book also provides a good overview of the main issues facing the Internet of Things such as the issues of privacy and security, application and usage, and standardization.

Synchronization in Wireless Sensor Networks
Erchin Serpedin 2009-07-30 Presents the key clock synchronization protocols, emphasizing design and optimization techniques for building efficient estimation schemes and performance benchmarks.

Hardware-dependent Software Wolfgang Ecker
2009-01-16 Despite its importance, the role of HdS is most often underestimated and the topic is not well represented in literature and education. To address this, Hardware-dependent Software brings together experts from different HdS areas. By providing a

comprehensive overview of general HdS principles, tools, and applications, this book provides adequate insight into the current technology and upcoming developments in the domain of HdS. The reader will find an interesting text book with self-contained introductions to the principles of Real-Time Operating Systems (RTOS), the emerging BIOS successor UEFI, and the Hardware Abstraction Layer (HAL). Other chapters cover industrial applications, verification, and tool environments. Tool introductions cover the application of tools in the ASIP software tool chain (i.e. Tensilica) and the generation of drivers and OS components from C-based languages. Applications focus on telecommunication and automotive systems.

Handbook of Position Location Reza Zekavat 2011-09-09 Radio systems capable of localization have emerging applications inhomeland security, law enforcement, emergency response, defensecommand and control, multi-robot coordination andvehicle-to-vehicle and vehicle-to-pedestrian collision avoidance.In fact, high resolution localization is vital for manyapplications, including: traffic alert, emergency services, e.g.,indoor localization for firefighters, and battlefield command andcontrol. These systems promise to dramatically reduce society'svulnerabilities to catastrophic events and improve its quality ofof life. While work this important area is progressing, limited resourcesare available to support graduate students and researchers in thisimportant area. Specifically, a limited number of books has beenpublished in this area covering selected subjects. Thiscomprehensive handbook offers gaps of available localization bookspresenting in-depth coverage from fundamentals of coordinates toadvanced application examples.

Wireless Sensor Networks Mohamed Ibnkahla 2017-12-19 With classical techniques for data transmission soon reaching their limitations, cognitive approaches may offer a solution to user requirements for better coverage, connectivity, security, and energy efficiency at lower cost. Wireless Sensor Networks: A Cognitive Perspective presents a unified view of the state of the art of cognitive approaches in telecommunications. A benchmark in the field, it brings together research that has previously been scattered throughout conference and journal papers. Cutting-Edge Topics in Cognitive Communications After a review of the cognitive concept and approaches, the book outlines a generic architecture for cognition in wireless sensor networks. It then targets specific issues that need to be addressed through cognition, from cognitive radio and spectrum access to routing protocols. The book also explores how to use weighted cognitive maps to improve network lifetime through optimizing routing, medium access, and power control while fulfilling end-to-end goals. The final chapter discusses the implementation of hardware for GPS/INS-enabled wireless sensor networks. This addresses an important need for real-time node position information in many wireless sensor network applications and communication protocols. Real-World Applications of Wireless Sensor Networks using the Cognitive Concept Written in a tutorial style, the book supplies an in-depth survey of each topic, accompanied by detailed descriptions of the algorithms and protocols. It also provides a step-by-step analysis of the various communications systems through extensive computer simulations and illustrations. Examples cover environmental monitoring, vehicular communications, tracking, and more. A comprehensive overview of cognitive

communications in wireless sensor networks, this work lays the foundations for readers to participate in a new era of research in this emerging field.

Wireless Ad Hoc Networking Shih-Lin Wu 2007-03-28 The rapid progress of mobile, wireless communication and embedded micro-sensing MEMS technologies has brought about the rise of pervasive computing. Wireless local-area networks (WLANs) and wireless personal-area networks (WPANs) are now common tools for many people, and it is predicted that wearable sensor networks will greatly improve everyday life as we know it. By integrating these technologies into a pervasive system, we can access information and use computing resources anytime, anywhere, and with any device. Wireless Ad Hoc Networking: Personal-Area, Local-Area, and the Sensory-Area Networks covers these key technologies used in wireless ad hoc networks. The book is divided into three parts, each providing self-contained chapters written by international experts. Topics include networking architectures and protocols, cross-layer architectures, localization and location tracking, time synchronization, QoS and real-time, security and dependability, applications, modeling and performance evaluation, implementation and experience, and much more. The book is novel in its single source presentation of ad hoc networking and related key technologies and applications over the platforms of personal area, sensory area, and local area networks. It is a valuable resource for those who work in or are interested in learning about the pervasive computing environment.

Underwater Acoustic Sensor Networks Yang Xiao 2010-05-19 A detailed review of underwater channel characteristics, Underwater Acoustic Sensor Networks investigates the fundamental aspects of underwater communication. Prominent researchers

from around the world consider contemporary challenges in the development of underwater acoustic sensor networks (UW-ASNs) and introduce a cross-layer approach for effective integration of all communication functionalities. Discussing architectures for two- and three-dimensional sensor networks, this authoritative resource clearly delineates the main differences between terrestrial and underwater sensor networks—covering the wide range of topics related to UW-ASNs. It examines efficient distributed routing algorithms for delay-insensitive and delay-sensitive applications and introduces a realistic acoustic model characterized by channel utilization efficiency that enables proper setting of the optimal packet size for underwater communication. It also: Provides efficient sensor communication protocols for the underwater environment Addresses the topology control problem for sparse and dense 3D networks

Presents a novel distributed MAC protocol that incorporates a unique closed-loop distributed algorithm for setting the optimal transmit power and code length The book includes coverage of routing, fault tolerance, time synchronization, optimal clustering, medium access control, software, hardware, and channel modeling. Exploring the need to design an energy-efficient cross-layer protocol suite, this resource provides the understanding required to achieve high-performance channel access, routing, event transport reliability, and data flow control with underwater acoustic sensors.

Guide to Wireless Sensor Networks Sudip Misra 2009-05-29 Overview and Goals Wireless communication technologies are undergoing rapid advancements. The last few years have experienced a steep growth in research in the area of wireless sensor networks (WSNs). In WSNs, communication

takes place with the help of spatially distributedautonomoussensornodesequippedtosenses peci?cinformation. WSNs, especially the ones that have gained much popularity in the recent years, are, ty- cally, ad hoc in nature and they inherit many characteristics/features of wireless ad hoc networks such as the ability for infrastructure-less setup, minimal or no reliance on network planning, and the ability of the nodes to self-organize and self-con?gure without the involvement of a centralized network manager, router, access point, or a switch. These features help to set up WSNs fast in situations where there is no existing network setup or in times when setting up a ?xed infrastructure network is considered infeasible, for example, in times of emergency or during relief - erations. WSNs ?nd a variety of applications in both the military and the civilian population worldwide such as in cases of enemy intrusion in the battle?eld, object tracking, habitat monitoring, patient monitoring, ?re detection, and so on. Even though sensor networks have emerged to be attractive and they hold great promises for our future, there are several challenges that need to be addressed. Some of the well-known challenges are attributed to issues relating to coverage and deployment, scalability, quality-of-service, size, computational power, energy ef?ciency, and security.

Sensor and Ad-Hoc Networks S. Kami Makki 2010-03-14 This book brings together leading researchers and developers in the field of wireless sensor networks to explain the special problems and challenges of the algorithmic aspects of sensor and ad-hoc networks. The book also fosters communication not only between the different sensor and ad-hoc communities, but also between those communities and the distributed systems and information systems communities. The topics

addressed pertain to the sensors and mobile environment.

Mobile Ad-hoc and Sensor Networks Hongke

Zhang 2007-11-19 This book constitutes the refereed proceedings of the Third International Conference on Mobile Ad-hoc and Sensor Networks, MSN 2007, held in Beijing, China, in December 2007. The papers address all current issues in mobile ad hoc and sensor networks and are organized in topical sections on routing, network protocols, energy efficiency, data processing, self-organization and synchronization, deployment and application, as well as security.

Encyclopedia of Computer Science and Technology

Phillip A. Laplante 2017-10-02 With breadth and depth of coverage, the Encyclopedia of Computer Science and Technology, Second Edition has a multi-disciplinary scope, drawing together comprehensive coverage of the inter-related aspects of computer science and technology. The topics covered in this encyclopedia include: General and reference Hardware Computer systems organization Networks Software and its engineering Theory of computation Mathematics of computing Information systems Security and privacy Human-centered computing Computing methodologies Applied computing Professional issues Leading figures in the history of computer science The encyclopedia is structured according to the ACM Computing Classification System (CCS), first published in 1988 but subsequently revised in 2012. This classification system is the most comprehensive and is considered the de facto ontological framework for the computing field. The encyclopedia brings together the information and historical context that students, practicing professionals, researchers, and academicians need to have a strong and solid foundation in all aspects of computer science and

technology.

Agent and Multi-Agent Systems: Technologies and Applications Piotr Jedrzejowicz 2010-06-09 This book constitutes the proceedings of the 4th KES International Symposium on Agent and Multi-Agent Systems, KES-AMSTA 2010, held in June 2010 in Gdynia, Poland. The discussed field is concerned with the development and analysis of AI-based problem-solving and control architectures for both single-agent and multiple-agent systems. Only 83 papers were selected for publication in both volumes which focus on topics such as: Multi-Agent Systems Design and Implementation, Negotiations and Social Issues, Web Services and Semantic Web, Cooperation, Coordination and Teamwork, Agent-Based Modeling, Simulation and Decision Making, Multi-Agent Applications, Management and e-Business, Mobile Agents and Robots, and Machine Learning.

Wireless Sensor and Actuator Networks Amiya Nayak 2010-02-12 This timely book offers a mixture of theory, experiments, and simulations that provides qualitative and quantitative insights in the field of sensor and actuator networking. The chapters are selected in a way that makes the book comprehensive and self-contained. It covers a wide range of recognized problems in sensor networks, striking a balance between theoretical and practical coverage. The book is appropriate for graduate students and practitioners working as engineers, programmers, and technologists.

Localization Algorithms and Strategies for Wireless Sensor Networks: Monitoring and Surveillance Techniques for Target Tracking Mao, Guoqiang 2009-05-31 Wireless localization techniques are an area that has attracted interest from both industry and academia, with self-localization capability providing a highly desirable characteristic of

wireless sensor networks. Localization Algorithms and Strategies for Wireless Sensor Networks encompasses the significant and fast growing area of wireless localization techniques. This book provides comprehensive and up-to-date coverage of topics and fundamental theories underpinning measurement techniques and localization algorithms. A useful compilation for academicians, researchers, and practitioners, this Premier Reference Source contains relevant references and the latest studies emerging out of the wireless sensor network field.

Theoretical Aspects of Distributed Computing in Sensor Networks Sotiris Nikoletseas 2011-01-15

Wireless ad hoc sensor networks has recently become a very active research subject. Achieving efficient, fault-tolerant realizations of very large, highly dynamic, complex, unconventional networks is a real challenge for abstract modelling, algorithmic design and analysis, but a solid foundational and theoretical background seems to be lacking. This book presents high-quality contributions by leading experts worldwide on the key algorithmic and complexity-theoretic aspects of wireless sensor networks. The intended audience includes researchers and graduate students working on sensor networks, and the broader areas of wireless networking and distributed computing, as well as practitioners in the relevant application areas. The book can also serve as a text for advanced courses and seminars.

High Performance Heterogeneous Computing Jack Dongarra 2009-08-11 An analytical overview of the state of the art, open problems, and future trends in heterogeneous parallel and distributed computing This book provides an overview of the ongoing academic research, development, and uses of heterogeneous parallel and distributed computing in

the context of scientific computing. Presenting the state of the art in this challenging and rapidly evolving area, the book is organized in five distinct parts: Heterogeneous Platforms: Taxonomy, Typical Uses, and Programming Issues Performance Models of Heterogeneous Platforms and Design of Heterogeneous Algorithms Performance: Implementation and Software Applications Future Tre High Performance Heterogeneous Computing is a valuable¿reference for researchers and practitioners in the area of high performance heterogeneous computing. It also serves as an excellent supplemental text for graduate and postgraduate courses in related areas.

High-Performance Computing on Complex Environments Emmanuel Jeannot 2014-04-10 With recent changes in multicore and general-purpose computing on graphics processing units, the way parallel computers are used and programmed has drastically changed. It is important to provide a comprehensive study on how to use such machines written by specialists of the domain. The book provides recent research results in high-performance computing on complex environments, information on how to efficiently exploit heterogeneous and hierarchical architectures and distributed systems, detailed studies on the impact of applying heterogeneous computing practices to real problems, and applications varying from remote sensing to tomography. The content spans topics such as Numerical Analysis for Heterogeneous and Multicore Systems; Optimization of Communication for High Performance Heterogeneous and Hierarchical Platforms; Efficient Exploitation of Heterogeneous Architectures, Hybrid CPU+GPU, and Distributed Systems; Energy Awareness in High-Performance Computing; and Applications of Heterogeneous High-Performance Computing. •

Covers cutting-edge research in HPC on complex environments, following an international collaboration of members of the ComplexHPC • Explains how to efficiently exploit heterogeneous and hierarchical architectures and distributed systems • Twenty-three chapters and over 100 illustrations cover domains such as numerical analysis, communication and storage, applications, GPUs and accelerators, and energy efficiency
Principles of Wireless Sensor Networks Mohammad S. Obaidat 2014-12-04 Wireless sensor networks are an emerging technology with a wide range of applications in military and civilian domains. The book begins by detailing the basic principles and concepts of wireless sensor networks, including information gathering, energy management and the structure of sensory nodes. It proceeds to examine advanced topics, covering localisation, topology, security and evaluation of wireless sensor networks, highlighting international research being carried out in this area. Finally, it features numerous examples of applications of this technology to a range of domains, such as wireless, multimedia, underwater and underground wireless sensor networks. The concise but clear presentation of the important principles, techniques and applications of wireless sensor networks makes this guide an excellent introduction for anyone new to the subject, as well as an ideal reference for practitioners and researchers.
The Art of Wireless Sensor Networks Habib M. Ammari 2013-12-13 During the last one and a half decades, wireless sensor networks have witnessed significant growth and tremendous development in both academia and industry. "The Art of Wireless Sensor Networks: Volume 1: Fundamentals" focuses on the fundamentals concepts in the design, analysis, and implementation of wireless sensor

networks. It covers the various layers of the lifecycle of this type of network from the physical layer up to the application layer. Its rationale is that the first volume covers contemporary design issues, tools, and protocols for radio-based two-dimensional terrestrial sensor networks. All the book chapters in this volume include up-to-date research work spanning various classic facets of the physical properties and functional behavior of wireless sensor networks, including physical layer, medium access control, data routing, topology management, mobility management, localization, task management, data management, data gathering, security, middleware, sensor technology, standards, and operating systems. This book will be an excellent source of information for both senior undergraduate and graduate students majoring in computer science, computer engineering, electrical engineering, or any related discipline. In addition, computer scientists, researchers, and practitioners in both academia and industry will find this book useful and interesting.

Distributed Graph Algorithms for Computer Networks Kayhan Erciyes 2013-05-16 This book presents a comprehensive review of key distributed graph algorithms for computer network applications, with a particular emphasis on practical implementation. Topics and features: introduces a range of fundamental graph algorithms, covering spanning trees, graph traversal algorithms, routing algorithms, and self-stabilization; reviews graph-theoretical distributed approximation algorithms with applications in ad hoc wireless networks; describes in detail the implementation of each algorithm, with extensive use of supporting examples, and discusses their concrete network applications; examines key graph-theoretical algorithm concepts, such as dominating sets, and

parameters for mobility and energy levels of nodes in wireless ad hoc networks, and provides a contemporary survey of each topic; presents a simple simulator, developed to run distributed algorithms; provides practical exercises at the end of each chapter.

Wireless Sensor Networks Rastko R. Selmic 2016-11-02 This book presents a comprehensive overview of wireless sensor networks (WSNs) with an emphasis on security, coverage, and localization. It offers a structural treatment of WSN building blocks including hardware and protocol architectures and also provides a systems-level view of how WSNs operate. These building blocks will allow readers to program specialized applications and conduct research in advanced topics. A brief introductory chapter covers common applications and communication protocols for WSNs. Next, the authors review basic mathematical models such as

Voroni diagrams and Delaunay triangulations. Sensor principles, hardware structure, and medium access protocols are examined. Security challenges ranging from defense strategies to network robustness are explored, along with quality of service measures. Finally, this book discusses recent developments and future directions in WSN platforms. Each chapter concludes with classroom-tested exercises that reinforce key concepts. This book is suitable for researchers and for practitioners in industry. Advanced-level students in electrical engineering and computer science will also find the content helpful as a textbook or reference.

Industrial Wireless Sensor Networks R Budampati 2015-10-23 Industrial Wireless Sensor Networks: Monitoring, Control and Automation explores the explosive growth that has occurred in the use of wireless sensor networks in a variety of applications during the last few years. As wireless technology

can reduce costs, increase productivity, and ease maintenance, the book looks at the progress in standardization efforts regarding reliability, security, performance, power consumption, and integration. Early sections of the book discuss issues such as media access control (MAC), antenna design and site survey, energy harvesting, and explosion-proof design. Subsequent sections present WSN standards, including ISA100, ZigBeeTM, WifiTM, WirelessHARTTM and 6loWPAN, and the applications of WSNs in the oil and gas, chemical, food, and nuclear power industries. Reviews technologies and standards for industrial wireless sensor networks Considers particular applications for the technology and their ability to reduce costs, increase productivity, and ease maintenance Focuses on industry needs and standardization efforts regarding reliability, security, performance, power consumption, and integration.

NETWORKING 2012 Robert Bestak 2012-05-16 The two-volume set LNCS 7289 and 7290 constitutes the refereed proceedings of the 11th International IFIP TC 6 Networking Conference held in Prague, Czech Republic, in May 2012. The 64 revised full papers presented were carefully reviewed and selected from a total of 225 submissions. The papers feature innovative research in the areas of network architecture, applications and services, next generation Internet, wireless and sensor networks, and network science. The second volume includes 32 papers and is organized in topical sections on video streaming, peer to peer, interdomain, security, cooperation and collaboration, DTN and wireless sensor networks, and wireless networks.

Handbook of Sensor Networks Ivan Stojmenovic 2005-10-03 The State Of The Art Of Sensor Networks Written by an international team of

recognized experts in sensor networks from prestigious organizations such as Motorola, Fujitsu, the Massachusetts Institute of Technology, Cornell University, and the University of Illinois, Handbook of Sensor Networks: Algorithms and Architectures tackles important challenges and presents the latest trends and innovations in this growing field. Striking a balance between theoretical and practical coverage, this comprehensive reference explores a myriad of possible architectures for future commercial, social, and educational applications, and offers insightful information and analyses of critical issues, including: * Sensor training and security * Embedded operating systems * Signal processing and medium access * Target location, tracking, and sensor localization * Broadcasting, routing, and sensor area coverage * Topology construction and maintenance * Data-centric protocols and data gathering * Time synchronization and calibration *

Energy scavenging and power sources With exercises throughout, students, researchers, and professionals in computer science, electrical engineering, and telecommunications will find this an essential read to bring themselves up to date on the key challenges affecting the sensors industry. **Ad Hoc Networks** Jun Zhi-zhong 2013-04-22 This book constitutes the thoroughly refereed proceedings of the fourth International Conference on Ad Hoc Networks, ADHOCNETS 2012, held in Paris, France, in October 2012. The 18 revised full papers presented were carefully selected and reviewed from 43 submissions. These – and 6 invited papers now cover and even broader scope, referring to many types of autonomous wireless networks designed and deployed for a specific task or function, such as wireless sensor networks, vehicular networks, and home networks. They are organized in topical sections on MAC and PHY

layers, localization and position-based protocols in WSNs, resource allocations and cognitive radio, key, service and caching management, network architectures and frameworks, and mobility and disconnection management.

Wireless Communications Networks for the Smart Grid Quang-Dung Ho 2014-09-19 This brief presents a comprehensive review of the network architecture and communication technologies of the smart grid communication network (SGCN). It then studies the strengths, weaknesses and applications of two promising wireless mesh routing protocols that could be used to implement the SGCN. Packet transmission reliability, latency and robustness of these two protocols are evaluated and compared by simulations in various practical SGCN scenarios. Finally, technical challenges and open research opportunities of the SGCN are addressed. Wireless Communications Networks for Smart Grid provides communication network architects and engineers with valuable proven suggestions to successfully implement the SGCN. Advanced-level students studying computer science or electrical engineering will also find the content helpful.

Recent Trends in Networks and Communications Natarajan Meghanathan 2010-07-24 The Second International Conference on Networks and Communications (NeCoM 2010), the Second International Conference on Wireless and Mobile Networks (WiMoN 2010), and the Second International Conference on Web and Semantic Technology (WeST 2010) were held in Chennai, India, during July 23–25, 2010. They attracted many local and int- national delegates, presenting a balanced mixture of intellects from the East and from the West. The goal of these conferences is to bring together researchers and practitioners from academia and industry to focus on understanding

computer networks, wireless networks, mobile networks and the Web, semantic technologies and to establish new collaborations in these areas. Authors are invited to contribute to the conference by submitting articles that illustrate research results, projects, survey work and industrial experiences describing significant advances in the areas of all computer networks and Semantic Web technologies. The NeCoM 2010, WiMoN 2010 and WeST 2010 committees rigorously invited submissions for many months from researchers, scientists, engineers, students and practitioners related to the relevant themes and tracks of the workshop. This effort guaranteed submissions from an unparalleled number of internationally recognized top-level researchers. All the submissions underwent a strenuous peer-review process which comprised expert reviewers. These reviewers were selected from a talented pool of Technical Committee members and external reviewers on the basis of their expertise. The papers were then reviewed based on their contributions, technical c- tent, originality and clarity.

Algorithms and Protocols for Wireless and Mobile Ad Hoc Networks Azzedine Boukerche 2009 Focuses on several aspects of wireless ad hoc networks, particularly algorithmic methods and distributed computing with mobility and computation capability. This book provides the crucial building foundation for the design and construction of the future generation of ad hoc networks.