Building Wireless Sensor Networks With Zigbee Xbee Arduino And Processing

Wireless Sensor Networks Wireless Sensor Networks *Body Sensor Networks* Wireless Sensor Networks **Wireless Sensor Networks** Mission-Oriented Sensor Networks and Systems: Art and Science **Beginning Sensor Networks with XBee, Raspberry Pi, and Arduino** Wireless Sensor Networks **Protocols and Architectures for Wireless Sensor Networks Sensor Networks and Configuration** Wireless Sensor Networks: Technology, Protocols, And Applications Fundamentals of Wireless Sensor Networks **Beginning Sensor Networks with Arduino and Raspberry Pi Intelligent Sensor Networks** *Sensor Networks for Sustainable Development* Wireless Sensor Networks **Randomly Deployed Wireless Sensor Networks** Principles of Wireless Sensor Networks **Wireless Sensor Networks** Healthcare Sensor Networks Fundamentals of Sensor Network Programming Computational Intelligence in Sensor Networks Problem Solving for Wireless sensor Networks **Wireless Sensor Networks** Energy-Efficient Wireless Sensor Networks **Wireless Sensor Networks** Building Sensor Networks *Wireless Sensor Networks* Handbook of Sensor Networks **Sensor Networks with IEEE 802.15.4 Systems** *Wireless Sensor Networks* **Algorithmic Aspects of Wireless Sensor Networks** Co-operative and Energy Efficient Body Area and Wireless Sensor Networks for Healthcare Applications *Wireless Sensor Networks* Wireless Sensor Networks *Energy Scavenging for Wireless Sensor Networks* **Beginning Sensor Networks with Arduino and Raspberry Pi** *Optimal Coverage in Wireless Sensor Networks* **A Complete Guide to Wireless Sensor Networks** Wireless Sensor Networks

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Comprehending as capably as deal even more than other will manage to pay for each success. bordering to, the declaration as capably as perception of this Building Wireless Sensor Networks With Zigbee Xbee Arduino And Processing can be taken as competently as picked to act.

Sensor Networks for Sustainable Development Aug 20 2021 Recent advances in technology and manufacturing have made it possible to create small, powerful, energy-efficient, cost-effective sensor nodes for specialized telecommunication applications—nodes "smart" enough to be capable of adaptation, self-awareness, and self-organization. Sensor Networks for Sustainable Development examines sensor network technologies that increase the quality of human life and encourage societal progress with minimal effect on the earth's natural resources and environment. Organized as a collection of articles authored by leading experts in the field, this valuable reference captures the current state of the art and explores applications where sensor networks are used for sustainable development in: Agriculture Environment Energy Healthcare Transportation Disaster management Beneficial to designers and planners of emerging telecommunication networks, researchers in related industries, and students and academia seeking to learn about the impact of sensor networks on sustainable development, Sensor Networks for Sustainable Development provides scientific tutorials and technical information about smart sensor networks and their use in everything from remote patient monitoring to improving safety on the roadways and beyond.

Principles of Wireless Sensor Networks May 17 2021 A concise and clear guide to the concepts and applications of wireless sensor networks, ideal for students, practitioners and researchers.

Wireless Sensor Networks Jan 01 2020 A wireless sensor network (WSN) uses a number of autonomous devices to cooperatively monitor physical or environmental conditions via a wireless network. Since its military beginnings as a means of battlefield surveillance, practical use of this technology has extended to a range of civilian applications including environmental monitoring, natural disaster prediction and relief, health monitoring and fire detection. Technological advancements, coupled with lowering costs, suggest that wireless sensor networks will have a significant impact on 21st century life. The design of wireless sensor networks requires consideration of several disciplines such as distributed signal processing, communications and cross-layer design. Wireless Sensor Networks: Signal Processing and Communications focuses on the theoretical aspects of wireless sensor networks and offers readers signal processing and communication perspectives on the design of large-scale networks. It explains state-of-the-art design theories and techniques to readers and places emphasis on the fundamental properties of large-scale sensor networks. Wireless Sensor Networks: Signal Processing and Communications : Approaches WSNs from a new angle – distributed signal processing, communication algorithms and novel cross-layer design paradigms. Applies ideas and illustrations from classical theory to an emerging field of WSN applications. Presents important analytical tools for use in the design of application-specific WSNs. Wireless Sensor Networks will be of use to signal processing and communications researchers and practitioners in applying classical theory to network design. It identifies research directions for senior undergraduate and graduate students and offers a rich bibliography for further reading and investigation.

Mission-Oriented Sensor Networks and Systems: Art and Science May 29 2022 This book discusses topics in mission-oriented sensor networks and systems research and practice, enabling readers to understand the major technical and application challenges of these networks, with respect to their architectures, protocols, algorithms, and application design. It also presents novel theoretical and practical ideas, which have led to the development of solid foundations for the design, analysis, and implementation of energy-efficient, reliable, and secure mission-oriented sensor network applications. Covering various topics, including sensor node architecture, sensor deployment, mobile coverage, mission assignment, detection, localization, tracking, data dissemination, data fusion, topology control, geometric routing, location privacy, secure communication, and cryptograph, it is a valuable resource for computer scientists, researchers, and practitioners in academia and industry.

Wireless Sensor Networks: Technology, Protocols, And Applications Dec 24 2021 This book is intended to be a high-quality textbook that provides a carefully designed exposition of the important aspects of Wireless Sensor Networks. The book provides a thorough coverage of wireless sensor networks, including applications, communication and networking protocols, middleware, security and management. The book is targeted at networking professionals, managers, and practitioners, and government agencies who want to understand the benefits of this new technology and plan for its use and deployment. " Chapter 1. Introduction and Overview of Wireless Sensor Networks." Chapter 2. Commercial and Scientific Applications of Wireless Sensor Networks." Chapter 3. Basic Wireless Sensor Technology." Chapter 4. Wireless Sensors Networks Protocols: Physical Layer." Chapter 5. Medium Access Control Protocols for Wireless Sensor Networks." Chapter 6. Sensors Network Protocols: Routing Protocols." Chapter 7. Transport Control Protocols for Wireless Sensors Networks." Chapter 8. Middleware for Sensor Networks." Chapter 9. Network Management for Wireless Sensor Networks." Chapter 10. Operating Systems for Sensor Networks." Chapter 11. Performance and Traffic Management Issues.

Handbook of Sensor Networks Jun 05 2020 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.

A Complete Guide to Wireless Sensor Networks Jul 27 2019 This book provides comprehensive coverage of the major aspects in designing, implementing, and deploying wireless sensor networks by discussing present research on WSNs and their applications in various disciplines. It familiarizes readers with the current state of WSNs and how such networks can be improved to achieve effectiveness and efficiency. It starts with a detailed introduction of wireless sensor networks and their applications and proceeds with layered architecture of WSNs. It also addresses prominent issues such as mobility, heterogeneity, fault-tolerance, intermittent connectivity, and cross layer optimization along with a number of existing solutions to stimulate future research.

Wireless Sensor Networks Nov 30 2019 Wireless Sensor Networks presents the latest practical solutions to the design issues presented in wireless-sensor-network-based systems. Novel features of the text, distributed throughout, include workable solutions, demonstration systems and case studies of the design and application of wireless sensor networks (WSNs) based on the first-hand research and development experience of the author, and the chapters on real applications: building fire safety protection; smart home automation; and logistics resource management. Case studies and applications illustrate the practical perspectives of: · sensor node design; · embedded software design; · routing algorithms; · sink node positioning; · co-existence with other wireless systems; · data fusion; · security; · indoor location tracking; · integrating with radio-frequency identification; and · Internet of things Wireless Sensor Networks brings together multiple strands of research in the design of WSNs, mainly from software engineering, electronic engineering, and wireless communication perspectives, into an over-arching examination of the subject, benefiting students, field engineers, system developers and IT professionals. The contents have been well used as the teaching material of a course taught at postgraduate level in several universities making it suitable as an advanced text book and a reference book for final-year undergraduate and postgraduate students.

Optimal Coverage in Wireless Sensor Networks Aug 27 2019 This book will serve as a reference, presenting state-of-the-art research on theoretical aspects of optimal sensor coverage problems. Readers will find it a useful tool for furthering developments on theory and applications of optimal coverage; much of the content can serve as material for advanced topics courses at the graduate level. The book is well versed with the hottest research topics such as Lifetime of Coverage, Weighted Sensor Cover, k-Coverage, Heterogeneous Sensors, Barrier, Sweep and Partial Coverage, Mobile Sensors, Camera Sensors and Energy-Harvesting Sensors, and more. Topics are introduced in a natural order from simple covers to connected covers, to the lifetime problem. Later, the book begins revisiting earlier problems ranging from the introduction of weights to coverage by k sensors and partial coverage, and from sensor heterogeneity to novel problems such as the barrier coverage problem. The book ends with coverage of mobile sensors, camera sensors, energy-harvesting sensors, underwater sensors, and crowdsensing.

Body Sensor Networks Sep 01 2022 The last decade has witnessed a rapid surge of interest in new sensing and monitoring devices for wellbeing and healthcare. One key development in this area is wireless, wearable and implantable in vivo monitoring and intervention. A myriad of platforms are now available from both academic institutions and commercial organisations. They permit the management of patients with both acute and chronic symptoms, including diabetes, cardiovascular diseases, treatment of epilepsy and other debilitating neurological disorders. Despite extensive developments in sensing technologies, there are significant research issues related to system integration, sensor miniaturisation, low-power sensor interface, wireless telemetry and signal processing. In the 2nd edition of this popular and authoritative reference on Body Sensor Networks (BSN), major topics related to the latest technological developments and potential clinical applications are discussed, with contents covering. Biosensor Design, Interfacing and Nanotechnology Wireless Communication and Network Topologies Communication Protocols and Standards Energy Harvesting and Power Delivery Ultra-low Power Bio-inspired Processing Multi-sensor Fusion and Context Aware Sensing Autonomic Sensing Wearable, Ingestible Sensor Integration and Exemplar Applications System Integration and Wireless Sensor Microsystems The book also provides a comprehensive review of the current wireless sensor development platforms and a step-by-step guide to developing your own BSN applications through the use of the BSN development kit.

Co-operative and Energy Efficient Body Area and Wireless Sensor Networks for Healthcare Applications Jan 31 2020 With the advances in small and low-cost radio transceivers and RF front-ends development, the possibility of applying ubiquitous and non-invasive sensors integrated into user's daily clothing and living activities seems more feasible. The ability to share data increases the usefulness of personal information devices, providing features not possible with independent isolated devices. Current wireless sensor solutions are limited in that they do not provide the means to overcome obstacles and shadowing of propagating radio waves. Thus for reliable communications an increase in power consumption is required, reducing battery life. This book addresses the limitations outlined above by designing efficient and compact antenna systems. These systems will be cooperative and also aware of the surrounding environment and neighboring units, providing efficient and low power wireless connectivity for personal area network (PAN) and body area network (BAN) applications. Analysis of wearable antenna design and performance Addresses the Influence of body-worn antennas on radio channels and radio device performance from a power and error rate perspective. Cooperative networking principles applied to body area networks, showing the pros and cons of such concepts Real life case scenarios using ECG sample signals for potential application to healthcare monitoring.

Wireless Sensor Networks Jul 31 2022 This book presents an in-depth study on the recent advances in Wireless Sensor Networks (WSNs). The authors describe the existing WSN applications and discuss the research efforts being undertaken in this field. Theoretical analysis and factors influencing protocol design are also highlighted. The authors explore state-of-the-art protocols for WSN protocol stack in transport, routing, data link, and physical layers. Moreover, the synchronization and localization problems in WSNs are investigated along with existing solutions. Furthermore, cross-layer solutions are described. Finally, developing areas of WSNs including sensor-actor networks, multimedia sensor networks, and WSN applications in underwater and underground environments are explored. The book is written in an accessible, textbook style, and includes problems and solutions to assist learning. Key Features: The ultimate guide to recent advances and research into WSNs Discusses the most important problems and issues that arise when programming and designing WSN systems Shows why the unique features of WSNs – self-organization, cooperation, correlation -- will enable new applications that will provide the end user with intelligence and a better understanding of the environment Provides an overview of the existing evaluation approaches for WSNs including physical testbeds and software simulation environments Includes examples and learning exercises with a solutions manual; supplemented by an accompanying website containing PPT-slides. Wireless Sensor Networks is an essential textbook for advanced students on courses in wireless communications, networking and computer science. It will also be of interest to researchers, system and chip designers, network planners, technical mangers and other professionals in these fields.

Problem Solving for Wireless Sensor Networks Dec 12 2020 Problem Solving for Wireless Sensor Networks delivers a comprehensive review of the state of the art in the most important technological issues related to Wireless Sensor Networks (WSN). It covers topics such as hardware platforms, radio technologies, software technologies (including middleware), and network and deployment aspects. This book discusses the

main open issues inside each of these categories and identifies innovations considered most interesting for future research. Features: - Hardware Platforms in WSN, - Software Technologies in SWN, - Network Aspects and Deployment in WSN, - Standards and Safety Regulation for WSN, - European Projects Related to WSN, - WSN Application Scenarios at both utility and technical levels. Complete, cutting-edge and resulting from the work of many recognized researchers, Problem Solving for Wireless Sensor Networks is an invaluable reference for graduates and researchers, as well as practitioners.

Sensor Networks with IEEE 802.15.4 Systems May 05 2020 This book presents a simple, yet complete, approach to the design and performance analysis of distributed processing algorithms and techniques suitable for IEEE 802.15.4 networks. In particular, the book focuses on the bottom two layers of the ISO/OSI stack (Physical and Medium Access Control), discussing also a few issue related to routing. The book is a the synergistic combination of signal processing aspects on the one hand and MAC and connectivity issues on the other hand. The goal of the book is to clearly link physical layer aspects with medium access and topology aspects, in order to provide the reader with a clear understanding of how to approach the design of proper distributed signal processing and medium access algorithms in this context.

Fundamentals of Wireless Sensor Networks Nov 22 2021 In this book, the authors describe the fundamental concepts and practical aspects of wireless sensor networks. The book provides a comprehensive view to this rapidly evolving field, including its many novel applications, ranging from protecting civil infrastructure to pervasive health monitoring. Using detailed examples and illustrations, this book provides an inside track on the current state of the technology. The book is divided into three parts. In Part I, several node architectures, applications and operating systems are discussed. In Part II, the basic architectural frameworks, including the key building blocks required for constructing large-scale, energy-efficient sensor networks are presented. In Part III, the challenges and approaches pertaining to local and global management strategies are presented – this includes topics on power management, sensor node localization, time synchronization, and security. At the end of each chapter, the authors provide practical exercises to help students strengthen their grip on the subject. There are more than 200 exercises altogether. Key Features: Offers a comprehensive introduction to the theoretical and practical concepts pertaining to wireless sensor networks Explains the constraints and challenges of wireless sensor network design; and discusses the most promising solutions Provides an in-depth treatment of the most critical technologies for sensor network communications, power management, security, and programming Reviews the latest research results in sensor network design, and demonstrates how the individual components fit together to build complex sensing systems for a variety of application scenarios Includes an accompanying website containing solutions to exercises (http://www.wiley.com/go/dargie_fundamentals) This book serves as an introductory text to the field of wireless sensor networks at both graduate and advanced undergraduate level, but it will also appeal to researchers and practitioners wishing to learn about sensor network technologies and their application areas, including environmental monitoring, protection of civil infrastructure, health care, precision agriculture, traffic control, and homeland security.

Intelligent Sensor Networks Sep 20 2021 Although governments worldwide have invested significantly in intelligent sensor network research and applications, few books cover intelligent sensor networks from a machine learning and signal processing perspective. Filling this void, Intelligent Sensor Networks: The Integration of Sensor Networks, Signal Processing and Machine Learning focuses on the close integration of sensing, networking, and smart signal processing via machine learning. Based on the world-class research of award-winning authors, the book provides a firm grounding in the fundamentals of intelligent sensor networks, including compressive sensing and sampling, distributed signal processing, and intelligent signal learning. Presenting recent research results of world-renowned sensing experts, the book is organized into three parts: Machine Learning—describes the application of machine learning and other AI principles in sensor network intelligence—covering smart sensor/transducer architecture and data representation for intelligent sensors Signal Processing—considers the optimization of sensor network performance based on digital signal processing techniques—including cross-layer integration of routing and application-specific signal processing as well as on-board image processing in wireless multimedia sensor networks for intelligent transportation systems Networking—focuses on network protocol design in order to achieve an intelligent sensor networking—covering energy-efficient opportunistic routing protocols for sensor networking and multi-agent-driven wireless sensor cooperation Maintaining a focus on "intelligent" designs, the book details signal processing principles in sensor networks. It elaborates on critical platforms for intelligent sensor networks and illustrates key applications—including target tracking, object identification, and structural health monitoring. It also includes a paradigm for validating the extent of spatiotemporal associations among data sources to enhance data cleaning in sensor networks, a sensor stream reduction application, and also considers the use of Kalman filters for attack detection in a water system sensor network that consists of water level sensors and velocity sensors.

Beginning Sensor Networks with XBee, Raspberry Pi, and Arduino Apr 27 2022 Build sensor networks with Python and MicroPython using XBee radio modules, Raspberry Pi, and Arduino boards. This revised and updated edition will put all of these together to form a sensor network, and show you how to turn your Raspberry Pi into a MySQL database server to store your sensor data! You'll review the different types of sensors and sensor networks, along with new technology, including how to build a simple XBee network. You'll then walk through building an sensor nodes on the XBee, Raspberry Pi, and Arduino, and also learn how to collect data from multiple sensor nodes. The book also explores different ways to store sensor data, including writing to an SD card, sending data to the cloud, and setting up a Raspberry Pi MySQL server to host your data. You'll even learn how to connect to and interact with a MySQL database server directly from an Arduino! Finally you'll see how to put it all together by connecting your sensor nodes to your new Raspberry Pi database server. If you want to see how well XBee, Raspberry Pi, and Arduino can get along, especially to create a sensor network, then Beginning Sensor Networks with XBee, Raspberry Pi, and Arduino is just the book you need. What You'll Learn Code your sensor nodes with Python and MicroPython Work with new XBee 3 modules Host your data on Raspberry Pi Get started with MySQL Create sophisticated sensor networks Who This Book Is For Those interested in building or experimenting with sensor networks and IoT solutions, including those with little or no programming experience. A secondary target includes readers interested in using XBee modules with Raspberry Pi and Arduino, those interested in controlling XBee modules with MicroPython.

Computational Intelligence in Sensor Networks Jan 13 2021 This book discusses applications of computational intelligence in sensor networks. Consisting of twenty chapters, it addresses topics ranging from small-scale data processing to big data processing realized through sensor nodes with the help of computational approaches. Advances in sensor technology and computer networks have enabled sensor networks to evolve from small systems of large sensors to large nets of miniature sensors, from wired communications to wireless communications, and from static to dynamic network topology. In spite of these technological advances, sensor networks still face the challenges of communicating and processing large amounts of imprecise and partial data in resource-constrained environments. Further, optimal deployment of sensors in an environment is also seen as an intractable problem. On the other hand, computational intelligence techniques like neural networks, evolutionary computation, swarm intelligence, and fuzzy systems are gaining popularity in solving intractable problems in various disciplines including sensor networks. The contributions combine the best attributes of these two distinct fields, offering readers a comprehensive overview of the emerging research areas and presenting first-hand experience of a variety of computational intelligence approaches in sensor networks.

Fundamentals of Sensor Network Programming Feb 11 2021 This book provides the basics needed to develop sensor network software and supplements it with many case studies covering network applications. It also examines how to develop onboard applications on individual sensors, how to interconnect these sensors, and how to form networks of sensors, although the major aim of this book is to provide foundational principles of developing sensor networking software and critically examine sensor network applications.

Healthcare Sensor Networks Mar 15 2021 Healthcare sensor networks (HSNs) now offer the possibility to continuously monitor human activity and physiological signals in a mobile environment. Such sensor networks may be able to reduce the strain on the present healthcare workforce by providing new autonomous monitoring services ranging from simple user-reminder systems to more advanced monitoring agents for preventive, diagnostic, and rehabilitative purposes. Potential services include reminding people to take their medication, providing early warning for the onset of heart attacks or epileptic seizures, and monitoring a child's physical activity in order to assess their growth and mental development. Healthcare Sensor Networks: Challenges Toward Practical Implementation discusses the fundamental concepts in designing and building such networks. It presents the latest developments in HSNs, explores applications of the technology, and provides insights into practical design and deployment challenges. Bringing together contributions from international experts in the field, the book highlights the key areas that require further research for HSNs to become a technological and commercially viable reality. The first part of the book concentrates on the engineering challenges, covering new biosensors, energy harvesting techniques, new wireless communication methods, and novel security approaches. Building from single sensing devices to networked sensing systems, the second part of the book looks at various health applications of HSNs. It addresses the human-centric requirements that should be considered in the design of HSN technologies—cost, portability, functionality, and user acceptance—and demonstrates how engineering compromises must be made in HSN solutions. A useful and timely resource for researchers, postgraduate students, and engineers looking for innovative solutions in healthcare, this book will also be of interest to medical and allied health personnel working in hospitals. It offers a practical reference on novel, cost-effective, and user-oriented sensing technologies and networks that are set to revolutionize the delivery of healthcare in the future.

Building Sensor Networks Aug 08 2020 For all the interest that wireless sensor networks have created over the past decade, there are few examples to show that they are truly delivering on this promise and anticipation. What is missing? Deviating from the usual focus on routing and energy efficiency, Building Sensor Networks: From Design to Applications attempts to stitch together the path from conceptual development of applications, on one end, to actual complete applications at the other. With this change in perspective, the book examines important facets of wireless sensor networks (WSNs) that are not often discussed in the literature. From Design Practices to the Networking Protocols that Glue Applications Together Organized into three sections, the book presents insights from international experts representing both industry and academia. The first section, on design practices, explores alternative ways to approach the tasks of developing a suitable WSN solution to an application and assisting that development in a manner that is not necessarily tied to a particular application. The second section, on networking protocols, illustrates the impact of the intermediaries—the "glue" of putting applications together. Chapters look at ways to address traffic, delays in network clustering, and the coexistence of a WSN with other systems on a frequency band. The final section of the book delves into experiences with applications in chemical sensing, defense, global trade and security, and ecosystem monitoring. Although these applications may fail the purist definition of an ideal WSN, they offer valuable lessons for the future development and deployment of WSNs. Challenge Your Thinking about Designing WSN Applications Emphasizing the need to build applications, the contributors present examples of what applications of WSNs could look like and identify the constraints. Throughout, the book challenges and illuminates your thinking about how to tame the complexity of designing a WSN application. It is essential reading for anyone interested in future wireless technologies.

Wireless Sensor Networks Nov 10 2020 Infrastructure for Homeland Security Environments Wireless Sensor Networks helps readers discover the emerging field of low-cost standards-based sensors that promise a high order of spatial and temporal resolution and accuracy in an ever-increasing universe of applications. It shares the latest advances in science and engineering paving the way towards a large plethora of new applications in such areas as infrastructure protection and security, healthcare, energy, food safety, RFID, ZigBee, and processing. Unlike other books on wireless sensor networks that focus on limited topics in the field, this book is a broad introduction that covers all the major technology, standards, and application topics. It contains everything readers need to know to enter this burgeoning field, including current applications and promising research and development; communication and networking protocols; middleware architecture for wireless sensor networks; and security and management. The straightforward and engaging writing style of this book makes even complex concepts and processes easy to follow and understand. In addition, it offers several features that help readers grasp the material and then apply their knowledge in designing their own wireless sensor network systems: * Examples illustrate how concepts are applied to the development and application of * wireless sensor networks * Detailed case studies set forth all the steps of design and implementation needed to solve real-world problems * Chapter conclusions that serve as an excellent review by stressing the chapter's key concepts * References in each chapter guide readers to in-depth discussions of individual topics This book is ideal for networking designers and engineers who want to fully exploit this new technology and for government employees who are concerned about homeland security. With its examples, it is appropriate for use as a coursebook for upper-level undergraduates and graduate students.

Algorithmic Aspects of Wireless Sensor Networks Mar 03 2020 This book constitutes the reviewed proceedings of the First International Workshop on Algorithmic Aspects of Wireless Sensor Networks, ALGOSENSORS 2004, held in Turku, Finland in July 2004, in association with ICALP 2004. The 15 revised full papers presented together with abstracts of two invited papers were carefully reviewed and selected from 40 submissions. Among the topics addressed are sensor network modeling, algorithms for sensor localization, dynamic sensor networks, sensor network architectures, attribute-based named networks, routing, communication protocols, access control in sensor networks, sensor architecture, and energy consumption issues.

Energy-Efficient Wireless Sensor Networks Oct 10 2020 Energy-Efficient Wireless Sensor Networks, Energy-Efficient Wireless Sensor Networks is ideal to deal with the energy aspects of WSNs. It covers all the aspects of sensor networks with respect to energy conservation and optimization. It outlines the mechanisms, techniques, and algorithms of the physical layer, the media access control (MAC) layer, and the network layer in context with energy efficiency. It delves into energy-efficient security mechanisms and gives special attention to MAC protocols while presenting the current state of the art. This book discusses advances in energy-efficient algorithms using soft computing techniques and comparative analysis of these with traditional techniques. It also discusses the hierarchical network that improves the WSN lifetime and explores operational-level power management and energy harvesting. In addition to presenting other operational processes such as data aggregation, localization, time synchronization, and coverage, this book also discusses open research issues and considers the application and future trends of WSNs. Written primarily for students who are striving to understand the concepts of WSNs, Energy-Efficient Wireless Sensor Networks provides direction for budding researchers to explore a new area of research in WSNs. Industry experts and technical managers will also benefit from learning new business ideas and models as well as technological know-how. Book jacket.

Wireless Sensor Networks Jun 25 2019 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.

Wireless Sensor Networks Sep 08 2020 This book constitutes the refereed proceedings of the 5th European Workshop on Wireless Sensor Networks, EWSN 2008, held in Bologna, Italy, in January/February 2008. The 23 revised full papers presented were carefully reviewed and selected from 110 submissions. The papers are organized in topical sections on localization, detection of space/time correlated events, network coding, ZigBee, topology, software, as well as deployment and application development.

Wireless Sensor Networks Apr 03 2020 Wireless sensor networks (WSNs) consist of tiny sensors capable of sensing, computing, and communicating. Due to advances in semiconductors, networking, and material science technologies, it is now possible to deploy large-scale WSNs. The advancement in these technologies has not only decreased the deployment and maintenance costs of networks but has also increased the life of networks and made them more rugged. As WSNs become more reliable with lower maintenance costs, they are being deployed and used across various sectors for multiple applications. This book discusses the

applications, challenges, and design and deployment techniques of WSNs.

Wireless Sensor Networks Jul 19 2021 This book constitutes the refereed proceedings of the Third European Workshop on Wireless Sensor Networks February 2006. The 21 revised full papers presented together with the abstracts of one invited talk and two tutorials were carefully reviewed and selected from 133 submissions. The papers are organized in topical sections on query systems, sensor network services, routing, localization, platforms and development, medium access control, and measurements.

Wireless Sensor Networks Oct 02 2022 Because they provide practical machine-to-machine communication at a very low cost, the popularity of wireless sensor networks is expected to skyrocket in the next few years, duplicating the recent explosion of wireless LANs. Wireless Sensor Networks: Architectures and Protocols describes how to build these networks, from the layers of the

Wireless Sensor Networks Apr 15 2021 This SpringerBrief evaluates the cooperative effort of sensor nodes to accomplish high-level tasks with sensing, data processing and communication. The metrics of network-wide convergence, unbiasedness, consistency and optimality are discussed through network topology, distributed estimation algorithms and consensus strategy. Systematic analysis reveals that proper deployment of sensor nodes and a small number of low-cost relays (without sensing function) can speed up the information fusion and thus improve the estimation capability of wireless sensor networks (WSNs). This brief also investigates the spatial distribution of sensor nodes and basic scalable estimation algorithms, the consensus-based estimation capability for a class of relay assisted sensor networks with asymmetric communication topology, and the problem of filter design for mobile target tracking over WSNs. From the system perspective, the network topology is closely related to the capability and efficiency of network-wide scalable distributed estimation. Wireless Sensor Networks: Distributed Consensus Estimation is a valuable resource for researchers and professionals working in wireless communications, networks and distributed computing. Advanced-level students studying computer science and electrical engineering will also find the content helpful.

Beginning Sensor Networks with Arduino and Raspberry Pi Sep 28 2019 "Learn how to make arduino and Raspberry Pi-based sensor networks."--Cover.

Wireless Sensor Networks Mar 27 2022 This book focuses on the principles of wireless sensor networks (WSNs), their applications, and their analysis tools, with meticulous attention paid to definitions and terminology. This book presents the adopted technologies and their manufacturers in detail, making WSNs tangible for the reader. In introductory computer networking books, chapter sequencing follows the bottom-up or top-down architecture of the 7-layer protocol. This book addresses subsequent steps in this process, both horizontally and vertically, thus fostering a clearer and deeper understanding through chapters that elaborate on WSN concepts and issues. With such depth, this book is intended for a wide audience; it is meant to be a helper and motivator for senior undergraduates, postgraduates, researchers, and practitioners. It lays out important concepts and WSN-relate applications; uses appropriate literature to back research and practical issues; and focuses on new trends. Senior undergraduate students can use it to familiarize themselves with conceptual foundations and practical project implementations. For graduate students and researchers, test beds and simulators provide vital insights into analysis methods and tools for WSNs. Lastly, in addition to applications and deployment, practitioners will be able to learn more about WSN manufacturers and components within several platforms and test beds.

Wireless Sensor Networks Jun 29 2022 Designing, implementing, and operating a wireless sensor network involves a wide range of disciplines and many application-specific constraints. To make sense of and take advantage of these systems, a holistic approach is needed--and this is precisely what Wireless Sensor Networks delivers. Inside, two eminent researchers review the diverse technologies and techniques that interact in today's wireless sensor networks. At every step, they are guided by the high-level information-processing tasks that determine how these networks are architected and administered. Zhao and Guibas begin with the canonical problem of localizing and tracking moving objects, then systematically examine the many fundamental sensor network issues that spring from it, including network discovery, service establishment, data routing and aggregation, query processing, programming models, and system organization. The understanding gained as a result--how different layers support the needs of different applications, and how a wireless sensor network should be built to optimize performance and economy--is sure to endure as individual component technologies come and go. ·Written for practitioners, researchers, and students and relevant to all application areas, including environmental monitoring, industrial sensing and diagnostics, automotive and transportation, security and surveillance, military and battlefield uses, and large-scale infrastructural maintenance. ·Skillfully integrates the many disciplines at work in wireless sensor network design: signal processing and estimation, communication theory and protocols, distributed algorithms and databases, probabilistic reasoning, energy-aware computing, design methodologies, evaluation metrics, and more. ·Demonstrates how querying, data routing, and network self-organization can support high-level information-processing tasks.

Beginning Sensor Networks with Arduino and Raspberry Pi Oct 22 2021 Beginning Sensor Networks with Arduino and Raspberry Pi teaches you how to build sensor networks with Arduino, Raspberry Pi, and XBee radio modules, and even shows you how to turn your Raspberry Pi into a MySQL database server to store your sensor data! First you'll learn about the different types of sensors and sensor networks, including how to build a simple XBee network. Then you'll walk through building an Arduino-based temperature sensor and data collector, followed by building a Raspberry Pi-based sensor node. Next you'll learn different ways to store sensor data, including writing to an SD card, sending data to the cloud, and setting up a Raspberry Pi MySQL server to host your data. You even learn how to connect to and interact with a MySQL database server directly from an Arduino! Finally you'll learn how to put it all together by connecting your Arduino sensor node to your new Raspberry Pi database server. If you want to see how well Arduino and Raspberry Pi can get along, especially to create a sensor network, then Beginning Sensor Networks with Arduino and Raspberry Pi is just the book you need.

Sensor Networks and Configuration Jan 25 2022 This book incorporates a selection of research and development papers. Its scope is on history and background, underlying design methodology, application domains and recent developments. The readers will be able to understand the underlying technology, philosophy, concepts, ideas, and principles, with regard to broader areas of sensor network. Aspects of sensor network and experimental results have been presented in proper order.

Randomly Deployed Wireless Sensor Networks Jun 17 2021 Wireless sensor networks have a range of applications, including military uses and in environmental monitoring. When an area of interest is inaccessible by conventional means, such a network can be deployed in ways resulting in a random distribution of the sensors. Randomly Deployed Wireless Sensor Networks offers a probabilistic method to model and analyze these networks. The book considers the network design, coverage, target detection, localization and tracking of sensors in randomly deployed wireless networks, and proposes a stochastic model. It quantifies the relationship between parameters of the network and its performance, and puts forward a communication protocol. The title provides analyses and formulas, giving engineering insight into randomly deployed wireless sensor networks. Five chapters consider the analysis of coverage performance; working modes and scheduling mechanisms; the relationship between sensor behavior and network performance properties; probabilistic forwarding routing protocols; localization methods for multiple targets and target number estimation; and experiments on target localization and tracking with a Mica sensor system. Details a probabilistic method to model and analyze randomly deployed wireless sensor networks Gives working modes and scheduling mechanisms for sensor nodes, allowing high-probability of target detection Considers the relationship between sensor behaviour and network performance and lifetime Offers probabilistic forwarding routing protocols for randomly deployed wireless sensor networks Describes a method for localizing multiple targets and estimating their number

Protocols and Architectures for Wireless Sensor Networks Feb 23 2022 Learn all you need to know about wireless sensor networks! Protocols and Architectures for Wireless Sensor Networks provides a thorough description of the nuts and bolts of wireless sensor networks. The authors give an overview of the state-of-the-art, putting all the individual solutions into perspective with one and other. Numerous practical examples, case studies and illustrations demonstrate the theory, techniques and results presented. The clear chapter structure, listing learning objectives, outline and summarizing key points, help guide the reader expertly through the material. Protocols and Architectures for Wireless Sensor Networks: Covers architecture and communications protocols in detail with practical implementation examples and case studies. Provides an understanding of mutual relationships and dependencies between different protocols and architectural decisions. Offers an in-depth investigation of relevant protocol mechanisms. Shows which protocols are suitable for which tasks within a wireless sensor network and in which circumstances they perform efficiently. Features an extensive website with the bibliography, PowerPoint slides, additional exercises and worked solutions. This text provides academic researchers, graduate students in computer science, computer engineering, and electrical engineering, as well as practitioners in industry and research engineers with an understanding of the specific design challenges and solutions for wireless sensor networks. Check out www.wiley.com/go/wsn for accompanying course material! "I am deeply impressed by the book of Karl & Willig. It is by far the most complete source for wireless sensor networks...The book covers almost all topics related to sensor networks, gives an amazing number of references, and, thus, is the perfect source for students, teachers, and researchers. Throughout the book the reader will find high quality text, figures, formulas, comparisons etc. - all you need for a sound basis to start sensor network research." Prof. Jochen Schiller, Institute of Computer Science, Freie Universität Berlin

Wireless Sensor Networks Nov 03 2022 Although there are many books available on WSNs, most are low-level, introductory books. The few available for advanced readers fail to convey the breadth of knowledge required for those aiming to develop next-generation solutions for WSNs. Filling this void, Wireless Sensor Networks: From Theory to Applications supplies comprehensive coverage of WSNs. In order to provide the wide-ranging guidance required, the book brings together the contributions of domain experts working in the various subfields of WSNs worldwide. This edited volume examines recent advances in WSN technologies and considers the theoretical problems in WSN, including issues with monitoring, routing, and power control. It also details methodologies that can provide solutions to these problems. The book's 25 chapters are divided into seven parts: Data Collection Physical Layer and Interfacing Routing and Transport Protocols Energy-Saving Approaches Mobile and Multimedia WSN Data Storage and Monitoring Applications The book examines applications of WSN across a range of fields, including health, military, transportation, and mining. Addressing the main challenges in applying WSNs across all phases of our life, it explains how WSNs can assist in community development. Complete with a list of references at the end of each chapter, this book is ideal for senior undergraduate and postgraduate students, researchers, scholars, academics, industrial researchers, and practicing engineers working on WSNs. The text assumes that readers possess a foundation in computer networks, wireless communication, and basic electronics.

Wireless Sensor Networks Jul 07 2020 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.

Energy Scavenging for Wireless Sensor Networks Oct 29 2019 The vast reduction in size and power consumption of CMOS circuitry has led to a large research effort based around the vision of wireless sensor networks. The proposed networks will be comprised of thousands of small wireless nodes that operate in a multi-hop fashion, replacing long transmission distances with many low power, low cost wireless devices. The result will be the creation of an intelligent environment responding to its inhabitants and ambient conditions. Wireless devices currently being designed and built for use in such environments typically run on batteries. However, as the networks increase in number and the devices decrease in size, the replacement of depleted batteries will not be practical. The cost of replacing batteries in a few devices that make up a small network about once per year is modest. However, the cost of replacing thousands of devices in a single building annually, some of which are in areas difficult to access, is simply not practical. Another approach would be to use a battery that is large enough to last the entire lifetime of the wireless sensor device. However, a battery large enough to last the lifetime of the device would dominate the overall system size and cost, and thus is not very attractive. Alternative methods of powering the devices that will make up the wireless networks are desperately needed.