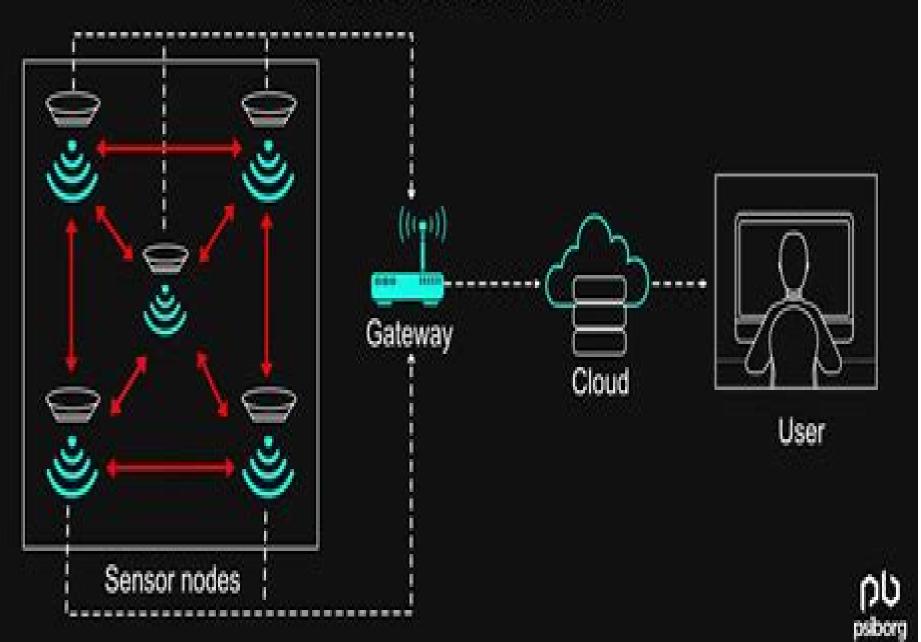
# Wireless Sensor Network



# **Wireless Sensor Networks Wireless Sensor Networks**

Sudip Misra, Isaac Woungang, Subhas Chandra Misra

#### **Wireless Sensor Networks Wireless Sensor Networks:**

Wireless Sensor Networks Ian F. Akyildiz, Mehmet Can Vuran, 2010-06-10 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 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 Wireless Sensor Networks Ibrahiem M. M. El Emary, S. Ramakrishnan, 2013-08-28 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 and Applications Yingshu Li, My T. Thai, 2008-02-10 Wireless sensor networks are being employed in a variety applications raing from medical to military and from home to industry The principle aim of this book is to provide a reference tool for the increasing number of scientists who depend upon sensor networks in some way The book is organized into several sections each including chapters exploring a speci c topic Wireless sensor networks are attracting great attention and there are many research topics yet to be studied In this book the topics covered include n work design and modelling network management data management security and applications The articles presented in the book are expository but of a scholarly nature including the appropriate history background a review of the state of the art thinking relative to the topic as well as a discussion of unsolved problems that are of special interest The target readers of this book include the researchers in computer s ence computer engineering and applied mathematics as well as students in these subjects Specialists as well as general readers will nd the articles st ulating and helpful Book Organization The book is organized into ve sections Section I introduces the design and modelling of sensor networks Chapter 1 by Iyer Kulkarni Mhatre and Rosenberg presents a taxonomy of wireless sensor networks based on their application level objectives tra c characteristics and data delivery requi ments Popa and Lewis in Chapter 2 describe some algorithms for systematic exploration of unknown environments using a mobile wireless sensor network Wireless Sensor Networks Shuang-Hua Yang, 2013-10-23 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 Wireless Sensor Networks Siva Yellampalli, 2021-09-15 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 Building Wireless Sensor Networks Nandini Mukherjee, Sarmistha Neogy, Sarbani Roy, 2017-12-19 Building Wireless Sensor Networks Theoretical and Practical Perspectives presents the state of the art of wireless sensor networks WSNs from fundamental concepts to cutting edge technologies Focusing on WSN topics ideal for undergraduate and postgraduate curricula this book Provides essential knowledge of the contemporary theory and practice of wireless sensor networking Describes WSN architectures protocols and operating systems Details the routing and data aggregation algorithms Addresses WSN security and energy efficiency Includes sample programs for experimentation The book offers overarching coverage of this exciting field filling a critical gap The Art of Wireless Sensor Networks Habib M. Ammari, 2013-12-17 During the last one and a in the existing literature half decades wireless sensor networks have witnessed significant growth and tremendous development in both academia and industry A large number of researchers including computer scientists and engineers have been interested in solving challenging problems that span all the layers of the protocol stack of sensor networking systems Several venues such as journals conferences and workshops have been launched to cover innovative research and practice in this promising and rapidly advancing field Because of these trends I thought it would be beneficial to provide our sensor networks community with a comprehensive reference on as much of the findings as possible on a variety of topics in wireless sensor networks As this area of research is in continuous progress it does not seem to be a reasonable solution to keep delaying the publication of such reference any more This book relates to the second volume and focuses on the advanced topics and applications of wireless sensor networks Our rationale is that the second volume has all application specific and non conventional sensor

networks emerging techniques and advanced topics that are not as matured as what is covered in the first volume Thus the second volume deals with three dimensional underground underwater body mounted and societal networks Following Donald E Knuth's above quoted elegant strategy to focus on several important fields The Art of Computer Programming Fundamental Algorithms 1997 all the book chapters in this volume include up to date research work spanning various topics such as stochastic modeling barrier and spatiotemporal coverage tracking estimation counting coverage and localization in three dimensional sensor networks topology control and routing in three dimensional sensor networks underground and underwater sensor networks multimedia and body sensor networks and social sensing Most of these major topics can be covered in an advanced course on wireless sensor networks This book will be an excellent source of information for graduate students majoring in computer science computer engineering electrical engineering or any related discipline Furthermore computer scientists researchers and practitioners in both academia and industry will find this book useful and interesting

Industrial Wireless Sensor Networks R Budampati, S Kolavennu, 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

Introduction to Wireless Sensor Networks Anna Forster, 2016-07-18 Explores real world wireless sensor network development deployment and applications Presents state of the art protocols and algorithms Includes end of chapter summaries exercises and references For students there are hardware overviews reading links programming examples and tests available at website For Instructors there are PowerPoint slides and solutions available at website Wireless Sensor Networks C.S. Raghavendra, Krishna M. Sivalingam, Taieb Znati, 2005-07-01 Wireless Sensor Networks presents a comprehensive and tightly organized compilation of chapters that surveys many of the exciting research developments taking place in this field Chapters are written by several of the leading researchers exclusively for this book Authors address many of the key challenges faced in the design analysis and deployment of wireless sensor networks Wireless Sensor Networks Feng Zhao, Leonidas Guibas, 2004-07-21 Information processing in sensor networks is a rapidly emerging area of computer science and electrical engineering research Because of advances in micro sensors wireless networking and embedded

processing ad hoc networks of sensor are becoming increasingly available for commercial military and homeland security applications Examples include monitoring e g traffic habitat security industrail sensing and diagnostics e g factory appliances infrastructures i e power grid water distribution waste disposal and battle awareness e g multi target tracking This book introduces practitioners to the fundamental issues and technology constraints concerning various aspects of sensor networks such as information organization guerying routing and self organization using concrete examples and does so by using concrete examples from current research and implementation efforts 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 Wireless Sensor Networks Nirupama Bulusu, 2005 This first of its kind resource offers you an in depth understanding of wireless sensor networks from a systems perspective The book describes and categorizes the technological trends leading applications state of the art platform developments future trends and challenges of sensor networks You find critical coverage of network protocols and mechanisms for node localization time synchronization media access control topology creation and management routing transport storage collaborative signal processing security and fault tolerance and node deployment in large scale sensor networks Application and Multidisciplinary Aspects of Wireless Sensor Networks Liljana Gavrilovska, Srdjan Krco, Veljko Milutinović, Ivan Stoimenovic, Roman Trobec, 2010-10-05 It is a general trend in computing that computers are becoming ever smaller and ever more interconnected Sensor networks large networks of small simple devices are a logical extreme of this trend Wireless sensor networks WSNs are attracting an increasing degree of research interest with a growing number of industrial applications starting to emerge Two of these applications personal health monitoring and emergency disaster recovery are the focus of the European Commission project ProSense Promote Mobilize Reinforce and Integrate Wireless Sensor Networking Research and Researchers This hands on introduction to WSN systems development presents a broad coverage of topics in the field contributed by researchers involved in the ProSense project An emphasis is placed on the practical knowledge required for the successful implementation of WSNs Divided into four parts the first part covers basic issues of sensors software and position based routing protocols Part two focuses on multidisciplinary issues including sensor network integration mobility aspects georouting medical applications and vehicular sensor networks The remaining two parts present case studies and further applications Topics and features presents a broad overview of WSN technology including an introduction to sensor and sensing technologies contains an extensive section on case studies providing details of the

development of a number of WSN applications discusses frameworks for WSN systems integration through which WSN technology will become fundamental to the Future Internet concept investigates real world applications of WSN systems in medical and vehicular sensor networks with a Foreword by the Nobel Laurate Professor Martin Perl of Stanford University Providing holistic coverage of WSN technology this text reference will enable graduate students of computer science electrical engineering and telecommunications to master the specific domains of this emerging area. The book will also be a valuable resource for researchers and practitioners interested in entering the field Principles of Wireless Sensor Networks Mohammad S. Obaidat, Sudip Misra, 2014-12-04 A concise and clear guide to the concepts and applications of wireless sensor networks ideal for students practitioners and researchers Wireless Sensor Networks Elena Gaura, Lewis Girod, James Brusey, Michael Allen, Geoffrey Challen, 2010-09-14 The twentieth century ended with the vision of smart dust a network of wirelessly connected devices whose size would match that of a dust particle each one a se contained package equipped with sensing computation communication and power Smart dust held the promise to bridge the physical and digital worlds in the most unobtrusive manner blending together realms that were previously considered well separated Applications involved scattering hundreds or even thousands of smart dust devices to monitor various environmental quantities in scenarios ranging from habitat monitoring to disaster management The devices were envisioned to se organize to accomplish their task in the most of cient way As such smart dust would become a powerful tool assisting the daily activities of scientists and en neers in a wide range of disparate disciplines Wireless sensor networks WSNs as we know them today are the most no worthy attempt at implementing the smart dust vision In the last decade this eld has seen a fast growing investment from both academia and industry Signi cant nancial resources and manpower have gone into making the smart dust vision a reality through WSNs Yet we still cannot claim complete success At present only specialist computerscientists or computerengineershave the necessary background to walk the road from conception to a nal deployed Guide to Wireless Sensor Networks Sudip Misra, Isaac Woungang, Subhas Chandra and running WSN system 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 distributed autonomous sensor nodes equipped to sense speci 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 Low-Power Wireless Sensor Networks Jukka Suhonen, Mikko Kohvakka, Ville Kaseva, Timo D. Hämäläinen, Marko Hännikäinen, 2012-01-14 Wireless sensor network WSN is an ad hoc network technology comprising even thousands of autonomic and self organizing nodes that combine environmental sensing data processing and wireless networking The applications for sensor networks range from home and industrial environments to military uses Unlike the traditional computer networks a WSN is application oriented and deployed for a specific task WSNs are data centric which means that messages are not send to individual nodes but to geographical locations or regions based on the data content A WSN node is typically battery powered and characterized by extremely small size and low cost As a result the processing power memory and energy resources of an individual sensor node are limited However the feasibility of a WSN lies on the collaboration between the nodes A reference WSN node comprises a Micro Controller Unit MCU having few Million Instructions Per Second MIPS processing speed tens of kilobytes program memory few kilobytes data memory In addition the node contains a short range radio and a set of sensors Supply power is typically obtained with small batteries Assuming a target lifetime of one year using AA size batteries the available power budget is around 1 mW This book covers the low power WSNs services ranging from hardware platforms and communication protocols to network deployment and sensor data collection and actuation The implications of resource constraints and expected performance in terms of throughput reliability and latency are explained As a case study this book presents experiments with low energy TUTWSN technology to illustrate the possibilities and limitations of WSN applications Concepts, Applications, Experimentation and Analysis of Wireless Sensor Networks Hossam Mahmoud Ahmad Fahmy, 2023-02-13 The third edition of this hands on textbook pursues the focus on the principles of wireless sensor networks WSNs their applications their protocols and standards and their analysis and test tools a meticulous care has been accorded to the definitions and terminology To make WSNs felt and seen the adopted technologies as well as their manufacturers are presented in detail In introductory computer networking books chapters sequencing follows the bottom up or top down architecture of the seven layers protocol This book is some more steps after both horizontally and vertically the view and understanding are getting clearer chapters ordering is based on topics significance to the elaboration of wireless sensor networks WSNs concepts and issues This book is intended for a wide audience it is meant to be help and motivate for both the senior undergraduates postgraduates researchers and practitioners concepts and WSNs related applications are laid out research and practical issues are backed by appropriate literature and new trends are put under focus For senior undergraduate students it familiarizes with conceptual foundations applications

and practical projects implementations For graduate students and researchers energy efficient routing protocols transport layer protocols and cross layering protocols approach are presented Testbeds and simulators provide a must follow emphasis on the analysis methods and tools for WSNs For practitioners besides applications and deployment the manufacturers and components of WSNs at several platforms and testbeds are fully explored <u>Wireless Sensor Networks</u> Shafiullah Khan,Al-Sakib Khan Pathan,Nabil Ali Alrajeh,2016-04-21 Wireless sensor networks WSNs utilize fast cheap and effective applications to imitate the human intelligence capability of sensing on a wider distributed scale But acquiring data from the deployment area of a WSN is not always easy and multiple issues arise including the limited resources of sensor devices run with one time batteries Additi

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