

Intelligent Sensor Networks The Integration Of Sensor Networks Signal Processing And Machine Learning

Focuses on sensor applications and smart meters in the newly developing interconnected smart grid • Focuses on sensor applications and smart meters in the newly developing interconnected smart grid • Presents the most updated technological developments in the measurement and testing of power systems within the smart grid environment • Reflects the modernization of electric utility power systems with the extensive use of computer, sensor, and data communications technologies, providing benefits to energy consumers and utility companies alike • The leading author heads a group of researchers focusing on the construction of smart grid and smart substation for Sichuan Power Grid, one of the largest in China's power system

The field of computational intelligence has grown tremendously over that past five years, thanks to evolving soft computing and artificial intelligent methodologies, tools and techniques for envisaging the essence of intelligence embedded in real life observations. Consequently, scientists have been able to explain and understand real life processes and practices which previously often remain unexplored by virtue of their underlying imprecision, uncertainties and redundancies, and the unavailability of appropriate methods for describing the incompleteness and vagueness of information represented. With the advent of the field of computational intelligence, researchers are now able to explore and unearth the intelligence, otherwise insurmountable, embedded in the systems under consideration. Computational Intelligence is now not limited to only specific computational fields, it has made inroads in signal processing, smart manufacturing, predictive control, robot navigation, smart cities, and sensor design to name a few. Recent Trends in Computational Intelligence Enabled Research: Theoretical Foundations and Applications explores the use of this computational paradigm across a wide range of applied domains which handle meaningful information. Chapters investigate a broad spectrum of the applications of computational intelligence across different platforms and disciplines, expanding our knowledge base of various research initiatives in this direction. This volume aims to bring together researchers, engineers, developers and practitioners from academia and industry working in all major areas and interdisciplinary areas of computational intelligence, communication systems, computer networks, and soft computing. Provides insights into the theory, algorithms, implementation, and application of computational intelligence techniques Covers a wide range of applications of deep learning across various domains which are researching the applications of computational intelligence Investigates novel techniques and reviews the state-of-the-art in the areas of machine learning, computer vision, soft computing techniques

As the field of communications networks continues to evolve, the challenging area of wireless sensor networks is rapidly coming of age. Recent advances have made it possible to make sensor components more compact, robust, and energy efficient than ever, earning the idiosyncratic alias of Smart Dust. Production has also improved, yielding larger, Bioanalytical science and its technological subdomain, biosensors, are ever-evolving subjects, striving for rapid improvement in terms of performance and expanding the target range to meet the vast societal and market demands. The key performance factors for a biosensor that drive the research are selectivity, sensitivity, response time, accuracy, and reproducibility, with additional requirements of its portability and inexpensive nature. These performance factors are largely governed by the materials and techniques being used in these bioanalytical platforms. The selection of materials to meet these requirements is critical, as their interaction or involvement with the biological recognition elements should initiate or improve these performance factors. The technique discussed primarily applies to transducers involved in converting a biochemical signal to optical or electrical signals. Over the years, the emergence of novel materials and techniques has drastically improved the performance of these bioanalytical systems, enabling them to expand their analytical horizon. These advanced materials and techniques are central to modern bioanalytical and biosensor research. Advanced Materials and Techniques for Biosensors and Bioanalytical Applications provides a comprehensive review of the subject, including a knowledge platform for both academics and researchers. Considering biosensors as a central theme to this book, an outline on this subject with background principles has been included, with a scope of extending the utility of the book to coursework in graduate and postgraduate schools. Features: • Basic principles on different classes of biosensors, recent advances and applications • Smart materials for biosensors and other rapid, portable detection devices • Metal nanoparticles and nanocrystals for analytical applications • Carbon-based nanoparticles and quantum dots for sensing applications • Nanozymes as potential catalysts for sensing applications • Bioelectrochemiluminescence and photoelectrochemical-based biosensors • Paper electronics and paper-based biosensors • Microbial biosensors: artificial intelligence, genetic engineering, and synthetic biology • Biofuel cells as a signal transduction platform • FET-based biosensors, including ISFET and BioFET This book serves as a reference for scientific investigators and a textbook for a graduate-level course in biosensors and advanced bioanalytical techniques. This book is a printed edition of the Special Issue "Wireless Sensor and Actuator Networks for Smart Cities" that was published in JSAN

Cyber-physical systems (CPSs) have quickly become one of the hottest computer applications today. With their tight integration of cyber and physical objects, it is believed CPSs will transform how we interact with the physical world, just like the Internet transformed how we interact with one another. A CPS could be a system at multiple scales, from large smart bridges with fluctuation detection and responding functions, to autonomous cars and tiny implanted medical devices. Cyber-Physical Systems: Integrated Computing and Engineering Design supplies comprehensive coverage of the principles and design of CPSs. It addresses the many challenges that must be overcome and outlines a roadmap of how to get there. Emphasizes the integration of cyber computing and physical objects control Covers important CPS

theory foundations and models Includes interesting case studies of several important civilian and health care applications that illustrate the CPS design process Addresses the collaboration of the sensing and controlling of a physical system with robust software architecture Explains how to account for random failure events that can occur in a real CPS environment Presented in a systematic manner, the book begins by discussing the basic concept underlying CPSs and examining some challenging design issues. It then covers the most important design theories and modeling methods for a practical CPS. Next, it moves on to sensor-based CPSs, which use embedded sensors and actuators to interact with the physical world. The text presents concrete CPS designs for popular civilian applications, including building and energy management. Reflecting the importance of human health care in society, it includes CPS examples of rehabilitation applications such as virtual reality-based disability recovery platforms.

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.

Security and Resilience in Intelligent Data-Centric Systems and Communication Networks presents current, state-of-the-art work on novel research in theoretical and practical resilience and security aspects of intelligent data-centric critical systems and networks. The book analyzes concepts and technologies that are successfully used in the implementation of intelligent data-centric critical systems and communication networks, also touching on future developments. In addition, readers will find in-demand information for domain experts and developers who want to understand and realize the aspects (opportunities and challenges) of using emerging technologies for designing and developing more secure and resilient intelligent data-centric critical systems and communication networks. Topics covered include airports, seaports, rail transport systems, plants for the provision of water and energy, and business transactional systems. The book is well suited for researchers and PhD interested in the use of security and resilient computing technologies. Includes tools and techniques to prevent and avoid both accidental and malicious behaviors Explains the state-of-the-art technological solutions for main issues hindering the development of monitoring and reaction solutions Describes new methods and technologies, advanced prototypes, systems, tools and techniques of future direction

The field of multi-sensor fusion and integration is growing into significance as our society is in transition into ubiquitous computing environments with robotics services everywhere under ambient intelligence. What surround us are to be the networks of sensors and actuators that monitor our environment, health, security and safety, as well as the service robots, intelligent vehicles, and autonomous systems of ever heightened autonomy and dependability with integrated heterogeneous sensors and actuators. The field of multi-sensor fusion and integration plays key role for making the above transition possible by providing fundamental theories and tools for implementation. This volume is an edition of the papers selected from the 7th IEEE International Conference on Multi-Sensor Integration and Fusion, IEEE MFI'08, held in Seoul, Korea, August 20–22, 2008. Only 32 papers out of the 122 papers accepted for IEEE MFI'08 were chosen and requested for revision and extension to be included in this volume. The 32 contributions to this volume are organized into three parts: Part I is dedicated to the Theories in Data and Information Fusion, Part II to the Multi-Sensor Fusion and Integration in Robotics and Vision, and Part III to the Applications to Sensor Networks and Ubiquitous Computing Environments. To help readers understand better, a part summary is included in each part as an introduction. The summaries of Parts I, II, and III are prepared respectively by Prof. Hanseok Ko, Prof. Sukhan Lee and Prof. Hensoo Hahn.

This book provides a systematic examination of the developing business model, service enterprise integration. It investigates the proven concepts, models, methods, and techniques in manufacturing operations and examines all aspects relevant to service productivity. Chapters written by leading researchers provide critical literature reviews, conceptual analysis, and solution-result-oriented applications.

A practical guide to microgrid systems architecture, design topologies, control strategies and integration approaches *Microgrid Planning and Design* offers a detailed and authoritative guide to microgrid systems. The authors - noted experts on the topic - explore what is involved in the design of a microgrid, examine the process of mapping designs to accommodate available technologies and reveal how to determine the efficacy of the final outcome. This practical book is a compilation of collaborative research results drawn from a community of experts in 8 different universities over a 6-year period. *Microgrid Planning and Design* contains a review of microgrid benchmarks for the electric power system and covers the mathematical modeling that can be used during the microgrid design processes. The authors include real-world case studies, validated benchmark systems and the

components needed to plan and design an effective microgrid system. This important guide: Offers a practical and up-to-date book that examines leading edge technologies related to the smart grid Covers in detail all aspects of a microgrid from conception to completion Explores a modeling approach that combines power and communication systems Recommends modeling details that are appropriate for the type of study to be performed Defines typical system studies and requirements associated with the operation of the microgrid Written for graduate students and professionals in the electrical engineering industry, *Microgrid Planning and Design* is a guide to smart microgrids that can help with their strategic energy objectives such as increasing reliability, efficiency, autonomy and reducing greenhouse gases.

This book provides IT professionals, educators, researchers, and students a compendium of knowledge on smart sensors and devices, types of sensors, data analysis and monitoring with the help of smart sensors, decision making, impact of machine learning algorithms, and artificial intelligence-related methodologies for data analysis and understanding of smart applications in networks. Smart sensor networks play an important role in the establishment of network devices which can easily interact with physical world through plethora of variety of sensors for collecting and monitoring the surrounding context and allowing environment information. Apart from military applications, smart sensor networks are used in many civilian applications nowadays and there is a need to manage high volume of demands in related applications. This book comprises of 9 chapters and presents a valuable insight on the original research and review articles on the latest achievements that contributes to the field of smart sensor networks and their usage in real-life applications like smart city, smart home, e-healthcare, smart social sensing networks, etc. Chapters illustrate technological advances and trends, examine research opportunities, highlight best practices and standards, and discuss applications and adoption. Some chapters also provide holistic and multiple perspectives while examining the impact of smart sensor networks and the role of data analytics, data sharing, and its control along with future prospects.

The use of cyber-physical systems in recent computing, communication, and control methods to design and operate intelligent and autonomous systems using cutting-edge technologies has led to many advances. By studying emerging trends in these systems, programming techniques can be optimized and strengthened to create a higher level of effectiveness. *Cyber-Physical Systems for Next-Generation Networks* provides emerging research on using cyber-physical systems (CPS) as a method to control design and operation of intelligent systems through next-generation networks. While highlighting issues such as increasing CPS complexity due to components within physical and industrial systems, this publication explores information on real-time sensing, reasoning, and adaptation for cyber-physical systems while gaining an understanding of evolutionary computing for it. This book is a valuable resource for engineers, academicians, researchers, and graduate-level students seeking current research on CPS in cutting-edge technologies.

The book develops manufacturing concepts and applications beyond physical production and towards a wider manufacturing value chain incorporating external stakeholders that include suppliers of raw materials and parts, customers, collaborating manufacturing companies, manufacturing service providers, and environmental organisations. The focal point of the value chain remains as a manufacturing system and its operations while flows of parts/materials and information and services across the supply/value chain tiers are taken into account. The book emphasises on the two innovative paradigms of Reconfigurable Manufacturing Systems (RMS) and the 4th industrial revolution (Industry 4.0) along with their incorporated development. RMS, as a relatively new paradigm, has been introduced to meet the requirements of 'the factories of the future', which is aimed by Industry 4.0, though introducing greater responsiveness and customised flexibility into production systems, in which changes in product volumes and types occur regularly. Manufacturing responsiveness can be achieved by RMS through reconfiguring the production facilities according to changing demands of products and new market conditions. The book addresses challenges of mass-customisation and dynamic changes in the supply-chain environment by focusing on developing new techniques related to integrability, scalability and re-configurability at a system level and manufacturing readiness in terms of financial and technical feasibility of RMS. It demonstrate the expected impacts of an RMS design on operational performance and its supply/value chain in the current/future manufacturing environment facing dynamic changes in the internal/external circumstances. In order to establish a circular economy through the RMS value chain, an integrated data-based reconfiguration link is introduced to incorporate information sharing amongst the value chain stakeholders and facilitate grouping products into families with allocation of the product families to the corresponding system configurations with optimal product-process allocation. Decision support systems such as multi criteria decision making tools are developed and applied for the selection of product families and optimising product-process configuration. The proposed models are illustrated through real case studies in applicable manufacturing firms.

The Internet has gone from an Internet of people to an Internet of Things (IoT). This has brought forth strong levels of complexity in handling interoperability that involves the integrating of wireless sensor networks (WSNs) into IoT. This book offers insights into the evolution, usage, challenges, and proposed countermeasures associated with the integration. Focusing on the integration of WSNs into IoT and shedding further light on the subtleties of such integration, this book aims to highlight the encountered problems and provide suitable solutions. It throws light on the various types of threats that can attack both WSNs and IoT along with the recent approaches to counter them. This book is designed to be the first choice of reference at research and development centers, academic institutions, university libraries, and any institution interested in the integration of WSNs into IoT. Undergraduate and postgraduate students, Ph.D. scholars, industry technologists, young entrepreneurs, and researchers working in the field of security and privacy in IoT are the primary audience of this book.

The agricultural sector can benefit immensely from developments in the field of smart farming. However, this research area focuses on providing specific fixes to particular situations and falls short on implementing data-driven frameworks that provide large-scale benefits to the industry as a whole. Using deep learning can bring immense data and improve our understanding of various earth sciences and improve farm services to yield better crop production and profit.

Smart Agricultural Services Using Deep Learning, Big Data, and IoT is an essential publication that focuses on the application of deep learning to agriculture. While highlighting a broad range of topics including crop models, cybersecurity, and sustainable agriculture, this book is ideally designed for engineers, programmers, software developers, agriculturalists, farmers, policymakers, researchers, academicians, and students.

Where To Download Intelligent Sensor Networks The Integration Of Sensor Networks Signal Processing And Machine Learning

This book exploits the benefits of integration of wireless sensor networks (WSN) and Internet of Things (IoT) for smart cities. The authors discuss WSN and IoT in tackling complex computing tasks and challenges in the fields of disaster relief, security, and weather forecasting (among many others). This book highlights the challenges in the field of quality of service metrics (QoS) in the WSN based IoT applications. Topics include IoT Applications for eHealth, smart environments, intelligent transportation systems, delay tolerant models for IoT applications, protocols and architectures for industrial IoT, energy efficient protocols, and much more. Readers will get to know the solutions of these problems for development of smart city applications with the integration of WSN with IoT.

The first encompassing treatise of this new, but very important field puts the known physical limitations for classic 2D electronics into perspective with the requirements for further electronics developments and market necessities. This two-volume handbook presents 3D solutions to the feature density problem, addressing all important issues, such as wafer processing, die bonding, packaging technology, and thermal aspects. It begins with an introductory part, which defines necessary goals, existing issues and relates 3D integration to the semiconductor roadmap of the industry. Before going on to cover processing technology and 3D structure fabrication strategies in detail. This is followed by fields of application and a look at the future of 3D integration. The contributions come from key players in the field, from both academia and industry, including such companies as Lincoln Labs, Fraunhofer, RPI, ASET, IMEC, CEA-LETI, IBM, and Renesas.

"This book focuses on the relevant research theme of warehousing and mining sensor network data, specifically for the database, data warehousing and data mining research communities"--Provided by publisher.

Intelligent Sensor NetworksThe Integration of Sensor Networks, Signal Processing and Machine LearningCRC Press

Structural health monitoring (SHM) uses one or more in situ sensing systems placed in or around a structure, providing real-time evaluation of its performance and ultimately preventing structural failure. Although most commonly used in civil engineering, such as in roads, bridges, and dams, SHM is now finding applications in other engineering environments, such as naval and aerospace engineering. Written by a highly respected expert in the field, Structural Sensing, Health Monitoring, and Performance Evaluation provides the first comprehensive coverage of SHM. The text begins with a review of the various types of sensors currently used in SHM, including point sensors and noncontact systems. Subsequent chapters explain the processing and interpretation of data from a number of sensors working in parallel. After considering issues related to the structures themselves, the author surveys the design of a tailor-made SHM system. He also presents a collection of case studies, many of which are drawn from his own experiences. Exploring the power of sensors, this book shows how SHM technologies can be applied to a variety of structures and systems, including multistory buildings, offshore wind energy plants, and ecological systems.

The escalating demand for ubiquitous computing along with the complementary and flexible natures of Radio Frequency Identification (RFID) and Wireless Sensor Networks (WSNs) have sparked an increase in the integration of these two dynamic technologies. Although a variety of applications can be observed under development and in practical use, there

Smart Environments contains contributions from leading researchers, describing techniques and issues related to developing and living in intelligent environments. Reflecting the multidisciplinary nature of the design of smart environments, the topics covered include the latest research in smart environment philosophical and computational architecture considerations, network protocols for smart environments, intelligent sensor networks and powerline control of devices, and action prediction and identification.

Smart Sensor Networks (WSNs) using AI have left a mark on the lives of all by aiding in various sectors, such as manufacturing, education, healthcare, and monitoring of the environment and industries. This book covers recent AI applications and explores aspects of modern sensor technologies and the systems needed to operate them. The book reviews the fundamental concepts of gathering, processing, and analyzing different AI-based models and methods. It covers recent WSN techniques for the purpose of effective network management on par with the standards laid out by international organizations in related fields and focuses on both core concepts along with major applicational areas. The book will be used by technical developers, academicians, data sciences, industrial professionals, researchers, and students interested in the latest innovations on problem-oriented processing techniques in sensor networks using IoT and evolutionary computer applications for Industry 4.0.

Combining different perspectives from materials science, engineering, and computer science, this reference provides a unified view of the various aspects necessary for the successful realization of intelligent systems. The editors and authors are from academia and research institutions with close ties to industry, and are thus able to offer first-hand information here. They adopt a unique, three-tiered approach such that readers can gain basic, intermediate, and advanced topical knowledge. The technology section of the book is divided into chapters covering the basics of sensor integration in materials, the challenges associated with this approach, data processing, evaluation, and validation, as well as methods for achieving an autonomous energy supply. The applications part then goes on to showcase typical scenarios where material-integrated intelligent systems are already in use, such as for structural health monitoring and smart textiles.

The rapid development of advanced, arguably, intelligent sensors and their massive deployment provide a foundation for new paradigms to combat the challenges that arise in significant tasks such as positioning, tracking, navigation, and smart sensing in various environments. Relevant advances in artificial intelligence (AI) and machine learning (ML) are also finding rapid adoption by industry and fan the fire. Consequently, research on intelligent sensing systems and technologies has attracted considerable attention during the past decade, leading to a variety of effective applications related to intelligent transportation, autonomous vehicles, wearable computing, wireless sensor networks (WSN), and the internet of things (IoT). In particular, the sensors community has a great interest in novel, intelligent information fusion, and data mining methods coupling AI and ML for substantial performance enhancement, especially for the challenging scenarios that make traditional approaches inappropriate. This reprint book has collected 14 excellent papers that represent state-of-the-art achievements in the relevant topics and provides cutting-edge coverage of recent advances in sensor signal and data mining techniques, algorithms, and approaches, particularly applied for positioning, tracking, navigation, and smart sensing.

This volume surveys recent research on autonomous sensor networks from the perspective of enabling technologies that support medical, environmental and military applications. State of the art, as well as emerging concepts in wireless sensor networks, body area networks and ambient assisted living introduce the reader to the field, while subsequent chapters deal in depth with established and related technologies, which render their implementation possible. These range from smart textiles and printed electronic devices to implanted devices and specialized packaging, including the most relevant technological features. The last four chapters are devoted to customization, implementation difficulties and outlook for these technologies in specific applications. Using wireless sensor networks as part of pervasive computing scenarios is a difficult problem. It involves providing functionality and node behavior required by pervasive computing applications given the very limited capabilities and the constraints of wireless sensor nodes. The goal of this work is to investigate the problem of integrating wireless sensor nodes and wireless sensor networks in pervasive computing scenarios and to develop solutions that facilitate such an integration. Based on an analysis of both research areas, of their specific properties and requirements as well as the similarities and differences of the two fields, we

identify and discuss a set of five fundamental problem areas that complicate the integration of sensor networks and pervasive computing: communication, network setup and configuration, user experience, security and flexibility and adaptability. In the main part of this work, we then introduce a total of six solution approaches that deal with different aspects of the identified problem areas.

Smart Sensors Networks: Communication Technologies and Intelligent Applications explores the latest sensor and sensor networks techniques and applications, showing how networked wireless sensors are used to monitor and gather intelligence from our surrounding environment. It provides a systematic look at the unique characteristics of wireless sensor networks through their usage in a broad range of areas, including healthcare for the elderly, energy consumption, industrial automation, intelligent transportation systems, smart homes and cities, and more. The book shows how sensor-networks work and how they are applied to monitor our surrounding environment. It explores the most important aspects of modern sensors technologies, providing insights on the newest technologies and the systems needed to operate them. Readers will find the book to be an entry point for understanding the fundamental differences between the various sensor technologies and their use in for different scenarios.

Indexing: The books of this series are submitted to EI-Compendex and SCOPUS Presents numerous specific use-cases throughout, showing practical applications of concepts Contains contributions from leading experts around the globe Collects, in one place, the latest thinking on an emerging topic Addresses the security and privacy issues inherent in sensor deployment Technologies in today?s society are rapidly developing at a pace that is challenging to stay up to date with. As an increasing number of global regions are implementing smart methods and strategies for sustainable development, they are continually searching for modern advancements within computer science, sensor networks, software engineering, and smart technologies. A compilation of research is needed that displays current applications of computing methodologies in the progression of global cities and how smart technologies are being utilized. **Sensor Network Methodologies for Smart Applications** is a collection of innovative research on the methods of intelligent systems and technologies and their various applications within sustainable development practices. While highlighting topics including machine learning, network security, and optimization algorithms, this book is ideally designed for researchers, scientists, developers, programmers, engineers, educators, policymakers, geographers, planners, and students seeking current research on smart technologies and sensor networks.

"This book explores current research on how to implement smart sensor networks, covering a range of perspectives and relevant topics, such as threat and attacks detection, lightweight crypto and security solutions, authentication and intrusion detection"-- This book provides a comprehensive analysis of Brooks-Iyengar Distributed Sensing Algorithm, which brings together the power of Byzantine Agreement and sensor fusion in building a fault-tolerant distributed sensor network. The authors analyze its long-term impacts, advances, and future prospects. The book starts by discussing the Brooks-Iyengar algorithm, which has made significant impact since its initial publication in 1996. The authors show how the technique has been applied in many domains such as software reliability, distributed systems and OS development, etc. The book exemplifies how the algorithm has enhanced new real-time features by adding fault-tolerant capabilities for many applications. The authors posit that the Brooks-Iyengar Algorithm will to continue to be used where fault-tolerant solutions are needed in redundancy system scenarios. This book celebrates S.S. Iyengar's accomplishments that led to his 2019 Institute of Electrical and Electronics Engineers' (IEEE) Cybermatics Congress "Test of Time Award" for his work on creating Brooks-Iyengar Algorithm and its impact in advancing modern computing.

This volume focuses on the theory and practice of data stream management, and the novel challenges this emerging domain poses for data-management algorithms, systems, and applications. The collection of chapters, contributed by authorities in the field, offers a comprehensive introduction to both the algorithmic/theoretical foundations of data streams, as well as the streaming systems and applications built in different domains. A short introductory chapter provides a brief summary of some basic data streaming concepts and models, and discusses the key elements of a generic stream query processing architecture. Subsequently, Part I focuses on basic streaming algorithms for some key analytics functions (e.g., quantiles, norms, join aggregates, heavy hitters) over streaming data. Part II then examines important techniques for basic stream mining tasks (e.g., clustering, classification, frequent itemsets). Part III discusses a number of advanced topics on stream processing algorithms, and Part IV focuses on system and language aspects of data stream processing with surveys of influential system prototypes and language designs. Part V then presents some representative applications of streaming techniques in different domains (e.g., network management, financial analytics). Finally, the volume concludes with an overview of current data streaming products and new application domains (e.g. cloud computing, big data analytics, and complex event processing), and a discussion of future directions in this exciting field. The book provides a comprehensive overview of core concepts and technological foundations, as well as various systems and applications, and is of particular interest to students, lecturers and researchers in the area of data stream management.

Wireless sensor networks have gained significant attention industrially and academically due to their wide range of uses in various fields. Because of their vast amount of applications, wireless sensor networks are vulnerable to a variety of security attacks. The protection of wireless sensor networks remains a challenge due to their resource-constrained nature, which is why researchers have begun applying several branches of artificial intelligence to advance the security of these networks. Research is needed on the development of security practices in wireless sensor networks by using smart technologies.

Deep Learning Strategies for Security Enhancement in Wireless Sensor Networks provides emerging research exploring the theoretical and practical advancements of security protocols in wireless sensor networks using artificial intelligence-based techniques. Featuring coverage on a broad range of topics such as clustering protocols, intrusion detection, and energy harvesting, this book is ideally designed for researchers, developers, IT professionals, educators, policymakers, practitioners, scientists, theorists, engineers, academicians, and students seeking current research on

integrating intelligent techniques into sensor networks for more reliable security practices.

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.

A complete guide to the state of the art theoretical and manufacturing developments of body sensor network, design, and algorithms In Body Sensor Networking, Design, and Algorithms, professionals in the field of Biomedical Engineering and e-health get an in-depth look at advancements, changes, and developments. When it comes to advances in the industry, the text looks at cooperative networks, noninvasive and implantable sensor microelectronics, wireless sensor networks, platforms, and optimization—to name a few. Each chapter provides essential information needed to understand the current landscape of technology and mechanical developments. It covers subjects including Physiological Sensors, Sleep Stage Classification, Contactless Monitoring, and much more. Among the many topics covered, the text also includes additions such as:

- ? Over 120 figures, charts, and tables to assist with the understanding of complex topics
- ? Design examples and detailed experimental works
- ? A companion website featuring MATLAB and selected data sets

Additionally, readers will learn about wearable and implantable devices, invasive and noninvasive monitoring, biocompatibility, and the tools and platforms for long-term, low-power deployment of wireless communications. It's an essential resource for understanding the applications and practical implementation of BSN when it comes to elderly care, how to manage patients with chronic illnesses and diseases, and use cases for rehabilitation.

The Sensors Series includes books on all aspects of the science and technology of sensors, measuring transducers, sensing systems and their applications. Titles in the series are written mainly at the graduate and professional level and are suitable for instrument and measurement scientists, engineers, and technologists in both academe and industry. This book provides a comprehensive survey of all the disparate elements that make up intelligent sensor system technologies. It proceeds from the basic philosophies of measurement and information to examples of modern applications which exploit the newly available signal processing power. The essential theoretical background for an understanding of the capabilities of systems is included in the early chapters, as is a survey of the available primary sensor mechanisms. There is a treatment of some of the relevant electronic measurement techniques as well as the enabling technologies which make intelligent sensors possible. The latter half of the book is a guide to the implementation of intelligent sensor systems, with an emphasis on the range of possibilities offered by the exploitation of digital electronic hardware and software. Practical examples range from one of the earliest devices, a smart magnetic sensor, to new results leading to the fully intelligent and adaptive load cell. Sensor networks are covered, with the inclusion of topologies and protocols. The latest advances in the exploitation of ASIC technology are also included. The book should be essential reading for any scientist or engineer engaged in sensor research or development, and will also be a useful course text for advanced students of the subject. John Brignell is Professor of Industrial Instrumentation in the department of electronics and computer science at the University of Southampton, UK. He has considerable experience of the industrial applications of sensor technology, and has been a pioneer in the development of intelligent and distributed sensing systems. Neil White is a research fellow working in the same department. His research interests include thick-film fabrication techniques aimed at smart-sensor applications and intelligent instrumentation. This book provides a comprehensive survey of all the disparate elements that make up intelligent sensor system technologies. It proceeds from the basic philosophies of measurement and information to examples of modern applications which exploit the newly available signal processing power. The essential theoretical background for an understanding of the capabilities of systems is included in the early chapters, as is a survey of the available primary sensor mechanisms. There is a treatment of some of the relevant electronic measurement techniques as well as the enabling technologies which make intelligent sensors possible. The latter half of the book is a guide to the implementation of intelligent sensor systems, with an emphasis on the range of possibilities offered by the exploitation of digital electronic hardware and software. Practical examples range from one of the earliest devices, a smart magnetic sensor, to new results leading to the fully intelligent and adaptive load cell. Sensor networks are covered, with the inclusion of topologies and protocols. The latest advances in the exploitation of ASIC technology are also included. The book should be essential reading for any scientist or engineer engaged in sensor research or development, and will also be a useful course text for advanced students of the subject.

Technological advancements in recent years have enabled the development of tiny, cheap disposable and self contained

battery powered computers, known as sensor nodes or “motes”, which can accept input from an attached sensor, process this input and transmit the results wirelessly to some interested device(s). When a number of these nodes work together, conceivably up to hundreds of thousands, a Wireless Sensor Network (WSN) is formed. Research in the area of wireless sensor networks has become increasingly widespread in recent years, partly due to their wide range of potential uses and also partly due to the fact that the technology enabling such networks is now widely available from many different suppliers, such as: Crossbow, MotelV, Intel and SUN (java based motes). These wireless sensor networks have the potential to allow a level of integration between computers and the physical world that, to date, has been virtually impossible. The uses for such networks is almost limitless and include such diverse applications as a counter sniper system for urban warfare [1] tracking the path of a forest fire [2], determining the structural stability of a building after an earthquake [3], or tracking people or objects inside a building [4], etc.

Software reuse and integration has been described as the process of creating software systems from existing software rather than building software systems from scratch. Whereas reuse solely deals with the artifacts creation, integration focuses on how reusable artifacts interact with the already existing parts of the specified transformation. Currently, most reuse research focuses on creating and integrating adaptable components at development or at compile time. However, with the emergence of ubiquitous computing, reuse technologies that can support adaptation and reconfiguration of architectures and components at runtime are in demand. This edited book includes 15 high quality research papers written by experts in information reuse and integration to cover the most recent advances in the field. These papers are extended versions of the best papers which were presented at IEEE International Conference on Information Reuse and Integration and IEEE International Workshop on Formal Methods Integration, which was held in San Francisco in August 2013.

This book reports on research on innovative human systems integration and human-machine interaction, with an emphasis on artificial intelligence and automation, as well as computational modeling and simulation. It covers a wide range of applications in the area of design, construction and operation of products, systems and services, including lifecycle development and human-technology interaction. The book describes advanced methodologies and tools for evaluating and improving interface usability, new models, as well as case studies and best practices in virtual, augmented and mixed reality systems, with a special focus on dynamic environments. It also discusses different factors concerning the human, hardware, and artificial intelligence software. Based on the proceedings of the 1st International Conference on Intelligent Human Systems Integration (IHSI 2018), held on January 7-9, 2018, in Dubai, United Arab Emirates, the book also examines the forces that are currently shaping the nature of computing and cognitive systems, such as the need for decreasing hardware costs; the importance of infusing intelligence and automation, and the related trend toward hardware miniaturization and power reduction; the necessity for a better assimilation of computation in the environment; and the social concerns regarding access to computers and systems for people with special needs. It offers a timely survey and a practice-oriented reference guide to policy- and decision-makers, human factors engineers, systems developers and users alike.

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