

Signal Processing For Intelligent Sensor Systems With Matlab 1 2 Second Edition Signal Processing And Communications

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.

In two editions spanning more than a decade, The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering. Our knowledge continues to grow, and so does the Handbook. For the third edition, it has expanded into a set of six books carefully focused on a specialized area or field of study. Each book represents a concise yet definitive collection of key concepts, models, and equations in its respective domain, thoughtfully gathered for convenient access. Sensors, Nanoscience, Biomedical Engineering, and Instruments provides thorough coverage of sensors, materials and nanoscience, instruments and measurements, and biomedical systems and devices, including all of the basic information required to thoroughly understand each area. It explores the emerging fields of sensors, nanotechnologies, and biological effects. Each article includes defining terms, references, and sources of further information. Encompassing the work of the world's foremost experts in their respective specialties, Sensors, Nanoscience, Biomedical Engineering, and Instruments features the latest developments, the broadest scope of coverage, and new material on multisensor data fusion and MEMS and NEMS.

Annotation This textbook for senior undergraduate or graduate students describes the design of intelligent autonomous computing systems for radar, sonar, medical and machinery health diagnosis. Swanson (Pennsylvania State University) covers data acquisition, systems modeling, signal filtering, adaptive filtering, Kalman filtering, system identification, wavenumber processing, pattern recognition, sensor systems, and noise cancellation techniques. Annotation c. Book News, Inc., Portland, OR (booknews.com).

As technology continues to develop, certain innovations are beginning to cover a wide range of applications, specifically mobile robotic systems. The boundaries between the various automation methods and their implementations are not strictly defined, with overlaps occurring. Specificity is required regarding the research and development of android systems and how they pertain to modern science. Control and Signal Processing Applications for Mobile and Aerial Robotic Systems is a pivotal reference source that provides vital research on the current state of control and signal processing of portable robotic designs. While highlighting topics such as digital systems, control theory, and mathematical methods, this publication explores original inquiry contributions and the instrumentation of mechanical systems in the industrial and scientific fields. This book is ideally designed for technicians, engineers, industry specialists, researchers, academicians, and students seeking current research on today's execution of mobile robotic schemes.

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.

This book provides a thorough theoretical and practical introduction to the application of neural networks to pattern recognition and intelligent signal processing. It has been tested on students, unfamiliar with neural networks, who were able to pick up enough details to successfully complete their masters or final year undergraduate projects. The text also presents a comprehensive

treatment of a class of neural networks called common bandwidth spherical basis function NNs, including the probabilistic NN, the modified probabilistic NN and the general regression NN. Contents: A Brief Historical Overview; Basic Concepts; ANN Performance Evaluation; Basic Pattern Recognition Principles; ADALINES, Adaptive Filters, and Multi-Layer Perceptrons; Probabilistic Neural Network Classifier; General Regression Neural Network; The Modified Probabilistic Neural Network; Advanced MPNN Developments; Neural Networks Similar to the Common Bandwidth Spherical Basis Function Regression ANNs; Unsupervised Learning Neural Networks; Other Neural Network Models; Statistical Learning Theory; Application to Intelligent Signal Processing; Application to Intelligent Control. Readership: Students and professionals in computer science and engineering.

Smart Sensors and MEMS: Intelligent Devices and Microsystems for Industrial Applications, Second Edition highlights new, important developments in the field, including the latest on magnetic sensors, temperature sensors and microreaction chambers. The book outlines the industrial applications for smart sensors, covering direct interface circuits for sensors, capacitive sensors for displacement measurement in the sub-nanometer range, integrated inductive displacement sensors for harsh industrial environments, advanced silicon radiation detectors in the vacuum ultraviolet (VUV) and extreme ultraviolet (EUV) spectral range, among other topics. New sections include discussions on magnetic and temperature sensors and the industrial applications of smart micro-electro-mechanical systems (MEMS). The book is an invaluable reference for academics, materials scientists and electrical engineers working in the microelectronics, sensors and micromechanics industry. In addition, engineers looking for industrial sensing, monitoring and automation solutions will find this a comprehensive source of information. Contains new chapters that address key applications, such as magnetic sensors, microreaction chambers and temperature sensors Provides an in-depth information on a wide array of industrial applications for smart sensors and smart MEMS Presents the only book to discuss both smart sensors and MEMS for industrial applications

This edited volume contains a selection of refereed and revised papers originally presented at the International Symposium on Signal Processing and Intelligent Recognition Systems (SIRS-2014), March 13-15, 2014, Trivandrum, India. The program committee received 134 submissions from 11 countries. Each paper was peer reviewed by at least three or more independent referees of the program committee and the 52 papers were finally selected. The papers offer stimulating insights into Pattern Recognition, Machine Learning and Knowledge-Based Systems; Signal and Speech Processing; Image and Video Processing; Mobile Computing and Applications and Computer Vision. The book is directed to the researchers and scientists engaged in various field of signal processing and related areas.

"Intelligent Sensing, Instrumentation and Measurements" addresses issues towards the development of sensor nodes for wireless Sensor Networks. The fundamentals of sensors, interfacing, power supplies, configuration of sensor node, and GUI development are covered. The book will be useful for engineers and researchers in the field ,especially for higher undergraduate and postgraduate students as well as practitioners working on the development of Wireless Sensor Networks or Smart Sensors.

This highly experienced author sets out to build a bridge between two inter-disciplinary power engineering practices. The book looks into two major fields used in modern power systems: intelligent systems and the signal processing. The intelligent systems section comprises fuzzy logic, neural network and support vector machine. The author looks at relevant theories on the topics without assuming much particular background. Following the theoretical basics, he studies their applications in various problems in power engineering, like, load forecasting, phase balancing, or disturbance analysis.

In the current age of information explosion, newly invented technological sensors and software are now tightly integrated with our everyday lives. Many sensor processing algorithms have incorporated some forms of computational intelligence as part of their core framework in problem solving. These algorithms have the capacity to generalize and discover knowledge for themselves and learn new information whenever unseen data are captured. The primary aim of sensor processing is to develop techniques to interpret, understand, and act on information contained in the data. The interest of this book is in developing intelligent signal processing in order to pave the way for smart sensors. This involves mathematical advancement of nonlinear signal processing theory and its applications that extend far beyond traditional techniques. It bridges the boundary between theory and application, developing novel theoretically inspired methodologies targeting both longstanding and emergent signal processing applications. The topic ranges from phishing detection to integration of terrestrial laser scanning, and from fault diagnosis to bio-inspired filtering. The book will appeal to established practitioners, along with researchers and students in the emerging field of smart sensors processing.

Echo Signal Processing is designed for engineers and scientists who have an interest in signal processing and/or acoustics and are working in areas related to echo-location and sonar. Academics who are teaching signal processing courses in detection and estimation relating to echo-location can use the book either as a primary text or as a backup source. This book presents introductory and advanced topics in the areas of signal theory and processing as specifically applied to acoustic echo-location. It is written at the senior undergraduate or graduate level and assumes some familiarity with signal processing subjects such as linear and complex algebra, probability, advanced calculus, and linear system theory. The material is presented as a logical development starting with the basic principles of signal theory and proceeds to the development of topics in detection and estimation theory, waveform design, echo modeling, scattering theory, and spatial processing. Echo Signal Processing addresses the practical as well as theoretical aspects of receiver and waveform design and should be of interest to the practicing engineer as well as the student. Numerous examples demonstrating the concepts are provided and important relationships are boxed. The book departs from many radar-oriented texts as the effects of relative motion are treated in terms of the dilation of the signal time base rather than as a simple Doppler frequency shift. The fundamental detection, estimation, time dilation, and waveform theory presented is of a general nature and applicable to communications and radar as well as sonar.

Signal Processing for Intelligent Sensor Systems with MATLABCRC Press

DAQ and data processing is a basic part of all automated production systems, diagnostic systems, watching over quality of production, energy distribution, transport control or in various other areas. Demands on the speed, accuracy and reliability increase in general. It is possible to achieve not only using superior (but also more expensive) hardware, but also applying advanced data acquisition and intelligent data processing. It deals e.g. optimal data fusion of a number of sensors, new stochastic methods for accuracy increasing, new algorithms for acceleration of data processing, etc. These are the grounds for publishing this book. Advanced Data Acquisition and Intelligent Data Processing offers 10 up-to-date examples of different applications of

advanced data acquisition and intelligent data processing used in monitoring, measuring and diagnostics systems. The book arose based on the most interesting papers from this area published at IDAACS'2013 conference. However, the individual chapters include not only designed solution in wider context but also relevant theoretical parts, achieved results and possible future ways. Technical topics discussed in this book include: advanced methods of data acquisition in application that are not routine; measured data fusion using up-to-date advanced data processing; nonlinear dynamical systems identification; multidimensional image processing. Advanced Data Acquisition and Intelligent Data Processing is ideal for personnel of firms deals with advanced instrumentation, energy consumption monitoring, environment monitoring, non-destructive diagnostics robotics, etc., as well as academic staff and postgraduate students in electrical, control and computer engineering.

This final report describes the accomplishments of the General Purpose Intelligent Sensor Interface task of the Applications of Artificial Intelligence to Space Station grant for the period from October 1, 1987 through September 30, 1988. Portions of the First Biannual Report not revised will not be included but only referenced. The goal is to develop an intelligent sensor system that will simplify the design and development of expert systems using sensors of the physical phenomena as a source of data. This research will concentrate on the integration of image processing sensors and voice processing sensors with a computer designed for expert system development. The result of this research will be the design and documentation of a system in which the user will not need to be an expert in such areas as image processing algorithms, local area networks, image processor hardware selection or interfacing, television camera selection, voice recognition hardware selection, or analog signal processing. The user will be able to access data from video or voice sensors through standard LISP statements without any need to know about the sensor hardware or software. Mckee, James W. Unspecified Center...

"IEEE Press is proud to present the first selected reprint volume devoted to the new field of intelligent signal processing (ISP). ISP differs fundamentally from the classical approach to statistical signal processing in that the input-output behavior of a complex system is modeled by using "intelligent" or "model-free" techniques, rather than relying on the shortcomings of a mathematical model. Information is extracted from incoming signal and noise data, making few assumptions about the statistical structure of signals and their environment. Intelligent Signal Processing explores how ISP tools address the problems of practical neural systems, new signal data, and blind fuzzy approximators. The editors have compiled 20 articles written by prominent researchers covering 15 diverse, practical applications of this nascent topic, exposing the reader to the signal processing power of learning and adaptive systems. This essential reference is intended for researchers, professional engineers, and scientists working in statistical signal processing and its applications in various fields such as humanistic intelligence, stochastic resonance, financial markets, optimization, pattern recognition, signal detection, speech processing, and sensor fusion. Intelligent Signal Processing is also invaluable for graduate students and academics with a background in computer science, computer engineering, or electrical engineering. About the Editors Simon Haykin is the founding director of the Communications Research Laboratory at McMaster University, Hamilton, Ontario, Canada, where he serves as university professor. His research interests include nonlinear dynamics, neural networks and adaptive filters and their applications in radar and communications systems. Dr. Haykin is the editor for a series of books on "Adaptive and Learning Systems for Signal Processing, Communications and Control" (Publisher) and is both an IEEE Fellow and Fellow of the Royal Society of Canada. Bart Kosko is a past director of the University of Southern California's (USC) Signal and Image Processing Institute. He has authored several books, including Neural Networks and Fuzzy Systems, Neural Networks for Signal Processing (Publisher, copyright date) and Fuzzy Thinking (Publisher, copyright date), as well as the novel Nanotime (Publisher, copyright date). Dr. Kosko is an elected governor of the International Neural Network Society and has chaired many neural and fuzzy system conferences. Currently, he is associate professor of electrical engineering at USC."

In the current age of information explosion, newly invented technological sensors and software are now tightly integrated with our everyday lives. Many sensor processing algorithms have incorporated some forms of computational intelligence as part of their core framework in problem-solving. These algorithms have the capacity to generalize and discover knowledge for themselves and to learn new information whenever unseen data are captured. The primary aim of sensor processing is to develop techniques to interpret, understand, and act on information contained in the data. The interest of this book is in developing intelligent signal processing in order to pave the way for smart sensors. This involves the mathematical advancement of nonlinear signal processing theory and its applications that extend far beyond traditional techniques. It bridges the boundary between theory and application, developing novel theoretically inspired methodologies targeting both longstanding and emergent signal processing applications. The topics range from phishing detection to integration of terrestrial laser scanning, and from fault diagnosis to bio-inspired filtering. The book will appeal to established practitioners, along with researchers and students in the emerging field of smart sensor signal processing.

With contributions from an internationally-renowned group of experts, this book uses a multidisciplinary approach to review recent developments in the field of smart sensor systems, covering important system and design aspects. It examines topics over the whole range of sensor technology from the theory and constraints of basic elements, physics and electronics, up to the level of application-oriented issues. Developed as a complementary volume to 'Smart Sensor Systems' (Wiley 2008), which introduces the basics of smart sensor systems, this volume focuses on emerging sensing technologies and applications, including: State-of-the-art techniques for designing smart sensors and smart sensor systems, including measurement techniques at system level, such as dynamic error correction, calibration, self-calibration and trimming. Circuit design for sensor systems, such as the design of precision instrumentation amplifiers.

Impedance sensors, and the associated measurement techniques and electronics, that measure electrical characteristics to derive physical and biomedical parameters, such as blood viscosity or growth of micro-organisms. Complete sensor systems-on-a-chip, such as CMOS optical imagers and microarrays for DNA detection, and the associated circuit and micro-fabrication techniques. Vibratory gyroscopes and the associated electronics, employing mechanical and electrical signal amplification to enable low-power angular-rate sensing. Implantable smart sensors for neural interfacing in bio-medical applications. Smart combinations of energy harvesters and energy-storage devices for autonomous wireless sensors. Smart Sensor Systems: Emerging Technologies and Applications will greatly benefit final-year undergraduate and postgraduate students in the areas of electrical, mechanical and chemical engineering, and physics. Professional engineers and researchers in the microelectronics industry, including microsystem developers, will also find this a thorough and useful volume.

Advances in materials science and engineering have paved the way for the development of new and more capable sensors. Drawing upon case studies from manufacturing and structural

monitoring and involving chemical and long wave-length infrared sensors, this book suggests an approach that frames the relevant technical issues in such a way as to expedite the consideration of new and novel sensor materials. It enables a multidisciplinary approach for identifying opportunities and making realistic assessments of technical risk and could be used to guide relevant research and development in sensor technologies.

Sensors are the front end devices for information acquisition from the natural and/or artificial world. Higher performance of advanced sensing systems is achieved by using various types of machine intelligence. Intelligent sensors are smart devices with signal processing functions shared by distributed machine intelligence. Typical examples of intelligent sensors are the receptors and dedicated signal processing systems of the human sensory systems. The most important job of information processing in the sensory system is to extract necessary information from the receptors signals and transmit the useful information to the brain. This dedicated information processing is carried out in a distributed manner to reduce the work load of the brain. The processing also lightens the load of signal transmission through the neural network, the capacity of which is limited. Although the performance of the receptors in our human sensory system is not always ideal and is frequently inferior to that of man-made sensors, the total performance is usually far superior to those of our technical sensing systems. The weak points of human receptors are masked by the information processing. This processing makes our sensory system adaptable to the environment and optimizes system performance. The basic idea of this book, which contains new computing paradigms, is that the most advanced intelligent sensing system is the human sensory system. Section I reviews the technologies of intelligent sensors and discusses how they developed. Typical approaches for the realization of intelligent sensors emphasizing the architecture of intelligent sensing systems are also described. In section II, fundamental technologies for the fabrication of intelligent sensors and actuators are presented. Integration and micro-miniaturization techniques are emphasized. Section III presents advanced technologies approaching human sensory systems, these technologies are not directly aimed at practical applications, but introduce the readers to the development of engineering models of sensory systems. Technologies of integrated intelligent sensors, which will shortly be in use are introduced in section IV. In section V, examples are given of intelligent sensing systems which are used in industrial installations. Hardware for machine intelligence is not integrated at present, but can soon be implemented in the monolithic integrated structure. Without this machine intelligence, new functions, for example, self diagnosis or defects identification, cannot be realized. This section also demonstrates the potential of intelligent sensors in industry. Section VI introduces two interesting topics which are closely related to intelligent sensing systems. The first one is multisensor fusion. It is expected to be one of the fundamental and powerful technologies for realizing an advanced intelligent sensing systems. The second is visualizing technology of the sensed states for easy comprehension of the dynamic multi-dimensional state. This is useful for intelligent man-machine interfaces. This book will be recognised by readers as a milestone in the rapid progress of intelligent sensors.

Intelligent Computing for Interactive System Design provides a comprehensive resource on what has become the dominant paradigm in designing novel interaction methods, involving gestures, speech, text, touch and brain-controlled interaction, embedded in innovative and emerging human-computer interfaces. These interfaces support ubiquitous interaction with applications and services running on smartphones, wearables, in-vehicle systems, virtual and augmented reality, robotic systems, the Internet of Things (IoT), and many other domains that are now highly competitive, both in commercial and in research contexts. This book presents the crucial theoretical foundations needed by any student, researcher, or practitioner working on novel interface design, with chapters on statistical methods, digital signal processing (DSP), and machine learning (ML). These foundations are followed by chapters that discuss case studies on smart cities, brain-computer interfaces, probabilistic mobile text entry, secure gestures, personal context from mobile phones, adaptive touch interfaces, and automotive user interfaces. The case studies chapters also highlight an in-depth look at the practical application of DSP and ML methods used for processing of touch, gesture, biometric, or embedded sensor inputs. A common theme throughout the case studies is ubiquitous support for humans in their daily professional or personal activities. In addition, the book provides walk-through examples of different DSP and ML techniques and their use in interactive systems. Common terms are defined, and information on practical resources is provided (e.g., software tools, data resources) for hands-on project work to develop and evaluate multimodal and multi-sensor systems. In a series of in-chapter commentary boxes, an expert on the legal and ethical issues explores the emergent deep concerns of the professional community, on how DSP and ML should be adopted and used in socially appropriate ways, to most effectively advance human performance during ubiquitous interaction with omnipresent computers. This carefully edited collection is written by international experts and pioneers in the fields of DSP and ML. It provides a textbook for students and a reference and technology roadmap for developers and professionals working on interaction design on emerging platforms.

Signal Processing for Intelligent Sensors with MATLAB®, Second Edition once again presents the key topics and salient information required for sensor design and application. Organized to make it accessible to engineers in school as well as those practicing in the field, this reference explores a broad array of subjects and is divided into sections: Fundamentals of Digital Signal Processing, Frequency Domain Processing, Adaptive System Identification and Filtering, Wavenumber Sensor Systems, and Signal Processing Applications. Taking an informal, application-based approach and using a tone that is more engineer-to-engineer than professor-to-student, this revamped second edition enhances many of the features that made the original so popular. This includes retention of key algorithms and development methodologies and applications, which are creatively grouped in a way that differs from most comparable texts, to optimize their use. New for the Second Edition: Inclusion of more solved problems Web access to a large collection of MATLAB® scripts used to support data graphs presented throughout the book Additional coverage of more audio engineering, transducers, and sensor networking technology A new chapter on Digital Audio processing reflects a growing interest in digital surround sound (5.1 audio) techniques for entertainment, home theaters, and virtual reality systems New sections on sensor networking, use of meta-data architectures using XML, and agent-based automated data mining and control Serving dual roles as both a learning resource and a field reference on sensor system networks, this book progressively reveals digestible nuggets of critical information to help readers quickly master presented algorithms and adapt them to meet their requirements. It illustrates the current trend toward agile development of web services for wide area sensor networking and intelligent processing in the sensor system networks that are employed in homeland security, business, and environmental and demographic information systems.

Providing quality research for the reader, this title encompasses all the recent developments in smart sensor technology for health monitoring in aerospace structures, providing a valuable introduction to damage detection techniques. Focussing on engineering applications, all chapters are written by smart structures and materials experts from aerospace manufacturers and research/academic institutions. This key reference: Discusses the most important aspects related to smart technologies for damage detection; this includes not only monitoring techniques but also aspects related to specifications, design parameters, assessment and qualification routes. Presents real case studies and applications; this includes in-flight tests; the work presented goes far beyond academic research applications. Displays a balance between theoretical developments and engineering applications

There have been significant developments in the design and application of algorithms for both one-dimensional signal processing and multidimensional signal processing, namely image and video processing, with the recent focus changing from a step-by-step procedure of designing the algorithm first and following up with in-depth analysis and performance improvement to instead applying heuristic-based methods to solve signal-processing problems. In this book the contributing authors demonstrate both general-purpose algorithms and those aimed at solving specialized application problems, with a special emphasis on heuristic iterative optimization methods employing modern evolutionary and swarm intelligence based techniques. The applications considered are in domains such as communications engineering, estimation and tracking, digital filter design, wireless sensor networks, bioelectric signal classification, image denoising, and image feature tracking. The book presents interesting, state-of-the-art methodologies for solving real-world problems and it is a suitable reference for researchers and engineers in the areas of heuristics and signal processing.

Building on the unique features that made the first edition a bestseller, this second edition includes additional solved problems and web access to the large collection of MATLAB™ scripts that are highlighted throughout the text. The book offers expanded coverage of audio engineering, transducers, and sensor networking technology. It also includes new chapters on digital audio processing, as well as acoustics and vibrations transducers. The text addresses the use of meta-data architectures using XML and agent-based automated data mining and control. The numerous algorithms presented can be applied locally or network-based to solve complex detection problems.

A Beginners Guide to Data Agglomeration and Intelligent Sensing provides an overview of the Sensor Cloud Platform, Converge-casting, and Data Aggregation in support of intelligent sensing and relaying of information. The book begins with a brief introduction on sensors and transducers, giving readers insight into the various types of sensors and how one can work with them. In addition, it gives several real-life examples to help readers properly understand concepts. An overview of concepts such as wireless sensor networks, cloud platforms, and device-to-cloud and sensor cloud architecture are explained briefly, as is data gathering in wireless sensor networks and aggregation procedures. Final sections explore how to process gathered data and relay the data in an intelligent way, including concepts such as supervised and unsupervised learning, software defined networks, sensor data mining and smart systems. Presents the latest advances in data agglomeration for intelligent sensing Discusses the basic concepts of sensors, real-life applications of sensors and systems, the protocols and applications of wireless sensor networks, the methodology of sensor data accumulation, and real-life applications of Intelligent Sensor Networks Provides readers with an easy-to-learn and understand introduction to the concepts of the cloud platform, Sensor Cloud and Machine Learning

In recent years, MEMS have revolutionized the semiconductor industry, with sensors being a particularly buoyant sector. Smart MEMS and Sensor Systems presents readers with the means to understand, evaluate, appreciate and participate in the development of the field, from a unique systems perspective. The combination of MEMS and integrated intelligence has been put forward as a disruptive technology. The full potential of this technology is only evident when it is used to construct very large pervasive sensing systems. The book explores the many different technologies needed to build such systems and integrates knowledge from three different domains: MEMS technology, sensor system electronics and pervasive computing science. Throughout the book a top-down design perspective is taken, be it for the development of a single smart sensor or that of adaptive ad-hoc networks of millions of sensors. For experts in any of the domains named above the book provides the context for their MEMS based design work and an understanding of the role the other domains play. For the generalist (either in engineering or computing) or the technology manager the underpinning knowledge is provided, which can inform specialist decision making. Contents: Markets and Applications Microfabrication Technologies Sensor Electronics Sensor Signal Enhancement Case Study: Control Systems for Capacitive Inertial Sensors Case Study: Adaptive Optics and Smart VLSI/MEMS Systems Artificial Intelligence Techniques for Microsensors Identification and Compensation Smart, Intelligent and Cogent MEMS Based Sensors Sensor Arrays and Networks Wireless and Ad Hoc Sensor Networks Realising the Dream — A Case Study Readership: Graduate students on courses in sensing, instrumentation, VLSI, and MEMS technology; researchers and academics dealing with smart sensor systems; practitioners who need to understand and apply the technology effectively. Key Features: Provides a unique systems perspective on established MEMS sensor design techniques Presents state-of-the-art developments through surveys and original research by the authors Introduces new ideas for future designs of intelligent and cogent/autonomous sensors and sensor networks Has a good balance of technology/fabrication processes vs signal processing and concept- level discussion Aims at the multidisciplinary community involved in designing, producing and using MEMS sensors Keywords: MEMS; Sensor; Smart; Intelligent; Distributed Systems

This book presents ways of interfacing sensors to the digital world, and discusses the marriage between sensor systems and the IoT: the opportunities and challenges. As sensor output is often affected by noise and interference, the book presents effective schemes for recovering the data from a signal that is buried in noise. It also explores interesting applications in the area of health care, un-obstructive monitoring and the electronic nose and tongue. It is a valuable resource for engineers and scientists in the area of sensors

and interfacing wanting to update their knowledge of the latest developments in the field and learn more about sensing applications and challenges.

From simple thermistors to intelligent silicon microdevices with powerful capabilities to communicate information across networks, sensors play an important role in such diverse fields as biomedical and chemical engineering to wireless communications. Introducing a new dependent count method for frequency signal processing, this book presents a practical approach to the design of signal processing sensors. Modern advanced microsensors technologies require new and equally advanced methods of frequency signal processing in order to function at increasingly high speeds. The authors provide a comprehensive overview of data acquisition and signal processing methods for the new generation of smart and quasi-smart sensors. The practical approach of the text includes coverage of the design of signal processing methods for digital, frequency, period, duty-cycle and time interval sensors. * Contains numerous practical examples illustrating the design of unique signal processing sensors and transducers * Details traditional, novel, and state of the art methods for frequency signal processing * Coverage of the physical characteristics of smart sensors, development methods and applications potential * Outlines the concept, principles and nature of the method of dependent count (MDC) ; a unique method for frequency signal processing, developed by the authors This text is a leading edge resource for measurement engineers, researchers and developers working in microsensors, MEMS and microsystems, as well as advanced undergraduates and graduates in electrical and mechanical engineering.

Smartness is often associated with living beings, as they can adapt themselves to changing situations. Artificial smart structures are designed to mimic biological structures to a small or large extent. This book gives a comprehensive account of how this can be done. It will be of interest to students and professionals in science and engineering.

Signal Processing for Intelligent Sensors with MATLAB, Second Edition once again presents the key topics and salient information required for sensor design and application.

Organized to make it accessible to engineers in school as well as those practicing in the field, this reference explores a broad array of subjects and is divided into sections:

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

In the last decade, wireless or wired sensor networks have attracted much attention. However, most designs target general sensor network issues including protocol stack (routing, MAC, etc.) and security issues. This book focuses on the close integration of sensing, networking, and smart signal processing via machine learning. Based on their world-class research, the authors present the fundamentals of intelligent sensor networks. They cover sensing and sampling, distributed signal processing, and intelligent signal learning. In addition, they present cutting-edge research results from leading experts.

Intelligent sensors are revolutionizing the world of system design in everything from sports cars to assembly lines. These new sensors have abilities that leave their predecessors in the dust! They not only measure parameters efficiently and precisely, but they also have the ability to enhance and interrupt those measurements, thereby transforming raw data into truly useful information. Unlike many embedded systems books that confine themselves strictly to firmware and software, this book also delves into the supporting electronic hardware, providing the reader with a complete understanding of the issues involved when interfacing to specific types of sensor and offering insight into the real-world problems designers will face. The examples provide a complete, easily extensible code framework for sensor-based applications as well as basic support routines that are often ignored or treated superficially. The goal throughout is to make readers truly productive as quickly as possible while providing the thorough understanding necessary to design robust systems. Readers will gain in-depth, real-world design information that will help them be more productive and get up to speed on sensor design skills more quickly. The book provides designers and students a leg up in a relatively new design area, imparting knowledge about a new microcontroller that offers some of the functionality of a DSP chip. Quickly teaches the reader to design the new wave in sensor technology, "intelligent" sensors In-depth design techniques, real-world examples, detailed figures and usable code Application chapters thoroughly exploring temperature, pressure and load, and flow sensors

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