Data Acquisition And Signal Processing For Smart Sensors Pdf

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Advanced Data Acquisition and Intelligent Data Processing Vladimir Haasz 2014-05-15 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.

Advances in Signal Processing and Intelligent Recognition Systems Sabu M. Thampi 2017-09-12 This Edited Volume gathers a selection of refereed and revised papers originally presented at the Third International Symposium on Signal Processing and Intelligent Recognition Systems (SIRS’17), held on September 13–16, 2017 in Manipal, India. The papers offer stimulating insights into biometrics, digital watermarking, recognition systems, image and video processing, signal and speech processing, pattern recognition, machine learning and knowledge-based systems. Taken together, they offer a valuable resource for all researchers and scientists engaged in the various fields of signal processing and related areas. System Health Management Stephen B Johnson 2011-06-01 System Health Management: with Aerospace Applications provides the first complete reference text for System Health Management (SHM), the set of technologies and processes used to improve system dependability. Edited by a team of engineers and consultants with SHM design, development, and research experience from NASA, industry, and academia, each heading up sections in their own areas of expertise and co-coordinating contributions from leading experts, the book collates together in one text the state-of-the-art in SHM research, technology, and applications. It has been written primarily as a reference text for practitioners, for those in related disciplines, and for graduate students in aerospace or systems engineering. There are many technologies involved in SHM and no single person can be an expert in all aspects of the discipline. System Health Management: with Aerospace Applications provides an introduction to the major technologies, issues, and references in these disparate but related SHM areas. Since SHM has evolved most rapidly in aerospace, the various applications described in this book are taken primarily from the aerospace industry. However, the theories, techniques, and technologies discussed are applicable to many engineering disciplines and application areas. Readers will find sections on the basic theories and concepts of SHM, how it is applied in the system life cycle (architecture, design, verification and validation, etc.), the most important methods used (reliability, quality assurance, diagnostics, prognostics, etc.), and how SHM is applied in operations (commercial aircraft, launch operations, logistics, etc.), to subsystems (electrical power, structures, flight controls, etc.) and to system applications (robotic spacecraft, tactical missiles, rotorcraft, etc.). Renewable and Alternative Energy: Concepts, Methodologies, Tools, and Applications Management Association, Information Resources 2016-10-19
As the human population expands and natural resources become depleted, it becomes necessary to explore other sources for energy consumption and usage. Renewable and Alternative Energy: Concepts, Methodologies, Tools, and Applications provides a comprehensive overview of emerging perspectives and innovations for alternative energy sources. Highlighting relevant concepts on energy efficiency, current technologies, and ongoing industry trends, this is an ideal reference source for academics, practitioners, professionals, and upper-level students interested in the latest research on renewable energy.

Real-Time Data Acquisition in Human Physiology Dipali Bansal 2021-06-15 Real-Time Data Acquisition in Human Physiology: Real-Time Acquisition, Processing, and Interpretation—A MATLAB-Based Approach focuses on the design and development of a computer-based system to detect and digitally process human ECG, EMG, and carotid pulse waveforms in real time. The indigenous system developed and described in this book allows for an easy-to-interface, simple hardware arrangement for bio-signal detection. The computational functionality of MATLAB is verified for viewing, digital filtration, and feature extraction of acquired bio-signals.

This book demonstrates a method of providing a relatively cost-effective solution to human physiology real-time monitoring, processing, and interpretation that is more realizable and would directly benefit a larger population of patients. Presents an application-driven, interdisciplinary, and experimental approach to bio-signal processing with a focus on acquiring, processing, and understanding human ECG, EMG, carotid pulse data, and HRV. Covers instrumentation and digital signal processing techniques useful for detecting and interpreting human physiology in real time, including experimental layout and methodology in an easy-to-understand manner. Discusses development of a computer-based system that is capable of direct interface through the sound port of a PC and does not require proprietary DAQ units and ADC units. Covers a MATLAB-based algorithm for online noise reduction, features extraction techniques, and infers diagnostic features in real time. Provides proof of concept of a PC-based twin channel acquisition system for the recognition of multiple physiological parameters. Establishes the use of Digital Signal Controller to enhance features of acquired human physiology. Presents the use of carotid pulse waveforms for HRV analysis in critical situations using a very simple hardware/software arrangement.

Application of Machine Learning and Deep Learning Methods to Power System Problems Morteza Nazari-Heris 2021-11-21 This book evaluates the role of innovative machine learning and deep learning methods in dealing with power system issues, concentrating on recent developments and advances that improve planning, operation, and control of power systems. Cutting-edge case studies from around the world consider prediction, classification, clustering, and fault/event detection in power systems, providing effective and promising solutions for many novel challenges faced by power system operators. Written by leading experts, the book will be an ideal resource for researchers and engineers working in the electrical power engineering and power system planning communities, as well as students in advanced graduate-level courses.

Smart Sensors and MEMS S Nhtianov 2018-03-09 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-electromechanical 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.

Biomedical Signal Processing for Healthcare Applications Varun Bajaj 2021-07-21 This book examines the use of biomedical signal processing—EEG, EMG, and ECG—in analyzing and diagnosing various medical conditions, particularly diseases related to the heart and brain. In combination with machine learning tools and other optimization methods, the analysis of biomedical signals greatly benefits the healthcare sector by improving patient outcomes through early, reliable detection. The discussion of these modalities promotes better understanding, analysis, and application of biomedical signal processing for specific diseases. The major highlights of Biomedical Signal Processing for Healthcare Applications include biomedical signals, acquisition of signals, pre-processing and analysis, post-processing and classification of the signals, and application of analysis and classification for the diagnosis of brain- and heart-related diseases. Emphasis is given to brain and heart signals because incomplete interpretations are made by physicians of these aspects in several situations, and these partial interpretations lead to major complications. FEATURES Examines modeling and acquisition of biomedical signals of different disorders. Discusses CAD-based analysis of diagnosis useful for healthcare. Includes all important modalities of biomedical signals, such as EEG, EMG, MEG, ECG, and PCG. Includes case studies and research directions, including novel approaches used in
advanced healthcare systems. This book can be used by a wide range of
users, including students, research scholars, faculty, and practitioners in
the field of biomedical engineering and medical image analysis and
diagnosis.

**ECG Signal Processing, Classification and Interpretation**
Adam Gacek
2011-09-18
The book shows how the various paradigms of computational
intelligence, employed either singly or in combination, can produce an
effective structure for obtaining often vital information from ECG signals.
The text is self-contained, addressing concepts, methodology, algorithms,
and case studies and applications, providing the reader with the necessary
backlog augmented with step-by-step explanation of the more
advanced concepts. It is structured in three parts: Part I covers the
fundamental ideas of computational intelligence together with the relevant
principles of data acquisition, morphology and use in diagnosis; Part II
deals with techniques and models of computational intelligence that are
suitable for signal processing; and Part III details ECG system-diagnostic
interpretation and knowledge acquisition architectures. Illustrative material
includes: brief numerical experiments; detailed schemes, exercises and
more advanced problems.

**Power Systems Signal Processing for Smart Grids**
Paulo Fernando Ribeiro
2013-09-20
With special relation to smart grids, this book provides
comprehensive explanation of how Digital Signal
Processing (DSP) and Computational Intelligence (CI) techniques can be
applied to solve problems in the power system. Its unique coverage bridges
the gap between DSP, electrical power and energy engineering systems,
showing many different techniques applied to typical and expected system
conditions with practical power system examples. Surveying all recent
advances on DSP for power systems, this book enables engineers and
researchers to understand the current state of the art and to develop new
tools. It presents: an overview on the power system and electric signals,
with description of the basic concepts of DSP commonly found in
powersystem problems the application of several signal processing tools to
to problems; looking at power signal estimation and decomposition,
pattern recognition techniques, detection of the power system
signal variations description of DSP in relation to measurements, power
quality, monitoring, protection and control, and wide area monitoring a
companion website with real signal data, several Matlab codes with
examples, DSP scripts and samples of signals for further processing,
understanding and analysis Practicing power systems engineers and utility
engineers will find this book invaluable, as will researchers of electrical
power and energy systems, postgraduate electrical engineering
students, and staff at utility companies.

**Material-Integrated Intelligent Systems**
Stefan Bosse
2018-02-06
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
case typical scenarios where material-integrated intelligent systems
are already in use, such as for structural health monitoring and smart
textiles.

**Signal Processing for Intelligent Sensor Systems**
David C. Swanson
2000-04-18
"Integrates a broad range of physics, algorithms, and sensing
techniques for development of intelligent systems. Highlights adaptive
least-squared error modeling. Covers complex sampling, physical system
modeling using digital filters, frequency domain processing, beamforming,
and much more."

**Sensors for Health Monitoring**
Nilanjan Dey
2019-09-09
Sensors for Health Monitoring discusses the characteristics of U-Healthcare systems in
different domains, providing a foundation for working professionals and
undergraduate and postgraduate students. The book provides information
and advice on how to choose the best sensors for a U-Healthcare system,
advises and guides readers on how to overcome challenges relating to
data acquisition and signal processing, and presents comprehensive
coverage of up-to-date requirements in hardware, communication and
calculation for next-generation U-Health systems. It then compares new
technological and technical trends and discusses how they address
expected U-Health requirements. In addition, detailed information on
system operations is presented and challenges in ubiquitous computing
are highlighted. The book not only helps beginners with a holistic approach
toward understanding U-Health systems, but also presents researchers
with the technological trends and design challenges they may face when
designing such systems. Presents an outstanding update on the use of U-
Health data analysis and management tools in different applications,
highlighting sensor systems. Highlights Internet of Things enabled U-
Healthcare Covers different data transmission techniques, applications and
challenges with extensive case studies for U-Healthcare systems

**Signal Processing for Neuroscientists**
Wim van Drongelen
2006-12-18
Signal Processing for Neuroscientists introduces analysis techniques
primarily aimed at neuroscientists and biomedical engineering students
with a reasonable but modest background in mathematics, physics, and
computer programming. The focus of this text is on what can be
considered the ‘golden trio’ in the signal processing field: averaging,
Fourier analysis, and filtering. Techniques such as convolution, correlation,
coherence, and wavelet analysis are considered in the context of time and
frequency domain analysis. The whole spectrum of signal analysis is
covered, ranging from data acquisition to data processing; and from the mathematical background of the analysis to the practical application of processing algorithms. Overall, the approach to the mathematics is informal with a focus on basic understanding of the methods and their interrelationships rather than detailed proofs or derivations. One of the principle goals is to provide the reader with the background required to understand the principles of commercially available analyses software, and to allow him/her to construct his/her own analysis tools in an environment such as MATLAB®. Multiple color illustrations are integrated in the text. Includes an introduction to biomedical signals, noise characteristics, and recording techniques Basics and background for more advanced topics can be found in extensive notes and appendices A Companion Website hosts the MATLAB scripts and several data files:


Intelligent Speech Signal Processing Nilanjan Dey 2019-03-27 Intelligent Speech Signal Processing investigates the utilization of speech analytics across several systems and real-world activities, including sharing data analytics, creating collaboration networks between several participants, and implementing video-conferencing in different application areas. Chapters focus on the latest applications of speech data analysis and management tools across different recording systems. The book emphasizes the multidisciplinary nature of the field, presenting different applications and challenges with extensive studies on the design, development and management of intelligent systems, neural networks and related machine learning techniques for speech signal processing. Highlights different data analytics techniques in speech signal processing, including machine learning and data mining. Illustrates different applications and challenges across the design, implementation and management of intelligent systems and neural networks techniques for speech signal processing. Includes coverage of biomodal speech recognition, voice activity detection, spoken language and speech disorder identification, automatic speech to speech summarization, and convolutional neural networks.

eMaintenance Diego Galar 2017-06-15 eMaintenance: Essential Electronic Tools for Efficiency enables the reader to improve efficiency of operations, maintenance staff, infrastructure managers and system integrators, by accessing a real time computerized system from data to decision. In recent years, the exciting possibilities of eMaintenance have become increasingly recognized as a source of productivity improvement in industry. The seamless linking of systems and equipment to control centres for real time reconfiguring is improving efficiency, reliability, and sustainability in a variety of settings. The book provides an introduction to collecting and processing data from machinery, explains the methods of overcoming the challenges of data collection and processing, and presents tools for data driven condition monitoring and decision making. This is a groundbreaking handbook for those interested in the possibilities of running a plant as a smart asset. Provides an introduction to collecting and processing data from machinery Explains how to use sensor-based tools to increase efficiency of diagnosis, prognosis, and decision-making in maintenance Describes methods for overcoming the challenges of data collection and processing.

Intelligent Sensor Networks Fei Hu 2012-12-15 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.

Cognitive Systems and Signal Processing Fuchun Sun 2019-04-26 This two-volume set (CCIS 1005 and CCIS 1006) constitutes the refereed proceedings of the 4th International Conference on Cognitive Systems and Signal Processing, ICPSIP2018, held in Beijing, China, in November and December 2018. The 96 revised full papers presented were carefully reviewed and selected from 169 submissions. The papers are organized in topical sections on vision and image; algorithms; robotics; human-computer interaction; deep learning; information processing and automatic driving.

Brain Signal Analysis Todd C. Handy 2009 Recent developments in the tools and techniques of data acquisition and analysis incognitive electrophysiology.

Image Sensors and Signal Processing for Digital Still Cameras Junichi Nakamura 2017-12-19 Shrinking pixel sizes along with improvements in image sensors, optics, and electronics have elevated DSCs to levels of performance that match, and have the potential to surpass, that of silver-halide film cameras. Image Sensors and Signal Processing for Digital Still Cameras captures the current state of DSC image acquisition and signal processing technology and takes an all-inclusive look at the field, from the history of DSCs to future possibilities. The first chapter outlines the evolution of DSCs, their basic structure, and their major application classes. The next few chapters discuss high-quality optics that meet the requirements of better image sensors, the basic functions and performance parameters of image sensors, and detailed discussions of both CCD and CMOS image sensors. The book then discusses how color theory affects the uses of DSCs, presents basic image processing and camera control algorithms and examples of advanced image processing algorithms, explores the architecture and required performance of signal processing engines, and explains how to evaluate image quality for each component described. The book closes with a look at future technologies and the challenges that must be overcome to realize them. With
contributions from many active DSC experts, Image Sensors and Image Processing for Digital Still Cameras offers unparalleled real-world coverage and opens wide the door for future innovation. Applied Smart Health Care Informatics Sourav De 2022-03-07 Applied Smart Health Care Informatics Explores how intelligent systems offer new opportunities for optimizing the acquisition, storage, retrieval, and use of information in healthcare. Applied Smart Health Care Informatics explores how health information technology and intelligent systems can be integrated and deployed to enhance healthcare management. Edited and authored by leading experts in the field, this timely volume introduces modern approaches for managing existing data in the healthcare sector by utilizing artificial intelligence (AI), meta-heuristic algorithms, deep learning, the Internet of Things (IoT), and other smart technologies. Detailed chapters review advances in areas including machine learning, computer vision, and soft computing techniques, and discuss various applications of healthcare management systems such as medical imaging, electronic medical records (EMR), and drug development assistance. Throughout the text, the authors propose new research directions and highlight the smart technologies that are central to establishing proactive health management, supporting enhanced coordination of care, and improving the overall quality of healthcare services. Provides an overview of different deep learning applications for intelligent healthcare informatics management. Describes novel methodologies and emerging trends in artificial intelligence and computational intelligence and their relevance to health information engineering and management. Proposes IoT solutions that disseminate essential medical information for intelligent healthcare management. Discusses mobile-based healthcare management, content-based image retrieval, and computer-aided diagnosis using machine and deep learning techniques. Examines the use of exploratory data analysis in intelligent healthcare informatics systems. Applied Smart Health Care Informatics: A Computational Intelligence Perspective is an invaluable text for graduate students, postdoctoral researchers, academic lecturers, and industry professionals working in the area of healthcare and intelligent soft computing.

Smart Sensor Systems Gerard Meijer 2008-11-26 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, providing complete coverage of all important system and design aspects, their building blocks and methods of signal processing. It examines topics over the whole range of sensor technology from the theory and constraints of basic elements, the applied techniques and electronic, up to the level of application-oriented issues. Developed as a complementary volume to ‘Smart Sensor Systems’ (Wiley 2008), which introduces the theoretical foundations, this volume focuses on practical applications, including: State-of-the-art techniques for designing smart sensors and smart sensor systems, with measurement techniques at system level, such as collaboration and trimming, and impedance-measurement techniques. Sensing elements and sensor systems for the measurement of mechanical quantities, and microarrays for DNA detection. Circuident for sensor systems, such as the design of low-noise amplifiers, and measurement techniques at device level, such as dynamic offset cancellation and optical imagers. Implantable smart sensors for biomedical applications and automotive sensors. A supplementary website hosts case studies and a solutions manual to the problems. 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.

Communications, Signal Processing, and Systems Qilian Liang 2021-06-07 This book brings together papers presented at the 2020 International Conference on Communications, Signal Processing, and Systems, which provides a venue to disseminate the latest developments and to discuss the interactions and links between these multidisciplinary fields. Spanning topics ranging from communications, signal processing and systems, this book is aimed at undergraduate and graduate students in Electrical Engineering, Computer Science and Mathematics, researchers and engineers from academia and industry as well as government employees (such as NSF, DOD and DOE).

Data Acquisition and Signal Processing for Smart Sensors Nikolay V. Kirianaki 2002-04-29 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.

**Smart Technologies for Safety Engineering** Jan Holnicki-Szulc 2008-04-30

Smart technologies comprise a dynamic new interdisciplinary research field that encompasses a wide spectrum of engineering applications including, but not limited to, intelligent structures and materials, actuators, sensors and structural observability, control systems and software tools for the design of adaptive structures. Smart technologies focus on the issues surrounding the safety and integrity of engineering systems. Smart Technologies for Safety Engineering presents the achievements of ten years of research from the Smart-Tech Centre applied to some of the key issues of safety engineering. Results presented include: Original methods and software tools for modelling, design, simulation and control of adaptive structures and applicability of the adaptive concept to the design of structures for extreme loads; Application of the smart-tech concept to hot research topics and emerging engineering issues including health monitoring of structures and engineering systems, monitoring of loading conditions, automatic structural adaptation to unpredictable, randomly changing dynamic conditions and the optimal design of adaptive structures and engineering systems; Numerically efficient and original software packages that can be used for the design of adaptive, as well as passive (without control devices) structures. The Virtual Distortion Method, which has been developed especially for fast reanalysis of structures and systems and exact sensitivity analysis, allowing for effective modelling, design, health monitoring and control of smart engineering systems. The original research and practical applications in Smart Technologies for Safety Engineering will appeal to a broad spectrum of engineers, researchers, professors and graduate students involved in the research, design and development of widely understood adaptronics and mechatronics, including smart structures and materials, adaptive impact absorption, health and load monitoring, vibration control, vibroacoustics and related issues.

**Advances in Computational Intelligence** Félix Castro 2018-12-31

The two-volume set LNAI 10632 and 10633 constitutes the proceedings of the 16th Mexican International Conference on Artificial Intelligence, MICAI 2017, held in Ensenada, Mexico, in October 2017. The total of 60 papers presented in these two volumes was carefully reviewed and selected from 203 submissions. The contributions were organized in the following topical sections: Part I: neural networks; evolutionary algorithms and optimization; hybrid intelligent systems and fuzzy logic; and machine learning and data mining. Part II: natural language processing and social networks; intelligent tutoring systems and educational applications; and image processing and pattern recognition.

**Voltage-to-Frequency Converters** Cristina Azcona Murillo 2013-03-12

This book develops voltage-to-frequency converter (VFC) solutions integrated in standard CMOS technology to be used as a part of a microcontroller-based, multisensor interface in the environment of portable applications, particularly within a WSN node. Coverage includes the total design flow of monolithic VFCs, according to the target application, as well as the analysis, design and implementation of the main VFC blocks, revealing the main challenges and solutions encountered during the design of such high performance cells. Four complete VFCs, each temperature compensated, are fully designed and evaluated: a programmable VFC that includes an offset frequency and a sleep/mode enable terminal; a low power rail-to-rail VFC; and two rail-to-rail differential VFCs.

**Advances in Intelligent Information Hiding and Multimedia Signal Processing** Jeng-Shyang Pan 2019-07-10

The book presents selected papers from the Fifteenth International Conference on Intelligent Information Hiding and Multimedia Signal Processing, in conjunction with the Twelfth International Conference on Frontiers of Information Technology, Applications and Tools, held on July 18–20, 2019 in Jilin, China. Featuring the latest research, it provides valuable information on problem solving and applications for engineers in computer science-related fields, and is a valuable reference resource for academics, industry practitioners and students.

**Smart Sensor Systems** Gerard Meijer 2014-04-02

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 microfabrication 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-stored 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.

**Microelectronics and Signal Processing** Sanket Goel 2021-06-06 This book is about general and specific areas involved in electrical and electronics engineering which comprises broad subjects such as MEMS and Microfluidics, VLSI, Communication and Signal Processing. This book discusses the recent trends in various aspects of research areas for diverse applications like biomedical, biochemical, and power source systems. It also discusses modelling, simulating, and prototyping of the different electronic-based systems for carrying out varied applications. With this book, the readers will understand the multiphase fundamentals guiding electrical and biomedical devices that form the current features such as automation, integration, and miniaturization of a particular device. This book showcases a unique platform as it covers the different areas of research in this trending era as a benchmark. This book is a link between the electronics and cutting-edge technologies that are being used for numerous applications representing the physical and virtual developments of electronic devices. Therefore, this book will mostly uphold the innovation and originality involved in the development of miniaturized devices, and proposing new methods, emphasizing with different areas of electrical and electronics engineering. This book entitles various approaches involved in electrical, biomedical, and electronics for modern distribution of research strategies and covers the state-of-art research themes. These include signal sensing, signal simulators, 3D printing technology, power systems, data acquisition systems, instrumentation, electrochemical sensing, electromechanical measurements, and signal analysis. The book will provide the academic perspectives of the cutting-edge R&D outputs from the faculty members and Ph.D. students, amalgamating the newer cross-dimensional areas, such as cyber-physical systems, nanoelectronics, smart-sensors, point-of-need devices, etc. The book will become a benchmark to the readers to understand the academic aspect of the contemporary work and the way forward on how this will lead to help the society-at-large.

**Autonomic Nervous System Dynamics for Mood and Emotional-State Recognition** Gaetano Valenza 2013-10-29 This monograph reports on advances in the measurement and study of autonomic nervous system (ANS) dynamics as a source of reliable and effective markers for mood state recognition and assessment of emotional responses. Its primary impact will be in affecting computation and the application of emotion-recognition systems. Applicative studies of biosignals such as: electrocardiograms; electrodermal responses; respiration activity; gaze points; and pupil-size variation are covered in detail, and experimental results explain how to characterize the elicited affective levels and mood states pragmatically and accurately using the information thus extracted from the ANS. Nonlinear signal processing techniques play a crucial role in understanding the ANS physiology underlying superficially noticeable changes and provide important quantifiers of cardiovascular control dynamics. These have prognostic value in both healthy subjects and patients with mood disorders. Moreover, Autonomic Nervous System Dynamics for Mood and Emotional-State Recognition proposes a novel probabilistic approach based on the point-process theory in order to model and characterize the instantaneous ANS nonlinear dynamics providing a foundation from which machine “understanding” of emotional response can be enhanced. Using mathematics and signal processing, this work also contributes to pragmatic issues such as emotional and mood-state modeling, elicitation, and non-invasive ANS monitoring. Throughout the text a critical review on the current state-of-the-art is reported, leading to the description of dedicated experimental protocols, novel and reliable mood models, and novel wearable systems able to perform ANS monitoring in a naturalistic environment. Biomedical engineers will find this book of interest, especially those concerned with nonlinear analysis, as will researchers and industrial technicians developing wearable systems and sensors for ANS monitoring.

**Smart Grid Using Big Data Analytics** Robert C. Qiu 2017-04-17 This book is aimed at students in communications and signal processing who want to extend their skills in the energy area. It describes power systems and why these backgrounds are so useful to smart grid, wireless communications being very different to traditional wireline communications.

**Data Analysis and Signal Processing in Chromatography** A. Felinger 1998-05-19 This book gives an overview of the numerical data analysis and signal treatment techniques that are used in chromatography and related separation techniques. Emphasis is given to the description of the symmetrical and asymmetrical chromatographic peak shape models. Both theoretical and empirical models are discussed. The fundamentals of data acquisition, types and effect of baseline noise, and methods of improving the signal-to-noise ratio (either in time or in frequency and wavelet domain) are thoroughly discussed. Resolution enhancement techniques, such as curve fitting, deconvolution by Fourier and wavelet transforms, iterative deconvolution, Kalman filtering and multivariate methods of curve resolution are all discussed with several chromatographic examples. Quantitative analysis by peak area of peak height measurement, the precision and accuracy of the quantitation of stand-alone or overlapping and symmetrical or asymmetrical peaks are treated. In a separate chapter, guidelines are given for the use of transform techniques for the analysis of chromatograms. A statistical description of peak overlap is given in the final chapters. Since the concept of resolution has to be reconsidered when one separates complex mixtures, the problem of resolution and overlap is quantitatively discussed by means of statistical methods, and by using Fourier analysis of the complex chromatogram. Features of this book

- The ultimate source of numerical techniques to enhance chromatographic data
- Gives a detailed description of signal and...
resolution enhancement techniques in a manner applicable for enhancing not only chromatography, but also spectroscopic and other analytical signals. The first book with a thorough overview of the statistics of peak overlap. This is the first volume to encompass both the simple and more sophisticated methods for the numerical treatment of chromatograms. It is, therefore, the fundamental resource of numerical analysis methods for every analyst.

3D Imaging—Multidimensional Signal Processing and Deep Learning
Lakhmi C. Jain 2022-08-02 This book gathers selected papers presented at the conference “Advances in 3D Image and Graphics Representation, Analysis, Computing and Information Technology,” one of the first initiatives devoted to the problems of 3D imaging in all contemporary scientific and application areas. The two volumes of the book cover wide area of the aspects of the contemporary multidimensional imaging and outline the related future trends from data acquisition to real-world applications based on new techniques and theoretical approaches. This volume contains papers devoted to the theoretical representation and analysis of the 3D images. The related topics included are 3D image transformation, 3D sensor image representation, 3D content generation technologies, 3D graphic information processing, VR content generation technologies, multi-dimensional image processing, dynamic and auxiliary 3D displays, VR/AR/MR device, VR camera technologies, 3D imaging technologies and applications, 3D computer vision, 3D video communications, 3D medical images processing and analysis, 3D remote sensing images and systems, deep learning for image restoration and recognition, neural networks for MD image processing, etc.

Smart Information Systems
Frank Hopfgartner 2015-01-14 This text presents an overview of smart information systems for both the private and public sector, highlighting the research questions that can be studied by applying computational intelligence. The book demonstrates how to transform raw data into effective smart information services, covering the challenges and potential of this approach. Each chapter describes the algorithms, tools, measures and evaluations used to answer important questions. This is then further illustrated by a diverse selection of case studies reflecting genuine problems faced by SMEs, multinational manufacturers, service companies, and the public sector. Features: provides a state-of-the-art introduction to the field, integrating contributions from both academia and industry; reviews novel information aggregation services; discusses personalization and recommendation systems; examines sensor-based knowledge acquisition services, describing how the analysis of sensor data can be used to provide a clear picture of our world.

Data Acquisition Systems
Maurizio Di Paolo Emilio 2013-03-21 This book describes the fundamentals of data acquisition systems, how they enable users to sample signals that measure real physical conditions and convert the resulting samples into digital, numeric values that can be analyzed by a computer. The author takes a problem-solving approach to data acquisition, providing the tools engineers need to use the concepts introduced. Coverage includes sensors that convert physical parameters to electrical signals, signal conditioning circuitry to convert sensor signals into a form that can be converted to digital values and analog-to-digital converters, which convert conditioned sensor signals to digital values. Readers will benefit from the hands-on approach, culminating with data acquisition projects, including hardware and software needed to build data acquisition systems.

Advances in Neural Signal Processing
Ramana Vinjamuri 2020-09-09 Neural signal processing is a specialized area of signal processing aimed at extracting information or decoding intent from neural signals recorded from the central or peripheral nervous system. This has significant applications in the areas of neuroscience and neural engineering. These applications are famously known in the area of brain-machine interfaces. This book presents recent advances in this flourishing field of neural signal processing with demonstrative applications.

A Real-time Data Acquisition and Digital Signal Processing System for Neuromonitoring
Nirjhar Bhattacharjee 2015 This work reports a versatile real-time data acquisition, signal processing and sensor calibrationsystem using NI (National Instruments) LabVIEW. The goal of the developed system is to simultaneously monitor different physiological parameters in an animal’s brain during traumatic brain injury (TBI). The system is developed in conjunction with the smart catheter sensor array which is an integrated platform of multiple microsensors in a single microcatheter device. The sensor simultaneously records key physiological parameters from an animal brain which include temperature, partial pressure of Oxygen, Glucose, Lactate, Cerebral Blood Flow (CBF) and neural activity. The system after data acquisition and processing displays the real-time data in a user interface in a clear and concise way. A sensor calibration software is also developed using LabVIEW which provides calibration solution for the Smart Catheter sensors. The developed system consists of a front end motherboard circuit interface which encodes the real-time analog signal to serial bits and transmits it to a backend system for data-logging and signal processing. The back-end system consists of a NI cRIO (Compact RIO) hardware with serial/O ports. The cRIO system consists of an inbuilt FPGA (Field Programmable Gate Array) chip and a Real-Time (RT) controller which are used for data processing and transmission to a laptop computer with user interface. The program development was done using LabVIEW to create a high quality and fast response system. The developed system was tested with simulated signals to validate the system for long term monitoring application. Finally the Smart Catheter sensors were calibrated with the calibration function and in-vivo recording was done from a rat’s brain. The results of the experiments have been reported in this thesis.

Technologies for Smart Sensors and Sensor Fusion
Kevin Yallup
2017-12-19 Exciting new developments are enabling sensors to go beyond the realm of simple sensing of movement or capture of images to deliver information such as location in a built environment, the sense of touch, and the presence of chemicals. These sensors unlock the potential for smarter systems, allowing machines to interact with the world around them in more intelligent and sophisticated ways. Featuring contributions from authors working at the leading edge of sensor technology, Technologies for Smart Sensors and Sensor Fusion showcases the latest advancements in sensors with biotechnology, medical science, chemical detection, environmental monitoring, automotive, and industrial applications. This valuable reference describes the increasingly varied number of sensors that can be integrated into arrays, and examines the growing availability and computational power of communication devices that support the algorithms needed to reduce the raw sensor data from multiple sensors and convert it into the information needed by the sensor array to enable rapid transmission of the results to the required point. Using both SI and US units, the text: Provides a fundamental and analytical understanding of the underlying technology for smart sensors Discusses groundbreaking software and sensor systems as well as key issues surrounding sensor fusion Exemplifies the richness and diversity of development work in the world of smart sensors and sensor fusion Offering fresh insight into the sensors of the future, Technologies for Smart Sensors and Sensor Fusion not only exposes readers to trends but also inspires innovation in smart sensor and sensor system development.

Biomedical Signal Analysis for Connected Healthcare
Sridhar Krishnan
2021-07-09 Biomedical Signal Analysis for Connected Healthcare provides rigorous coverage on several generations of techniques, including time domain approaches for event detection, spectral analysis for interpretation of clinical events of interest, time-varying signal processing for understanding dynamical aspects of complex biomedical systems, the application of machine learning principles in enhanced clinical decision-making, the application of sparse techniques and compressive sensing in providing low-power applications that are essential for wearable designs, the emerging paradigms of the Internet of Things, and connected healthcare. Provides comprehensive coverage of biomedical engineering, technologies, and healthcare applications of various physiological signals Covers vital signals, including ECG, EEG, EMG and body sounds Includes case studies and MATLAB code for selected applications