Synchronous Demodulator And Configurable Analog Filter

Photonic switching is a term used to describe existing and new photonic devices in conjunction with existing and new electronic devices to realise new or improved switching and networking capabilities. It includes simple mechanically activated optical switches used for network protection switching and network reconfiguration, where an entire optical signal is redirected as a unit. It includes the use of optical interconnections within equipment to facilitate internal high speed and high density interconnects. It includes the use of tunable transmitters and receivers at the core of a high speed packet or circuit switch, with large quantities of electronics providing supporting interface and control functions. In principle it also includes the concept of an all-optical switch whose architecture and component technologies have yet to be invented. In recent years materials and device scientists have been coming together more and more with systems architects to uncover the real opportunity areas for coherent communications and photonic switching.

The articles in The Encyclopedia of Medical Devices and Instrumentation focus on what is currently useful or is likely to be useful in future medicine. They answer the question, What are the branches of medicine and how does technology assist each of them? Articles focus on the practice of medicine that is assisted by devices, rather than including, for example, the use of drugs to treat disease. The title is the only resource on the market dealing with the subject in encyclopedic detail. * Accessible to practitioners with a broad range of backgrounds from students to researchers and physicians * Articles cover the latest developments such as nanotechnology, fiber optics, and signal processing

This practical, hands-on resource describes functional units and circuits of telecommunication systems. The functions characterizing these systems, including RF amplifiers (both low noise and power amplifiers), signal sources, mixers and phase lock loops, are explored from an operational level viewpoint. And as all functions are migrating to digital implementations, this book describes functional units and circuits of telecommunication systems (with radio, wire, or optical links), from functional level viewpoint to the circuit details and examples. The structure of a radio transceiver is described and a view of all functional units, including migration to SDR (Software Defined Radio) is provided. Chapters include a functional identification of the units described and analysis of possible circuit solutions and analysis of error sources. The sequence reflects the actual design procedure: functional identification, search and analysis of solutions, and critical review to provide an understanding of the various solutions and tradeoffs, with guidelines for design and/or selection of proper functional units.

This book presents a compilation of selected papers from the Fourth International Symposium on Software Reliability, Industrial Safety, Cyber Security and Physical Protection of Nuclear Power Plant, held in August 2019 in Guiyang, China. The purpose of the symposium was to discuss inspection, testing, certification and research concerning the software and hardware of instrument and control (I&C) systems used at nuclear power plants (NPP), such as sensors, actuators and control systems. The event provides a venue for exchange among experts, scholars and nuclear power practitioners, as well as a platform for the combination of teaching and research at universities and enterprises to promote the safe development of nuclear power plants. Readers will find a wealth of valuable insights into achieving safer and more efficient instrumentation and control systems.

A CMOS Self-Powered Front-End Architecture for Subcutaneous Event-Detector Devices presents the conception and prototype realization of a Self-Powered architecture for subcutaneous detector devices. The architecture is designed to work as a true/false (event detector) or threshold level alarm of some substances, ions, etc... that are detected through a three-electrodes amperometric BioSensor approach. The device is envisaged as a Low-Power subcutaneous implantable application powered by an inductive link, one emitter antenna at the external side of the skin and the receiver antenna under the skin. The sensor is controlled with a Potentiostat circuit and then, a post-processing unit detects the desired levels and activates the transmission via a backscattering method by the inductive link. All the instrumentation, except the power module, is implemented in the so called BioChip. Following the idea of the powering link to harvest energy of the magnetic induced link at the implanted device, a Multi-Harvesting Power Chip (MHPC) has been also designed.

Nuclear Power Plants: Innovative Technologies for Instrumentation and Control SystemsThe Fourth International Symposium on Software Reliability, Industrial Safety, Cyber Security and Physical Protection of Nuclear Power Plant (ISNPP)Springer Nature

For decades, microwave radios in the 6 to 50 GHz bands have been providing wireless communications. Recently, newer technologies at the 60 to 100 GHz mm-wave bands have taken advantage of new wireless regulations that are designed to enable ultra-high capacity communications. Exploring this exciting area in depth, this cutting-edge resource offers you the latest details on multigigabit wireless communications. The book places emphasis on practical use and applications, but also provides a thorough explanation of important technological underpinnings to give you a complete understanding of subject. You find clear guidance on system design and link planning, helping you to determine performance levels given the physical limitations of operating in these frequency bands. Supported with over 50 illustrations, the book covers a wide range of critical topics, from the high frequency electromagnetic spectrum and high data rate mm-wave radios, to wireless link margins and path profiling.

"A textbook for 4th year undergraduate/first year graduate electrical engineering students"--

This is a book about real-world design techniques for analog circuits: amplifiers, filters, injection-locked oscillators, phase-locked loops, transimpedance amplifiers, group delay correction circuits, notch filters, and spectrum regrowth in digital radio frequency (RF) transmitters, etc. The book offers practical solutions to analog and RF problems, helping the reader to achieve high-performance circuit and system design. A variety of issues are covered, such as: How to flatten group delay of filters How to use reciprocity to advantage How to neutralize a parasitic

capacitance How to deepen a notch by adding only two components to the network How to demodulate a signal using the secant waveform and its benefit How to flatten the frequency response of a diode detector When to use a transimpedance amplifier and how to maximize its performance How to recover non-return-to-zero (NRZ) data when alternating current (AC) coupling is required Why phase noise corrupts adjacent communication channels Simple method to prevent false locking in phase-locked loops How to improve the bandwidth of amplification by using current conveyors A very simple impedance matching technique requiring only one reactive component How to use optimization Quadrature distortion and cross-rail interference This book is meant to be a handbook (or a supplemental textbook) for students and practitioners in the design of analog and RF circuitry with primary emphasis on practical albeit sometimes unorthodox circuit realizations. Equations and behavioral simulations result in an abundance of illustrations, following a "words and pictures" easy-to-understand approach. Teachers will find the book an important supplement to a standard analog and RF course, or it may stand alone as a textbook. Working engineers may find it useful as a handbook by bookmarking some of the step-by-step procedures, e.g., the section on simplified impedance matching or group delay flattening.

Pneumatic, hydraulic and allied instrumentation schemes have given way to electronic schemes in recent years thanks to the rapid strides in electronics and allied areas. Principles, design and applications of such state-of-the-art instrumentation schemes form the subject matter of this book. Through representative examples, the basic building blocks of instrumentation schemes are identified and each of these building blocks discussed in terms of its design and interface characteristics. The common generic schemes synthesized with such building blocks are dealt with subsequently. This forms the scope of Part I. The focus in Part II is on application. Displacement and allied instrumentation, force and allied instrumentation and process instrumentation in terms of temperature, flow, pressure level and other common process variables are dealt with separately and exhaustively. Despite the diversity in the sensor principles and characteristics and the variety in the applications and their environments, it is possible judiciously to carve out broad areas of application for each type of sensor and the instrumentation built around it. The last chapter categorises instrumentation schemes according to their different levels of complexity. Specific practical examples - especially at involved complexity levels - are discussed in detail.

This two-volume handbook offers a comprehensive and coordinated presentation of SQUIDs (Superconducting Quantum Interference Devices), including device fundamentals, design, technology, system construction and multiple applications. It is intended to bridge the gap between fundamentals and applications, and will be a valuable textbook reference for graduate students and for professionals engaged in SQUID research and engineering. It will also be of use to specialists in multiple fields of practical SQUID applications, from human brain research and heart diagnostics to airplane and nuclear plant testing to prospecting for oil, minerals and buried ordnance. While the first volume presents the theory and fabrication of SQUIDs, the second volume is devoted to applications. It starts with an important aspect of the analysis of measured magnetic signals generated by current sources (the inverse problem), and includes several chapters devoted to various areas of application, namely biomagnetism (research on and diagnostics of human brain, heart, liver, etc.), detection of extremely weak signals, for example electromagnetic radiation and Nuclear Magnetic Resonance. The volume closes with a chapter on motion detectors and the detection of gravity waves.

A resource on position sensor technology, including background, operational theory, design and applications This book explains the theory and applications of the technologies used in the measurement of linear and angular/rotary position sensors. The first three chapters provide readers with the necessary background information on sensors. These chapters review: the working definitions and conventions used in sensing technology; the specifications of linear position transducers and sensors and how they affect performance; and sensor output types and communication protocols. The remaining chapters discuss each separate sensor technology in detail. These include resistive sensors, cable extension transducers, capacitive sensors, inductive sensors, LVDT and RVDT sensors, distributed impedance sensors, Hall Effect sensors, magnetoresistive sensors, magnetostrictive sensors, linear and rotary encoders, and optical triangulation position sensors. Discusses sensor specification, theory of operation, sensor design, and application criteria Reviews the background history of the linear and angular/rotary position sensors as well as the underlying engineering techniques Includes end-of-chapter exercises Position Sensors is written for electrical, mechanical, and material engineers as well as engineering students who are interested in understanding sensor technologies.

Based on the popular Artech House classic, Digital Communication Systems Engineering with Software-Defined Radio, this book provides a practical approach to quickly learning the software-defined radio (SDR) concepts needed for work in the field. This up-to-date volume guides readers on how to quickly prototype wireless designs using SDR for real-world testing and experimentation. This book explores advanced wireless communication techniques such as OFDM, LTE, WLA, and hardware targeting. Readers will gain an understanding of the core concepts behind wireless hardware, such as the radio frequency front-end, analog-to-digital and digital-to-analog converters, as well as various processing technologies. Moreover, this volume includes chapters on timing estimation, matched filtering, frame synchronization message decoding, and source coding. The orthogonal frequency division multiplexing is explained and details about HDL code generation and deployment are provided. The book concludes with coverage of the WLAN toolbox with OFDM beacon reception and the LTE toolbox with downlink reception. Multiple case studies are provided throughout the book. Both MATLAB and Simulink source code are included to assist readers with their projects in the field.

Virtual Manufacturing presents a novel concept of combining human computer interfaces with virtual reality for discrete and continuous manufacturing systems. The authors address the relevant concepts of manufacturing engineering, virtual reality, and computer science and engineering, before embarking on a description of the methodology for building augmented reality for manufacturing processes and manufacturing systems. Virtual Manufacturing is centered on the description of the development of augmented reality models for a range of processes based on CNC, PLC, SCADA, mechatronics and on embedded systems. Further discussions address the use of augmented reality for developing augmented reality models to control contemporary manufacturing systems and to acquire micro- and macro-level decision parameters for managers to boost profitability of their manufacturing systems. Guiding readers through the building of their own virtual factory software, Virtual Manufacturing comes with access to online files and software that will enable readers to create a virtual factory, operate it and experiment with it. This is a valuable source of information with a useful toolkit for anyone interested in virtual manufacturing, including advanced undergraduate students, postgraduate students and researchers.

To create the exotic materials and technologies needed to make stargates and warp drives is the holy grail of advanced propulsion. A less ambitious, but nonetheless revolutionary, goal is finding a way to accelerate a spaceship without having to lug along a gargantuan reservoir of fuel that you blow out a tailpipe. Tethers and solar sails are conventional realizations of the basic idea. There may now be a way to achieve these lofty objectives. "Making Starships and Stargates" will have three parts. The first will deal with information about the theories of relativity needed to understand the predictions of the effects

that make possible the "propulsion" techniques, and an explanation of those techniques. The second will deal with experimental investigations into the feasibility of the predicted effects; that is, do the effects exist and can they be applied to propulsion? The third part of the book – the most speculative – will examine the question: what physics is needed if we are to make wormholes and warp drives? Is such physics plausible? And how might we go about actually building such devices? This book pulls all of that material together from various sources, updates and revises it, and presents it in a coherent form so that those interested will be able to find everything of relevance all in one place.

This book covers the state-of-the-art technologies for positioning with nanometer resolutions and accuracies, particularly those based on piezoelectric actuators and MEMS actuators. The latest advances are described, including the design of nanopositioning devices, sensing and actuation technologies and control methods for nanopositioning. This is an ideal book for mechanical and electrical engineering students and researchers; micro and nanotechnology researchers and graduate students; as well as those working in the precision instrumentation or semiconductor industries.

Wearable technologies are equipped with microchips and sensors capable of tracking and wirelessly communicating information in real time. With innovations on the horizon, the future of wearable devices will go beyond answering calls or counting our steps to providing us with sophisticated wearable gadgets capable of addressing fundamental and technological challenges. This book investigates the development of wearable technologies across a range of applications from educational assessment to health, biomedical sensing, and energy harvesting. Furthermore, it discusses some key innovations in micro/nano fabrication of these technologies, their basic working mechanisms, and the challenges facing their progress.

Analog Integrated Circuits for Communication: Principles, Simulation and Design, Second Edition covers the analysis and design of nonlinear analog integrated circuits that form the basis of present-day communication systems. Both bipolar and MOS transistor circuits are analyzed and several numerical examples are used to illustrate the analysis and design techniques developed in this book. Especially unique to this work is the tight coupling between the first-order circuit analysis and circuit simulation results. Extensive use has been made of the public domain circuit simulator Spice, to verify the results of first-order analyses, and for detailed simulations with complex device models. Highlights of the new edition include: A new introductory chapter that provides a brief review of communication systems, transistor models, and distortion generation and simulation. Addition of new material on MOSFET mixers, compression and intercept points, matching networks. Revisions of text and explanations where necessary to reflect the new organization of the book Spice input files for all the circuit examples that are available to the reader from a website. Problem sets at the end of each chapter to reinforce and apply the subject matter. An instructors solutions manual is available on the book's webpage at springer.com. Analog Integrated Circuits for Communication: Principles, Simulation and Design, Second Edition is for readers who have completed an introductory course in analog circuits and are familiar with basic analysis techniques as well as with the operating principles of semiconductor devices. This book also serves as a useful reference for practicing engineers.

Analog circuit and system design today is more essential than ever before. With the growth of digital systems, wireless communications, complex industrial and automotive systems, designers are challenged to develop sophisticated analog solutions. This comprehensive source book of circuit design solutions will aid systems designers with elegant and practical design techniques that focus on common circuit design challenges. The book's in-depth application examples provide insight into circuit design and application solutions that you can apply in today's demanding designs. Covers the fundamentals of linear/analog circuit and system design to guide engineers with their design challenges Based on the Application Notes of Linear Technology, the foremost designer of high performance analog products, readers will gain practical insights into design techniques and practice Broad range of topics, including power management tutorials, switching regulator design, linear regulator design, data conversion, signal conditioning, and high frequency/RF design Contributors include the leading lights in analog design, Robert Dobkin, Jim Williams and Carl Nelson, among others

As biosensors comprise a prospective alternative to traditional chemical analyses, enabling fast on- and in-line measurements with sufficient selectivity, the field is expanding rapidly and is offering new ideas and developments every day. This book aims to cover the present state of the art in the biosensor technology and introduce the general aspects of biosensor- based techniques and methods. The book consists of 13 chapters by 44 authors and is divided into 3 sections, focused on bio-recognition techniques, signal transduction methods and signal analysis.

This book is based on the best contributions to the advancement of bioimpedance knowledge and use from the Latin American Congress series, CLABIO. Basic bioimpedance facts as well as promising and original contributions to bioimpedance theory and applications are presented, giving the reader stimulating material for reflection, decision making, and further experiments. Contributions come from a diverse international pool of experts and address topics on electrode and skin impedance modelling, tomography, spectroscopy, instrumentation, and clinical applications.

This book is a printed edition of the Special Issue "UAV-Based Remote Sensing" that was published in Sensors

Atrial Fibrillation: New Insights for the Healthcare Professional: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Diagnosis and Screening. The editors have built Atrial Fibrillation: New Insights for the Healthcare Professional: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Diagnosis and Screening in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Atrial Fibrillation: New Insights for the Healthcare Professional: 2013 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

Textbook for beginning technology students. Calculus is not required, but basic algebra is used throughout. No bibliography. Annotation copyright Book News, Inc. Portland, Or.

The advancement of information technology is becoming more prevalent in all aspects of the world today, including online environments. Understanding technology's effect on niche markets and all fields of research is crucial for practitioners in this area. Contemporary Advancements in Information Technology Development in Dynamic Environments presents an in-depth

discussion into the information technology revolution present in fields such as government, gaming, social networking, and cloud computing. This book's investigation into the research and application of information technology in several specific areas make this a useful resource for practitioners, professionals, undergraduate/graduate students, and academics.

A method of using the SIMS (the selective modulation interferometric spectrometer) to measure the difference between the spectral content of two optical beams is given. The differencing is done optically; that is, the modulated director signal is directly proportional to the difference between the two spectra being compared. This optical differencing minimizes the dynamic-range requirements of the electronics and requires only a simple modification of the basic cyclic SIMS spectrometer. This technique can be used to suppress background radiation for the enhancement of target detection and tracking. Laboratory measurements demonstrating the application of this technique are reported. (Author).

Covering the complete design cycle of nanopositioning systems, this is the first comprehensive text on the topic. The book first introduces concepts associated with nanopositioning stages and outlines their application in such tasks as scanning probe microscopy, nanofabrication, data storage, cell surgery and precision optics. Piezoelectric transducers, employed ubiquitously in nanopositioning applications are then discussed in detail including practical considerations and constraints on transducer response. The reader is then given an overview of the types of nanopositioner before the text turns to the in-depth coverage of mechanical design including flexures, materials, manufacturing techniques, and electronics. This process is illustrated by the example of a high-speed serial-kinematic nanopositioner. Position sensors are then catalogued and described and the text then focuses on control. Several forms of control are treated: shunt control, feedback control, force feedback control and feedforward control (including an appreciation of iterative learning control). Performance issues are given importance as are problems limiting that performance such as hysteresis and noise which arise in the treatment of control and are then given chapter-length attention in their own right. The reader also learns about cost functions and other issues involved in command shaping, charge drives and electrical considerations. All concepts are demonstrated experimentally including by direct application to atomic force microscope imaging. Design, Modeling and Control of Nanopositioning Systems will be of interest to researchers in mechatronics generally and in control applied to atomic force microscopy and other nanopositioning applications. Microscope developers and mechanical designers of nanopositioning devices will find the text essential reading.