20 Foundations Of Analog And Digital Electronic Circuits

The fast user growth in wireless communications has created significant demands for new wireless services in both the licensed and unlicensed frequency spectra. Since many spectra are not fully utilized most of the time, cognitive radio, as a form of spectrum reuse, can be an effective means to significantly boost communications resources. Since its introduction in late last century, cognitive radio has attracted wide attention from academics to industry. Despite the efforts from the research community, there are still many issues of applying it in practice. This books is an attempt to cover some of the open issues across the area and introduce some insight to many of the problems. It contains thirteen chapters written by experts across the globe covering topics including spectrum sensing fundamental, cooperative sensing, spectrum management, and interaction among users.

This organizational history relates the role of the National Science Foundation (NSF) in the development of modern computing. Drawing upon new and existing oral histories, extensive use of NSF documents, and the experience of two of the

authors as senior managers, this book describes how NSF's programmatic activities originated and evolved to become the primary source of funding for fundamental research in computing and information technologies. The book traces how NSF's support has provided facilities and education for computing usage by all scientific disciplines, aided in institution and professional community building, supported fundamental research in computer science and allied disciplines, and led the efforts to broaden participation in computing by all segments of society. Today, the research and infrastructure facilitated by NSF computing programs are significant economic drivers of American society and industry. For example, NSF supported work that led to the first widely-used web browser, Netscape; sponsored the creation of algorithms at the core of the Google search engine; facilitated the growth of the public Internet; and funded research on the scientific basis for countless other applications and technologies. NSF has advanced the development of human capital and ideas for future advances in computing and its applications. This account is the first comprehensive coverage of NSF's role in the extraordinary growth and expansion of modern computing and its use. It will appeal to historians of computing, policy makers and leaders in government and academia, and individuals interested in the history and development of computing and the NSF.

This handbook gives comprehensive coverage of all kinds of industrial control systems to help engineers and researchers correctly and efficiently implement their projects. It is an indispensable guide and references for anyone involved in control, automation, computer networks and robotics in industry and academia alike. Whether you are part of the manufacturing sector, large-scale infrastructure systems, or processing technologies, this book is the key to learning and implementing real time and distributed control applications. It covers working at the device and machine level as well as the wider environments of plant and enterprise. It includes information on sensors and actuators; computer hardware; system interfaces; digital controllers that perform programs and protocols; the embedded applications software; data communications in distributed control systems; and the system routines that make control systems more user-friendly and safe to operate. This handbook is a single source reference in an industry with highly disparate information from myriad sources. * Helps engineers and researchers correctly and efficiently implement their projects. * An indispensable guide and references for anyone involved in control, automation, computer networks and robotics. * Equally suitable for industry and academia

Foundations of Analog and Digital Electronic CircuitsElsevier

Unlike books currently on the market, this volume attempts to satisfy two goals:

combine circuits and electronics into a single, unified treatment, and establish a strong connection with the contemporary world of digital systems. Using the concept of abstraction, the authors attempt to form a bridge between the world of physics and the world of large computer systems.

This book explains the application of recent advances in computational intelligence – algorithms, design methodologies, and synthesis techniques – to the design of integrated circuits and systems. It highlights new biasing and sizing approaches and optimization techniques and their application to the design of high-performance digital, VLSI, radio-frequency, and mixed-signal circuits and systems. This first of two related volumes addresses the design of analog and mixed-signal (AMS) and radio-frequency (RF) circuits, with 17 chapters grouped into parts on analog and mixed-signal applications, and radio-frequency design. It will be of interest to practitioners and researchers in computer science and electronics engineering engaged with the design of electronic circuits. Unsurpassed in its coverage, usability, and authority since its first publication in 1969, the three-volume Instrument Engineers' Handbook continues to be the premier reference for instrument engineers around the world. It helps users select and implement hundreds of measurement and control instruments and analytical devices and design the most cost-effective process control systems

that optimize production and maximize safety. Now entering its fourth edition, Volume 1: Process Measurement and Analysis is fully updated with increased emphasis on installation and maintenance consideration. Its coverage is now fully globalized with product descriptions from manufacturers around the world. Béla G. Lipták speaks on Post-Oil Energy Technology on the AT&T Tech Channel. Models that include a notion of time are ubiquitous in disciplines such as the natural sciences, engineering, philosophy, and linguistics, but in computing the abstractions provided by the traditional models are problematic and the discipline has spawned many novel models. This book is a systematic thorough presentation of the results of several decades of research on developing, analyzing, and applying time models to computing and engineering. After an opening motivation introducing the topics, structure and goals, the authors introduce the notions of formalism and model in general terms along with some of their fundamental classification criteria. In doing so they present the fundamentals of propositional and predicate logic, and essential issues that arise when modeling time across all types of system. Part I is a summary of the models that are traditional in engineering and the natural sciences, including fundamental computer science: dynamical systems and control theory; hardware design; and software algorithmic and complexity analysis. Part II covers

advanced and specialized formalisms dealing with time modeling in heterogeneous software-intensive systems: formalisms that share finite state machines as common "ancestors"; Petri nets in many variants; notations based on mathematical logic, such as temporal logic; process algebras; and "dual-language approaches" combining two notations with different characteristics to model and verify complex systems, e.g., model-checking frameworks. Finally, the book concludes with summarizing remarks and hints towards future developments and open challenges. The presentation uses a rigorous, yet not overly technical, style, appropriate for readers with heterogeneous backgrounds, and each chapter is supplemented with detailed bibliographic remarks and carefully chosen exercises of varying difficulty and scope. The book is aimed at graduate students and researchers in computer science, while researchers and practitioners in other scientific and engineering disciplines interested in time modeling with a computational flavor will also find the book of value, and the comparative and conceptual approach makes this a valuable introduction for non-experts. The authors assume a basic knowledge of calculus, probability theory, algorithms, and programming, while a more advanced knowledge of automata, formal languages, and mathematical logic is useful.

In this in-depth book, the authors address the concepts and terminology that are

needed to work in the field of process control. The material is presented in a straightforward manner that is independent of the control system manufacturer. It is assumed that the reader may not have worked in a process plant environment and may be unfamiliar with the field devices and control systems. Much of the material on the practical aspects of control design and process applications is based on the authors personal experience gained in working with process control systems. Thus, the book is written to act as a guide for engineers, managers, technicians, and others that are new to process control or experienced control engineers who are unfamiliar with multi-loop control techniques. After the traditional single-loop and multi-loop techniques that are most often used in industry are covered, a brief introduction to advanced control techniques is provided. Whether the reader of this book is working as a process control engineer, working in a control group or working in an instrument department, the information will set the solid foundation needed to understand and work with existing control systems or to design new control applications. At various points in the chapters on process characterization and control design, the reader has an opportunity to apply what was learned using web-based workshops. The only items required to access these workshops are a high-speed Internet connection and a web browser. Dynamic process simulations are built into the workshops to

give the reader a realistic "hands-on" experience. Also, one chapter of the book is dedicated to techniques that may be used to create process simulations using tools that are commonly available within most distributed control systems. At various points in the chapters on process characterization and control design, the reader has an opportunity to apply what was learned using web-based workshops. The only items required to access these workshops are a high-speed Internet connection and a web browser. Dynamic process simulations are built into the workshops to give the reader a realistic "hands-on" experience. Also, one chapter of the book is dedicated to techniques that may be used to create process simulations using tools that are commonly available within most distributed control systems. As control techniques are introduced, simple process examples are used to illustrate how these techniques are applied in industry. The last chapter of the book, on process applications, contains several more complex examples from industry that illustrate how basic control techniques may be combined to meet a variety of application requirements. As control techniques are introduced, simple process examples are used to illustrate how these techniques are applied in industry. The last chapter of the book, on process applications, contains several more complex examples from industry that illustrate how basic control techniques may be combined to meet a variety of

application requirements.

Instrument Engineers' Handbook – Volume 3: Process Software and Digital Networks, Fourth Edition is the latest addition to an enduring collection that industrial automation (AT) professionals often refer to as the "bible." First published in 1970, the entire handbook is approximately 5,000 pages, designed as standalone volumes that cover the measurement (Volume 1), control (Volume 2), and software (Volume 3) aspects of automation. This fourth edition of the third volume provides an in-depth, state-of-the-art review of control software packages used in plant optimization, control, maintenance, and safety. Each updated volume of this renowned reference requires about ten years to prepare, so revised installments have been issued every decade, taking into account the numerous developments that occur from one publication to the next. Assessing the rapid evolution of automation and optimization in control systems used in all types of industrial plants, this book details the wired/wireless communications and software used. This includes the ever-increasing number of applications for intelligent instruments, enhanced networks, Internet use, virtual private networks, and integration of control systems with the main networks used by management, all of which operate in a linked global environment. Topics covered include: Advances in new displays, which help operators to more quickly assess and

respond to plant conditions Software and networks that help monitor, control, and optimize industrial processes, to determine the efficiency, energy consumption, and profitability of operations Strategies to counteract changes in market conditions and energy and raw material costs Techniques to fortify the safety of plant operations and the security of digital communications systems This volume explores why the holistic approach to integrating process and enterprise networks is convenient and efficient, despite associated problems involving cyber and local network security, energy conservation, and other issues. It shows how firewalls must separate the business (IT) and the operation (automation technology, or AT) domains to guarantee the safe function of all industrial plants. This book illustrates how these concerns must be addressed using effective technical solutions and proper management policies and practices. Reinforcing the fact that all industrial control systems are, in general, critically interdependent, this handbook provides a wide range of software application examples from industries including: automotive, mining, renewable energy, steel, dairy, pharmaceutical, mineral processing, oil, gas, electric power, utility, and nuclear power.

Hardware description languages (HDL) such as VHDL and Verilog have found their way into almost every aspect of the design of digital hardware systems.

Since their inception they gradually proved to be an essential part of modern design methodologies and design automation tools, ever exceeding their original goals of being description and simulation languages. Their use for automatic synthesis, formal proof, and testing are good examples. So far, HDLs have been mainly dealing with digital systems. However, integrated systems designed today require more and more analog parts such as A/D and D/A converters, phase locked loops, current mirrors, etc. The verification of the complete system therefore asks for the use of a single language. Using VHDL or Verilog to handle analog descriptions is possible, as it is shown in this book, but the real power is coming from true mixed-signal HDLs that integrate discrete and continuous semantics into a unified framework. Analog HDLs (AHDL) are considered here a subset of mixed-signal HDLs as they intend to provide the same level of features as HDLs do but with a scope limited to analog systems, possibly with limited support of discrete semantics. Analog and Mixed-Signal Hardware Description Languages covers several aspects related to analog and mixed-signal hardware description languages including: The use of a digital HDL for the description and the simulation of analog systems The emergence of extensions of existing standard HDLs that provide true analog and mixed-signal HDLs. The use of analog and mixed-signal HDLs for the development of behavioral models of

analog (electronic) building blocks (operational amplifier, PLL) and for the design of microsystems that do not only involve electronic parts. The use of a front-end tool that eases the description task with the help of a graphical paradigm, yet generating AHDL descriptions automatically. Analog and Mixed-Signal Hardware Description Languages is the first book to show how to use these new hardware description languages in the design of electronic components and systems. It is necessary reading for researchers and designers working in electronic design. This is a wide-reaching discussion of the issues and problems of electronic full text information delivery and its technological foundations.

Featuring contributions from major technology vendors, industry consortia, and government and private research establishments, the Industrial Communication Technology Handbook, Second Edition provides comprehensive and authoritative coverage of wire- and wireless-based specialized communication networks used in plant and factory automation, automotive applications, avionics, building automation, energy and power systems, train applications, and more. New to the Second Edition: 46 brand-new chapters and 21 substantially revised chapters Inclusion of the latest, most significant developments in specialized communication technologies and systems Addition of new application domains for specialized networks The Industrial Communication Technology Handbook,

Second Edition supplies readers with a thorough understanding of the application-specific requirements for communication services and their supporting technologies. It is useful to a broad spectrum of professionals involved in the conception, design, development, standardization, and use of specialized communication networks as well as academic institutions engaged in engineering education and vocational training.

This well-organized book is intended for the undergraduate students of Electrical, Electronics and Communications, Computer, Instrumentation and Instrumentation and Control Engineering; and postgraduate students of science in Electronics, Physics and Instrumentation. Data acquisition being the core of all PC-based measurements and control instrumentation systems engineering, this book presents detailed discussions on PC bus based data acquisition, remote data acquisition, GPIB data acquisition and networked data acquisition configurations. This book also describes sensors, signal-conditioning and principles of PC-based data acquisition. It provides several latest and advanced techniques. This book stresses the need for understanding the use of Personal Computers in measurement and control instrumentation applications. KEY FEATURES : • Provides several laboratory experiments to help the readers to gain hands-on experience in PC-based measurement and control. • Provides a

number of review questions/problems (with solutions to the odd numbered problems) and objective type questions with solutions. • Presents a number of working circuits, design and programming examples. • Presents comparison of properties, features and characteristics of different bus systems, interface standards, and network protocols. • Includes the advanced techniques such as sigma–delta converter, RS-485, I2C bus, SPI bus, FireWire, IEEE-488.2, SCPI and Fieldbus standards.

This book focuses on the basic principles of digital electronics and logic design. It is designed as a textbook for undergraduate students of electronics, electrical engineering, computer science, physics, and information technology. The text covers the syllabi of several Indian and foreign universities. It depicts the comprehensive resources on the recent ideas in the area of digital electronics explored by leading experts from both industry and academia. A good number of diagrams are provided to illustrate the concepts related to digital electronics so that students can easily comprehend the subject. Solved examples within the text explain the concepts discussed and exercises are provided at the end of each chapter.

This 3rd Edition, written by control systems engineers with extensive FOUNDATIONA(TM) Fieldbus installation experience, builds on the contents of the previous two editions, providing quick reference information on all aspects of the FOUNDATIONA(TM) Fieldbus H1 protocol life cycle, including design considerations, installation tips, and commissioning. Operations and maintenance tips are also provided along with other useful information that design engineers, control system engineers, and instrumentation technicians need to know about

FOUNDATIONA(TM) Fieldbus when meeting with a vendor or client, and while managing an installation at a job site. Packed with handy reference information, the book covers the essentials on network design, including power distribution and power supply requirements. It also provides rules for cabling length, documentation requirements, a commissioning checklist, topology diagrams, system sizing formulas, and tips for integrating with other systems. This valuable resource explains the different forms of Fieldbus Power Conditioners such as Fieldbus Intrinsic Safety Concept (FISCO) along with a useful range of configuration and troubleshooting tips.

Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database.

The 3rd International Conference on Foundations and Frontiers in Computer, Communication and Electrical Engineering is a notable event which brings together academia, researchers, engineers and students in the fields of Electronics and Communication, Computer and Electrical Engineering making the conference a perfect platform to share experience, f

Liquid loading can reduce production and shorten the lifecycle of a well costing a company millions in revenue. A handy guide on the latest techniques, equipment, and chemicals used in de-watering gas wells, Gas Well Deliquification, 2nd Edition continues to be the engineer's choice for recognizing and minimizing the effects of liquid loading. The 2nd Edition serves as a guide discussing the most frequently used methods and tools used to diagnose liquid loading problems and reduce the detrimental effects of liquid loading on gas production. With new extensive chapters on Coal Bed Methane and Production this is the essential reference for

operating engineers, reservoir engineers, consulting engineers and service companies who supply gas well equipment. It provides managers with a comprehensive look into the methods of successful Production Automation as well as tools for the profitable use, production and supervision of coal bed gases. • Turnkey solutions for the problems of liquid loading interference • Based on decades of practical, easy to use methods of de-watering gas wells • Expands on the 1st edition's useful reference with new methods for utilizing Production Automation and managing Coal Bed Methane

Sound Systems: Design and Optimization provides an accessible and unique perspective on the behavior of sound systems in the practical world. The third edition reflects current trends in the audio field thereby providing readers with the newest methodologies and techniques. In this greatly expanded new edition, you'll find clearer explanations, a more streamlined organization, increased coverage of current technologies and comprehensive case studies of the author's award-winning work in the field. As the only book devoted exclusively to modern tools and techniques in this emerging field, Sound Systems: Design and Optimization provides the specialized guidance needed to perfect your design skills. This book helps you: Improve your design and optimization decisions by understanding how audiences perceive reinforced sound Use modern analyzers and prediction programs to select speaker placement, equalization, delay and level settings based on how loudspeakers interact in the space Define speaker array configurations and design strategies that maximize the potential for spatial uniformity Gain a comprehensive understanding of the tools and techniques required to generate a design that will create a successful transmission/reception model

This book has been written to help digital engineers who need a few basic analog tools in their

toolbox. For practicing digital engineers, students, educators and hands-on managers who are looking for the analog foundation they need to handle their daily engineering problems, this will serve as a valuable reference to the nuts-and-bolts of system analog design in a digital world. This book is a hands-on designer's guide to the most important topics in analog electronics - such as Analog-to-Digital and Digital-to-Analog conversion, operational amplifiers, filters, and integrating analog and digital systems. The presentation is tailored for engineers who are primarily experienced and/or educated in digital circuit design. This book will teach such readers how to "think analog" when it is the best solution to their problem. Special attention is also given to fundamental topics, such as noise and how to use analog test and measurement equipment, that are often ignored in other analog titles aimed at professional engineers. Extensive use of case-histories and real design examples Offers digital designers the right analog "tool" for the job at hand Conversational, annecdotal "tone" is very easily accessible by students and practitioners alike

Unlike books currently on the market, this book attempts to satisfy two goals: combine circuits and electronics into a single, unified treatment, and establish a strong connection with the contemporary world of digital systems. It will introduce a new way of looking not only at the treatment of circuits, but also at the treatment of introductory coursework in engineering in general. Using the concept of ''abstraction,'' the book attempts to form a bridge between the world of physics and the world of large computer systems. In particular, it attempts to unify electrical engineering and computer science as the art of creating and exploiting successive abstractions to manage the complexity of building useful electrical systems. Computer systems are simply one type of electrical systems. +Balances circuits theory with practical digital

electronics applications. +Illustrates concepts with real devices. +Supports the popular circuits and electronics course on the MIT OpenCourse Ware from which professionals worldwide study this new approach. +Written by two educators well known for their innovative teaching and research and their collaboration with industry. +Focuses on contemporary MOS technology.

This textbook first published in 1992 now appearing in its third edition retains the best features from the earlier editions and adds significantly to the contents, which include developments in the 1990s.

The latest update to Bela Liptak's acclaimed "bible" of instrument engineering is now available. Retaining the format that made the previous editions bestsellers in their own right, the fourth edition of Process Control and Optimization continues the tradition of providing quick and easy access to highly practical information. The authors are practicing engineers, not theoretical people from academia, and their from-the-trenches advice has been repeatedly tested in real-life applications. Expanded coverage includes descriptions of overseas manufacturer's products and concepts, model-based optimization in control theory, new major inventions and innovations in control valves, and a full chapter devoted to safety. With more than 2000 graphs, figures, and tables, this all-inclusive encyclopedic volume replaces an entire library with one authoritative reference. The fourth edition brings the content of the previous editions completely up to date, incorporates the developments of the last decade, and broadens the horizons of the work from an American to a global perspective. Béla G. Lipták speaks on Post-Oil Energy Technology on the AT&T Tech Channel.

The book begins with an overview of automation history and followed by chapters on PLC,

DCS, and SCADA –describing how such technologies have become synonymous in process instrumentation and control. The book then introduces the niche of Fieldbuses in process industries. It then goes on to discuss wireless communication in the automation sector and its applications in the industrial arena. The book also discusses theall-pervading IoT and its industrial cousin,IIoT, which is finding increasing applications in process automation and control domain. The last chapter introduces OPC technology which has strongly emerged as a defacto standard for interoperable data exchange between multi-vendor software applications and bridges the divide between heterogeneous automation worlds in a very effective way. Key features: Presents an overall industrial automation scenario as it evolved over the years Discusses the already established PLC, DCS, and SCADA in a thorough and lucid manner and their recent advancements Provides an insight into today's industrial automation field Reviews Fieldbus communication and WSNs in the context of industrial communication Explores IIoT in process automation and control fields Introduces OPC which has already carved out a niche among industrial communication technologies with its seamless connectivity in a heterogeneous automation world Dr. Chanchal Dey is Associate Professor in the Department of Applied Physics, Instrumentation Engineering Section, University of Calcutta. He is a reviewer of IEEE, Elsevier, Springer, Acta Press, Sage, and Taylor & Francis Publishers. He has more than 80 papers in international journals and conference publications. His research interests include intelligent process control using conventional, fuzzy, and neuro-fuzzy techniques. Dr. Sunit Kumar Sen is an ex-professor, Department of Applied Physics, Instrumentation Engineering Section, University of Calcutta. He was a coordinator of two projects sponsored by AICTE and UGC, Government of India. He has published around70

papers in international and national journals and conferences and has published three books – the last one was published by CRC Press in 2014. He is a reviewer of Measurement, Elsevier. His field of interest is new designs of ADCs and DACs.

"The first edition of this comprehensive introduction to sensation and perception has been highly praised for its unique approach: it allows students to thoroughly grasp the fundamental principles in relation to the relatively simple sensory systems before moving on to the more complex topics."--BOOK JACKET.

Providing a comprehensive overview of the state-of-the-art in Collaborative Process Automation Systems (CPAS), this book discusses topics such as engineering, security, enterprise connectivity, advanced process control, plant asset management, and operator efficiency. Collaborating with other industry experts, the author covers the system architecture and infrastructure required for a CPAS, as well as important standards like OPC and the ISA-95 series of standards. This in-depth reference focuses on the differences between a CPAS and traditional automation systems. Implications on modern automation systems are outlined in theory and practice. This book is ideal for industrial engineers, as well as graduate students in control and automation.

Implementing Cisco Unified Communications Voice over IP and QoS (CVOICE) Foundation Learning Guide Foundation Learning for the CCNP® Voice (CVOICE) 642-437 Exam Kevin Wallace, CCIE® No. 7945 Implementing Cisco Unified Communications Voice over IP and QoS (CVOICE) Foundation Learning Guide is a Cisco®-authorized, self-paced learning tool for CCNP Voice foundation learning. Developed in conjunction with the Cisco CCNP Voice certification team, it covers all aspects of planning, designing, and deploying Cisco VoIP

networks and integrating gateways, gatekeepers, and QoS into them. Updated throughout for the new CCNP Voice (CVOICE) Version 8.0 exam (642-437), this guide teaches you how to implement and operate gateways, gatekeepers, Cisco Unified Border Element, Cisco Unified Communications Manager Express, and QoS in a voice network architecture. Coverage includes voice gateways, characteristics of VoIP call legs, dial plans and their implementation, basic implementation of IP phones in Cisco Unified Communications Manager Express environment, and essential information about gatekeepers and Cisco Unified Border Element. The book also provides information on voice-related QoS mechanisms that are required in Cisco Unified Communications networks. Fourteen video lab demonstrations on the accompanying CD-ROM walk you step by step through configuring DHCP servers, CUCME autoregistration, ISDN PRI circuits, PSTN dial plans, DID, H.323 and MGCP gateways, VoIP dial peering, gatekeepers, COR, AutoQoS VoIP, and much more. Whether you are preparing for CCNP Voice certification or simply want to gain a better understanding of VoIP and QoS, you will benefit from the foundation information presented in this book. - Voice gateways, including operational modes, functions, related call leg types, and routing techniques - Gateway connections to traditional voice circuits via analog and digital interfaces - Basic VoIP configuration, including A/D conversion, encoding, packetization, gateway protocols, dial peers, and transmission of DTMF, fax, and modem tones - Supporting Cisco IP Phones with Cisco Unified Communications Manager Express - Dial plans, including digit manipulation, path selection, calling privileges, and more - Gatekeepers, Cisco Unified Border Elements, and call admission control (CAC) configuration - QoS issues and mechanisms - Unique DiffServ QoS characteristics and mechanisms - Cisco AutoQoS configuration and operation Companion

CD-ROM The CD-ROM that accompanies this book contains 14 video lab demonstrations running approximately 90 minutes. This book is in the Foundation Learning Guide Series. These guides are developed together with Cisco® as the only authorized, self-paced learning tools that help networking professionals build their understanding of networking concepts and prepare for Cisco certification exams.

Building on the success of the previous three editions, Foundations for Microstrip Circuit Design offers extensive new, updated and revised material based upon the latest research. Strongly design-oriented, this fourth edition provides the reader with a fundamental understanding of this fast expanding field making it a definitive source for professional engineers and researchers and an indispensable reference for senior students in electronic engineering. Topics new to this edition: microwave substrates, multilayer transmission line structures, modern EM tools and techniques, microstrip and planar transmision line design, transmission line theory, substrates for planar transmission lines, Vias, wirebonds, 3D integrated interposer structures, computer-aided design, microstrip and power-dependent effects, circuit models, microwave network analysis, microstrip passive elements, and slotline design fundamentals.

Over the last two decades, fieldbus has totally revolutionized the way communication takes place in the fields of process control, automation, and manufacturing industries. Recent introduction of real-time fieldbuses has opened up its application in multi-axis motor control and other time-critical applications. Fieldbus is designed to ensure easy interoperability, smarter network designs, increased data availability, and lessened stress on the design aspects of safety protocols. This second edition of Fieldbus and Networking in Process

Automation discusses the different facets of fieldbus technology including design, wiring, installation, and commissioning as well as safety aspects in hostile application areas. The book: • Explains basic communication principles and networking—a must for understanding fieldbuses • Considers the advantages and shortcomings of individual fieldbuses • Provides a broad spectrum of different fieldbuses used in both process control and manufacturing industries in a precise and to-the-point manner • Introduces Common Industrial Protocol (CIP), EtherNet/IP, EtherCAT, SERCOS III, Powerlink, and Profinet IRT, which are mostly sought after in control and automation fields • Discusses hard real-time communication in a succinct manner—so essential in today's multi-axis motor control systems • Updates and streamlines the extra details from the original book to make it more concise and reader friendly Sunit Kumar Sen, a member of IET, holds advanced degrees from St Xavier's College and University of Calcutta, both in Kolkata, India. He was an ex-professor in the Instrumentation Engineering section of the Department of Applied Physics, University of Calcutta, and taught courses in digital electronics, communication, industrial instrumentation, microprocessors, electrical networks, and fieldbuses. He was the head of the Department of Applied Physics and University Science Instrumentation Center from 2008-2010 at the University of Calcutta. Previously, he was assistant manager, instrumentation (oprn.) at the Bokaro Steel Plant, Jharkhand, India, under the Steel Authority of India (SAIL). He has already written four books in the areas of instrumentation, microprocessors, and industrial automation technologies. He has been published in approximately 70 national and international journals and conferences. The book consists of 21 chapters which present interesting applications implemented using the LabVIEW environment, belonging to several distinct fields such as engineering, fault diagnosis,

medicine, remote access laboratory, internet communications, chemistry, physics, etc. The virtual instruments designed and implemented in LabVIEW provide the advantages of being more intuitive, of reducing the implementation time and of being portable. The audience for this book includes PhD students, researchers, engineers and professionals who are interested in finding out new tools developed using LabVIEW. Some chapters present interesting ideas and very detailed solutions which offer the immediate possibility of making fast innovations and of generating better products for the market. The effort made by all the scientists who contributed to editing this book was significant and as a result new and viable applications were presented.
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