Basic Electronic Communications Theory

This intuitive yet rigourous introduction derives the core results of digital communication from first principles. Theory, rather than industry standards, motivates the engineering approaches, and key results are stated with all the required assumptions. The book emphasizes the geometric view, opening with the inner product, the matched filter for its computation, Parseval's theorem, the sampling theorem as an orthonormal expansion, the isometry between passband signals and their baseband representation, and the spectral-efficiency optimality of quadrature amplitude modulation (QAM). Subsequent chapters address noise, hypothesis testing, Gaussian stochastic processes, and the sufficiency of the matched filter outputs. Uniquely, there is a treatment of white noise without generalized functions, and of the power spectral density without artificial random jitters and random phases in the analysis of QAM. This systematic and insightful book, with over 300 exercises, is ideal for graduate courses in digital communication, and for anyone asking 'why' and not just 'how'.

A concise introduction to the core concepts in digital communication, providing clarity and depth through examples, problems and MATLAB exercises. Its simple structure maps a logical route to understand the most basic principles in digital communication, and also leads students through more in-depth treatment with examples and step-by step instructions.

Do you need to know how to develop more efficient digital communication systems? Based on the author's experience of over thirty years in industrial design, this practical guide provides detailed coverage of synchronization subsystems and their relationship with other system components. Readers will gain a comprehensive understanding of the techniques needed for the design, performance analysis and implementation of synchronization functions for a range of different modern communication technologies. Specific topics covered include frequency-looked loops in wireless receivers, optimal OFDM timing phase determination and implementation, and interpolation filter design and analysis in digital resamplers. Numerous implementation examples help readers to develop the necessary practical skills, and slides summarizing key concepts accompany the book online. This is an invaluable guide and essential reference for both practicing engineers and graduate students working in digital communications.

Scientific knowledge grows at a phenomenal pace--but few books have had as lasting an impact or played as important a role in our modern world as The Mathematical Theory of Communication, published originally as a paper on communication theory more than fifty years ago. Republished in book form shortly thereafter, it has since gone through four hardcover and sixteen paperback printings. It is a revolutionary work, astounding in its foresight and contemporaneity. The University of Illinois Press is pleased and honored to issue this commemorative reprinting of a classic.

Electronic Communication
Signal Processing in Electronic Communications
Introduction to Digital Communication Systems
Principles of Modern Communication Systems
Multi-Carrier Digital Communications

An accessible undergraduate textbook introducing key fundamental principles behind modern communication systems, supported by exercises, software problems and lab exercises.

Providing the underlying principles of digital communication and the design techniques of real-world systems, this textbook prepares senior undergraduate and graduate students for the engineering practices required in industry. Covering the core concepts, including modulation, demodulation, equalization, and channel coding, it provides step-by-step mathematical derivations to aid understanding of background material. In addition to describing the basic theory, the principles of system and subsystem design are introduced, enabling students to visualize the intricate connections between subsystems and understand how each aspect of the design supports the overall goal of achieving reliable communications. Throughout the book, theories are linked to practical applications with over 250 real-world examples, whilst 370 varied homework problems in three levels of difficulty enhance and extend the text material. With this textbook, students can understand how digital communication systems operate in the real world, learn how to design subsystems, and evaluate end-to-end performance with ease and confidence.

Combining theoretical knowledge and practical applications, this advanced-level textbook covers the most important aspects of contemporary digital communication systems. Introduction to Digital Communication Systems focuses on the rules of functioning digital communication system blocks, starting with the performance limits set by the information theory. Drawing on information relating to turbo codes and LDPC codes, the text presents the basic methods of error correction and detection, followed by baseband transmission methods, and single- and multi-carrier digital modulations. The basic properties of several physical communication channels used in digital communication systems are explained, showing the transmission and reception methods on channels suffering from intersymbol interference. The text also describes the most recent developments in the transmission techniques specific to wireless communications used both in wireline and wireless systems. The case studies are a unique feature of this book, illustrating elements of the theory developed in each chapter. Introduction to Digital Communication Systems provides a concise approach to digital communications, with practical examples and problems to supplement the text. There is also a companion website featuring an instructors' solutions manual and presentation slides to aid understanding. Offers theoretical and practical knowledge in a self-contained textbook on digital communications Explains basic rules of recent achievements in digital communication systems such as MIMO, turbo codes, LDPC codes, OFDMA, SC-FDMA Provides problems at the end of each chapter with an instructors' solutions manual on the companion website Includes case studies and representative communication system examples such as DVB-S, GSM, UMTS, 3GPP-LTE

This work combines the expertise of communication specialists at three South African technikons to meet the requirements of first-year students in a variety of college courses. The text includes all key syllabus elements, while giving practical examples of communication in the workplace.

The 1980 Guide to the Evaluation of Educational Experiences in the Armed Services: Coast Guard, Marine Corps, Navy, Dept. of Defense
A First Course in Digital Communications
Information and Communication Theory

Analog and Digital Communications

Communications System Laboratory

One of the most comprehensive, clearly written books on electronic technology, Simpon's invaluable guide offers a concise and practical overview of the basic principles, theorems, circuit behavior and problem-solving procedures of this intriguing and fast-paced science. Examines a broad spectrum of topics, such as atomic structure, Kirchhoff's laws, energy, power, introductory circuit analysis techniques, Thevenin's theorem, the maximum power transfer theorem, electric circuit analysis, magnetism, resonance semiconductor diodes, electron current flow, and much more. Smoothly integrates the flow of material in a nonmathematical format without sacrificing depth of coverage or accuracy to help readers grasp more complex concepts and gain a more thorough understanding of the principles of electronics. Includes many practical applications, problems and examples emphasizing troubleshooting, design, and safety to provide a solid foundation in the field of electronics. An ideal reference source for electronic engineering technicians and those involved in the electronic technology field.

This book uses a practical approach in the application of theoretical concepts to digital communications in the design of software defined radio modems. This book discusses the design, implementation and performance verification of waveforms and algorithms appropriate for digital data modulation and demodulation in modern communication systems. Using a building-block approach, the author provides an introductory to the advanced understanding of acquisition and data detection using source and executable simulation code to validate the communication system performance with respect to theory and design specifications. The author focuses on theoretical analysis, algorithm design, firmware and software designs and subsystem and system testing. This book treats system designs with a variety of channel characteristics from very low to optical frequencies. This book offers system analysis and subsystem implementation options for acquisition and data detection appropriate to the channel conditions and system specifications, and provides test methods for demonstrating system performance. This book also: Outlines fundamental system requirements and related analysis that must be established prior to a detailed subsystem design Includes many examples that highlight various analytical solutions and case studies that characterize various system performance measures Discusses various aspects of atmospheric propagation using the spherical 4/3 effective earth radius model Examines Ionospheric propagation and uses the Rayleigh fading channel to evaluate link performance using several robust waveform modulations Contains end-of-chapter problems, allowing the reader to further engage with the text Digital Communications with Emphasis on Data Modems is a great resource for communication-system and digital signal processing engineers and students looking for in-depth theory as well as practical implementations.

The renowned communications theorist Robert Gallager brings his lucid writing style to the study of the fundamental system aspects of digital communication for a one-semester course for graduate students. With the clarity and insight that have characterized his teaching and earlier textbooks, he develops a simple framework and then combines this with careful proofs to help the reader understand modern systems and simplified models in an intuitive yet precise way. A strong narrative and links between theory and practice reinforce this concise, practical presentation. The book begins with data compression for arbitrary sources. Gallager then describes how to modulate the resulting binary data for transmission over wires, cables, optical fibers, and wireless channels. Analysis and intuitive interpretations are developed for channel noise models, followed by coverage of the principles of detection, coding, and decoding. The various concepts covered are brought together in a description of wireless communication, using CDMA as a case study.

This text deals with signal processing as an important aspect of electronic communications in its role of transmitting information, and the language of its expression. It develops the required mathematics in an interesting and informative way, leading to confidence on the part of the reader. The first part of the book focuses on continuous-time models, and contains chapters on signals and linear systems, and on system responses. Fourier methods, so vital in the study of information theory, are developed prior to a discussion of methods for the design of analogue filters. The second part of the book is directed towards discrete-time signals and systems. There is full development of the z- and discrete Fourier transforms to support the chapter on digital filter design. All preceding material in the book is drawn together in the final chapter on some important aspects of speech processing which provides an up-to-date example of the use of the theory. Topics considered include a speech production model, linear predictive filters, lattice filters and cepstral analysis, with application to recognition of non-nasal voiced speech and formant estimation. In addition to course requirement for undergraduates studying electrical engineering, applied mathematics, and branches of computer science involving such signal processing as speak synthesis, computer vision and robotics, this book should provide a valuable reference source for post-graduate research work in industry and academia. An elementary knowledge of algebra (e.g. partial fractions) is a prerequisite, and also calculus including differential equations. A knowledge of complex numbers and of the basic concept of a function of a complex variable is also needed. Deals with signal processing as an important aspect of electronic communications in its role of transmitting information, and the language of its expression Topics considered include a speech production model, linear predictive filters, lattice filters and cepstral analysis, with application to recognition of non-nasal voiced speech and formant estimation

Communication systems

Principles of Electronic Communication Systems

Digital Communications

Principles of Digital Communication

For Engineers and Mathematicians

This book examines the major business communication theories, delving into their relationships and practical applications. Many business communication studies lack a strong theoretical grounding—a deficit that creates difficulties for researching business communication phenomena and building upon previous studies. The book addresses this issue by cataloging and briefly describing the major business communication theories, as well as giving a typology of these theories to better integrate them. This book provides value to business communication researchers (who can use it to build upon and develop their work), experts in practice (who can apply it to improve business communications), and academics (who can use it to enhance their instructional designs). It also offers insights into new developments on the business communication theory horizon.

This second edition of Multi-Carrier Digital Communications: Theory and Applications of OFDM begins with a brief overview of multi-carrier communications. The authors then focus on the bandwidth efficient technology of OFDM, in particular the DSP techniques that have made the modulation

format practical. Several chapters describe and analyze the sub-systems of an OFDM implementation, such as clipping, synchronization channel estimation, equalization, and coding. Analysis of performance over channels with various impairments is presented. The book continues with descriptions of three very important and diverse applications of OFDM that have been standardized and are now being deployed: ADSL, digital broadcasting, and wireless LANs for multi-Mbps communications. Finally, the book concludes with describing the OFDM-based multiple access techniques, ultra wideband technology, and WiMAX.

Multi-carrier modulation, in particular orthogonal frequency division multiplexing (OFDM), has been successfully applied to a wide variety of digital communications applications for several years. Although OFDM has been chosen as the physical layer standard for a diversity of important systems, the theory, algorithms, and implementation techniques remain subjects of current interest. This book is intended to be a concise summary of the present state of the art of the theory and practice of OFDM technology. This book offers a unified presentation of OFDM theory and high speed and wireless applications. In particular, ADSL, wireless LAN, and digital broadcasting technologies are explained. It is hoped that this book will prove valuable both to developers of such systems, and to researchers and graduate students involved in analysis of digital communications, and will remain a valuable summary of the technology, providing an understanding of new advances as well as the present core technology.

This updated edition is an introduction appropriate for both the student and hobbyist to the theory and practice of electronics. It leads the reader through introductory understanding of the science underlying electronics, building basic circuits, learning the roles of the components, the application of digital theory and the possibilities for innovation by combining sensors, motors, and microcontrollers. Each chapter contains a brief lab to demonstrate the topic covered then moving on to the final projects that build a programmable robot with the Netduino or Arduino microcontroller and projects using the Raspberry Pi. The companion disc has videos of the labs, soldering skills, and code samples for programming of the robot. eBook Customers: Companion files are available for downloading with order number/proof of purchase by writing to the publisher at info@merclearning.com. Features: • Leads the reader through an introductory understanding of electronics with both simple labs and progressing to the construction of a microcontroller-driven robot using open source software and hardware and projects to run on a Raspberry Pi • Companion disc contains videos of labs, tutorials on soldering/ de-soldering, code for the microcontroller robot project, and figures from the text

Laying a Foundation for the Field

Communication Theory Today

Electronic cryptographic communications equipment specialist (AFSC 30650).

Principles of Digital Communication and Coding

Digital Communications with Emphasis on Data Modems

An important text that offers an in-depth guide to how information theory sets the boundaries for data communication In an accessible and practical style, Information and Communication Theory explores the topic of information theory and includes concrete tools that are appropriate for real-life communication systems. The text investigates the connection between theoretical and practical applications through a wide-variety of topics including an introduction to the basics of probability theory, information, (lossless) source coding, typical sequences as a central concept, channel coding, continuous random variables, Gaussian channels, discrete input continuous channels, and a brief look at rate distortion theory. The author explains the fundamental theory together with typical compression algorithms and how they are used in reality. He moves on to review source coding and how much a source can be compressed, and also explains algorithms such as the LZ family with applications to e.g. zip or png. In addition to exploring the channel coding theorem, the book includes illustrative examples of codes. This comprehensive text: Provides an adaptive version of Huffman coding that estimates source distribution Contains a series of problems that enhance an understanding of information presented in the text Covers a variety of topics including optimal source coding, channel coding, modulation and much more Includes appendices that explore probability distributions and the sampling theorem Written for graduate and undergraduate students studying information theory, as well as professional engineers, master's students, Information and Communication Theory offers an introduction to how information theory sets the boundaries for data communication.

This book, edited and authored by world leading experts, gives a review of the principles, methods and techniques of important and emerging research topics and technologies in wireless communications and transmission techniques. The reader will: Quickly grasp a new area of research Understand the underlying principles of a topic and its application Ascertain how a topic relates to other areas and learn of the research issues yet to be resolved Reviews important and emerging topics of research in wireless technology in a quick tutorial format Presents core principles in wireless transmission theory Provides reference content on core principles, technologies, algorithms, and applications Includes comprehensive references to journal articles and other literature on which to build further, more specific and detailed knowledge

Veteran electronics technician Frederick Gould clearly explains electronics communications theory and circuit operations in a language technicians can understand. This practical guide is free of jargon and complicated mathematics. Coverage includes communications transmitters; antennas, satellite, and personal communications systems; safety, test equipment and maintenance practices; spinoffs from military applications; and future trends.

This book was written as a first treatment of statistical com munication theory and communication systems at a senior graduate level. The only formal prerequisite is a knowledge of ele mentary calculus; however, some familiarity with linear systems and transform theory will be helpful. Chapter 1 is introductory and contains no substantial techni cal material. Chapter 2 is an elementary introduction to probability theory at a nonrigorous and non abstract level. It is essential to the remainder of the book but may be skipped (or reviewed has tily) by any student who has taken a one-semester undergraduate course in probability. Chapter 3 is a brief treatment of random processes and spec tral analysis. It includes an introduction to shot noise (Sections

3.14-3.17) which is not subsequently used explicitly. Chapter 4 considers linear systems with random inputs. It includes a considerable amount of material on narrow-band sys tems and on the representation of random processes. Chapter 5 treats the matched filter and the linear least mean-squared-error filter at an elementary level but in some detail. Numerous examples are provided throughout the book. Many of these are of an elementary nature and are intended merely to illustrate textual material. A reasonable number of problems of varying difficulty are provided. Instructors who adopt the text for classroom use may obtain a Solutions Manual for most of the problems by writing to the author.

Communication Systems Engineering

1977 supplement

Theory and Applications for Narrowband and Broadband Communications over Power Lines

Fundamentals of Digital Communication

Communicating for the Professions

Communications System Laboratory offers an integrated approach to communications system teaching. Inspired by his students' expressed desire to read background theory explained in simple terms and to obtain practical computer training, Dr. Kumar has crafted this textbook, ideal for a first course in communication systems. The book merges theory with practical software and hardware applications. Each chapter includes the following components: a brief theory that describes the underlying mathematics and principles, a problem-solving section with a set of typical problems, a computer laboratory with programming examples and exercises in MATLAB® and Simulink®, and finally, in applicable chapters, a hardware laboratory with exercises using test and measurement equipment. Covering fundamental topics such as frequency and bandwidth, as well as different generations of modulation including current 4G long-term evolution (LTE) techniques and future technologies like ultra wideband (UWB) systems, Communications System Laboratory provides engineering students with a deeper understanding of how electronic communications link the world.

Written by two distinguished experts in the field of digital communications, this classic text remains a vital resource three decades after its initial publication. Its treatment is geared toward advanced students of communications theory and to designers of channels, links, terminals, modems, or networks used to transmit and receive digital messages. The three-part approach begins with the fundamentals of digital communication and block coding, including an analysis of block code ensemble performance. The second part introduces convolutional coding, exploring ensemble performance and sequential decoding. The final section addresses source coding and rate distortion theory, examining fundamental concepts for memoryless sources as well as precepts related to memory, Gaussian sources, and universal coding. Appendixes of useful information appear throughout the text, and each chapter concludes with a set of problems, the solutions to which are available online.

Synchronization is a critical function in digital communications; its failures may have catastrophic effects on the transmission system performance. Furthermore, synchronization circuits comprehend such a large part of the receiver hardware that their implementation has a substantial impact on the overall costs. For these reasons design engineers are particularly concerned with the development of new and more efficient synchronization structures. Unfortunately, the advent of digital VLSI technology has radically affected modem design rules, to a point that most analog techniques employed so far have become totally obsolete. Although digital synchronization methods are well established by now in the literature, they only appear in the form of technical papers, often concentrating on specific performance or implementation issues. As a consequence they are hardly useful to give a unified view of an otherwise seemingly heterogeneous field. It is widely recognized that a fundamental understanding of digital synchronization can only be reached by providing the designer with a solid theoretical framework, or else he will not know where to adjust his methods when he attempts to apply them to new situations. The task of the present book is just to develop such a framework.

This state-of-the-art overview reflects the rich variety of approaches and disciplines embraced by contemporary communication studies. The book consists of thirteen original essays by some of the most prominent communication scholars, including Ien Ang, Deidre Boden, David Crowley, James M. Collins, Klaus Krippendorff, William Leiss, Denis McQuail, William Melody, Joshua Meyrowitz, David Mitchell, Mark Poster, Majid Tehranian, John B. Thompson and Teun A. van Dijk.

Systems, Modulation, and Noise

Academic Press Library in Mobile and Wireless Communications

Principles of Communications

Theory, Analysis, Design, Simulation, Testing, and Applications

Electronic Communication Systems

Thorough coverage of basic digital communication system principles ensures that readers are exposed to all basic relevant topics in digital communication system design. The use of CD player and JPEG image coding standard as examples of systems that employ modern communication principles allows readers to relate the theory to practical systems. Over 180 worked-out examples throughout the book aids readers in understanding basic concepts. Over 480 problems involving applications to practical systems such as satellite communications systems, ionospheric channels, and mobile radio channels gives readers ample opportunity to practice the concepts they have just learned. With an emphasis on digital communications, Communication Systems Engineering, Second Edition introduces the basic principles underlying the analysis and design of communication systems. In addition, this book gives a solid introduction to analog communications and a review of important mathematical foundation topics. New material has been added on wireless communication systems—GSM and CDMA/IS-94; turbo codes and iterative decoding; multicarrier (OFDM) systems; multiple antenna systems. Includes thorough coverage of basic digital communication system principles—including source coding, channel coding, baseband and carrier modulation, channel distortion, channel equalization, synchronization, and wireless communications. Includes basic coverage of analog modulation such as amplitude modulation, phase modulation, and frequency modulation as well as demodulation methods. For use as a reference for electrical engineers for all basic relevant topics in digital communication system design.

Power Line Communications (PLC) is a promising emerging technology, which has attracted much attention due to the wide availability of power distribution lines. This book provides a thorough introduction to the use of power lines for communication purposes, ranging from channel characterization, communications on the physical layer and electromagnetic interference, through to protocols, networks, standards and up to systems and implementations. With contributions from many of the most prominent international PLC experts from academia and industry, Power Line Communications brings together a

wealth of information on PLC specific topics that provide the reader with a broad coverage of the major developments within the field. Acts as a single source reference guide to PLC collating information that is widely dispersed in current literature, such as in research papers and standards. Covers both the state of the art, and ongoing research topics. Considers future developments and deployments of PLC "Principles of Electronic Communication Systems" is an introductory course in communication electronics for students with a background in basic electronics. The program provides students with the current, state-of-the-art electronics techniques used in all modern forms of electronic communications, including radio, television, telephones, facsimiles, cell phones, satellites, LAN systems, digital transmission, and microwave communications. The text is readable with easy-to-understand line drawings and color photographs. The up-to-date content includes a new chapter on wireless communications systems. Various aspects of troubleshooting are discussed throughout.
An accessible, yet mathematically rigorous, one-semester textbook, engaging students through use of problems, examples, and applications.
Synchronization Techniques for Digital Receivers
Theory and Design of Digital Communication Systems
Fundamental Theories of Business Communication
Transmission Techniques for Digital Communications
Theory and Applications of OFDM

Principles of Electronic Communication Systems 4th edition provides the most up-to-date survey available for students taking a first course in electronic communications. Requiring only basic algebra and trigonometry, the new edition is notable for its readability, learning features and numerous full-color photos and illustrations. A systems approach is used to cover state-of-the-art communications technologies, to best reflect current industry practice. This edition contains greatly expanded and updated material on the Internet, cell phones, and wireless technologies. Practical skills like testing and troubleshooting are integrated throughout. A brand-new Laboratory & Activities Manual provides both hands-on experiments and a variety of other activities, reflecting the variety of skills now needed by technicians. A new Online Learning Center web site is available, with a wealth of learning resources for students.

This is a modern textbook on digital communications and is designed for senior undergraduate and graduate students, whilst also providing a valuable reference for those working in the telecommunications industry. It provides a simple and thorough access to a wide range of topics through use of figures, tables, examples and problem sets. The author provides an integrated approach between RF engineering and statistical theory of communications. Intuitive explanations of the theoretical and practical aspects of telecommunications help the reader to acquire a deeper understanding of the topics. The book covers the fundamentals of antennas, channel modelling, receiver system noise, A/D conversion of signals, PCM, baseband transmission, optimum receiver, modulation techniques, error control coding, OFDM, fading channels, diversity and combining techniques, MIMO systems and cooperative communications. It will be an essential reference for all students and practitioners in the electrical engineering field.

Sections on important areas such as spread spectrum, cellular communications, and orthogonal frequency-division multiplexing are provided. * Computational examples are included, illustrating how to use the computer as a simulation tool, thereby allowing waveforms, spectra, and performance curves to be generated. * Overviews of the necessary background in signal, system, probability, and random process theory required for the analog and digital communications topics covered in the book.

This is a concise presentation of the concepts underlying the design of digital communication systems, without the detail that can overwhelm students. Many examples, from the basic to the cutting-edge, show how the theory is used in the design of modern systems and the relevance of this theory will motivate students. The theory is supported by practical algorithms so that the student can perform computations and simulations. Leading edge topics in coding and wireless communication make this an ideal text for students taking just one course on the subject. Fundamentals of Digital Communications has coverage of turbo and LDPC codes in sufficient detail and clarity to enable hands-on implementation and performance evaluation, as well as 'just enough' information theory to enable computation of performance benchmarks to compare them against. Other unique features include space-time communication and geometric insights into noncoherent communication and equalization.
The 1984 Guide to the Evaluation of Educational Experiences in the Armed Services
Basic Electronics
Technician's Guide to Electronic Communications
Principles of Electronics
Power Line Communications