

Digital Signal Processing In Modern Communication Systems

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Advanced Digital Signal Processing and Noise Reduction - Saeed V. Vaseghi 2008-12-23

Digital signal processing plays a central role in the development of modern communication and information processing systems. The theory and application of signal processing is concerned with the identification, modelling and utilisation of patterns and structures in a signal process. The observation signals are often distorted, incomplete and noisy and therefore noise reduction, the removal of channel distortion, and replacement of lost samples are important parts of a signal processing system. The fourth edition of *Advanced Digital Signal Processing and Noise Reduction* updates and extends the chapters in the previous edition and includes two new chapters on MIMO systems, Correlation and Eigen analysis and independent component analysis. The wide range of topics covered in this book include Wiener filters, echo cancellation, channel equalisation, spectral estimation, detection and removal of impulsive and transient noise, interpolation of missing data segments, speech enhancement and noise/interference in mobile communication

environments. This book provides a coherent and structured presentation of the theory and applications of statistical signal processing and noise reduction methods. Two new chapters on MIMO systems, correlation and Eigen analysis and independent component analysis Comprehensive coverage of advanced digital signal processing and noise reduction methods for communication and information processing systems Examples and applications in signal and information extraction from noisy data Comprehensive but accessible coverage of signal processing theory including probability models, Bayesian inference, hidden Markov models, adaptive filters and Linear prediction models *Advanced Digital Signal Processing and Noise Reduction* is an invaluable text for postgraduates, senior undergraduates and researchers in the fields of digital signal processing, telecommunications and statistical data analysis. It will also be of interest to professional engineers in telecommunications and audio and signal processing industries and network planners and implementers in mobile and wireless communication communities.

Digital Signal Processing - Jonathan M Blackledge 2006-03-01

This book forms the first part of a complete MSc course in an area that is fundamental to the continuing revolution in information technology and communication systems. Massively exhaustive, authoritative, comprehensive and reinforced with software, this is an introduction to modern methods in the developing field of Digital Signal Processing (DSP). The focus is on the design of algorithms and the processing of digital signals in areas of communications and control, providing the reader with a comprehensive introduction to the underlying principles and mathematical models. Provides an introduction to modern methods in the developing field of Digital Signal Processing (DSP) Focuses on the design of algorithms and the processing of digital signals in areas of communications and control Provides a comprehensive introduction to the underlying principles and mathematical models of Digital Signal Processing

Introduction to Communication Systems - Upamanyu Madhow
2014-11-24

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

Essentials of Digital Signal Processing - B. P. Lathi 2014-04-28

Offers a fresh approach to digital signal processing (DSP), combining heuristic reasoning and physical appreciation with mathematical methods.

Signal Processing for Communications - Paolo Prandoni 2008-06-17

With a novel, less classical approach to the subject, the authors have written a book with the conviction that signal processing should be taught to be fun. The treatment is therefore less focused on the mathematics and more on the conceptual aspects, the idea being to allow the readers to think about the subject at a higher conceptual level, thus building the foundations for more advanced topics. The book remains an engineering text, with the goal of helping students solve real-world problems. In this vein, the last chapter pulls together the individual topics as discussed throughout the book into an in-depth look at the

development of an end-to-end communication system, namely, a modem for communicating digital information over an analog channel.

Modern Communications - Daniel W. Bliss 2021-07-22

A concise and approachable introductory text for a single-semester course, organized systematically rather than historically. Combining theory with practical implementation, and accompanied online by PowerPoint slides, a solutions manual, and additional problems, it is ideal for a first communications course.

Theory and Design of Digital Communication Systems - Tri T. Ha
2010-10-28

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.

Applied Digital Signal Processing - Dimitris G. Manolakis 2011-11-21

Master the basic concepts and methodologies of digital signal processing with this systematic introduction, without the need for an extensive mathematical background. The authors lead the reader through the fundamental mathematical principles underlying the operation of key signal processing techniques, providing simple arguments and cases rather than detailed general proofs. Coverage of practical

implementation, discussion of the limitations of particular methods and plentiful MATLAB illustrations allow readers to better connect theory and practice. A focus on algorithms that are of theoretical importance or useful in real-world applications ensures that students cover material relevant to engineering practice, and equips students and practitioners alike with the basic principles necessary to apply DSP techniques to a variety of applications. Chapters include worked examples, problems and computer experiments, helping students to absorb the material they have just read. Lecture slides for all figures and solutions to the numerous problems are available to instructors.

Modern Digital Radio Communication Signals and Systems - Sung-Moon Michael Yang 2021-01-07

This book serves as an easily accessible reference for wireless digital communication systems. Topics are presented with simple but non-trivial examples and then elaborated with their variations and sophistications. The book includes numerous examples and exercises to illustrate key points. For this new edition, a set of problems at the end of each chapter is added, for a total of 298 problems. The book emphasizes both practical problem solving and a thorough understanding of fundamentals, aiming to realize the complementary relationship between practice and theory. Though the author emphasizes wireless radio channels, the fundamentals that are covered here are useful to different channels - digital subscriber line, coax, power lines, optical fibers, and even Gigabit serial connections. The material in chapters 5 (OFDM), 6 (Channel coding), 7 (Synchronization), and 8 (Transceivers) contains new and updated information, not explicitly available in typical textbooks, and useful in practice. For example, in chapter 5, all known orthogonal frequency division multiplex signals are derived from its digitized analog FDM counterparts. Thus, it is flexible to have different pulse shape for subcarriers, and it can be serial transmission as well as block transmission. Currently predominant cyclic prefix based OFDM is a block transmission using rectangular pulse in time domain. This flexibility may be useful in certain applications. For additional information, consult the book support website: <https://baycorewireless.com>

Understanding Digital Signal Processing - Richard G. Lyons
2010-11-01

Amazon.com's Top-Selling DSP Book for Seven Straight Years—Now Fully Updated! *Understanding Digital Signal Processing, Third Edition*, is quite simply the best resource for engineers and other technical professionals who want to master and apply today's latest DSP techniques. Richard G. Lyons has updated and expanded his best-selling second edition to reflect the newest technologies, building on the exceptionally readable coverage that made it the favorite of DSP professionals worldwide. He has also added hands-on problems to every chapter, giving students even more of the practical experience they need to succeed. Comprehensive in scope and clear in approach, this book achieves the perfect balance between theory and practice, keeps math at a tolerable level, and makes DSP exceptionally accessible to beginners without ever oversimplifying it. Readers can thoroughly grasp the basics and quickly move on to more sophisticated techniques. This edition adds extensive new coverage of FIR and IIR filter analysis techniques, digital differentiators, integrators, and matched filters. Lyons has significantly updated and expanded his discussions of multirate processing techniques, which are crucial to modern wireless and satellite communications. He also presents nearly twice as many DSP Tricks as in the second edition—including techniques even seasoned DSP professionals may have overlooked. Coverage includes New homework problems that deepen your understanding and help you apply what you've learned Practical, day-to-day DSP implementations and problem-solving throughout Useful new guidance on generalized digital networks, including discrete differentiators, integrators, and matched filters Clear descriptions of statistical measures of signals, variance reduction by averaging, and real-world signal-to-noise ratio (SNR) computation A significantly expanded chapter on sample rate conversion (multirate systems) and associated filtering techniques New guidance on implementing fast convolution, IIR filter scaling, and more Enhanced coverage of analyzing digital filter behavior and performance for diverse communications and biomedical applications Discrete

sequences/systems, periodic sampling, DFT, FFT, finite/infinite impulse response filters, quadrature (I/Q) processing, discrete Hilbert transforms, binary number formats, and much more

Mathematical Foundations for Signal Processing,

Communications, and Networking - Erchin Serpedin 2017-12-04

Mathematical Foundations for Signal Processing, Communications, and Networking describes mathematical concepts and results important in the design, analysis, and optimization of signal processing algorithms, modern communication systems, and networks. Helping readers master key techniques and comprehend the current research literature, the book offers a comprehensive overview of methods and applications from linear algebra, numerical analysis, statistics, probability, stochastic processes, and optimization. From basic transforms to Monte Carlo simulation to linear programming, the text covers a broad range of mathematical techniques essential to understanding the concepts and results in signal processing, telecommunications, and networking. Along with discussing mathematical theory, each self-contained chapter presents examples that illustrate the use of various mathematical concepts to solve different applications. Each chapter also includes a set of homework exercises and readings for additional study. This text helps readers understand fundamental and advanced results as well as recent research trends in the interrelated fields of signal processing, telecommunications, and networking. It provides all the necessary mathematical background to prepare students for more advanced courses and train specialists working in these areas.

Signal Processing for RF Circuit Impairment Mitigation - Xinping Huang 2014-09-01

A wireless communication system employs a radio frequency (RF) wave to transmit information bearing signals. In modern digital communication systems, sophisticated modulation techniques are developed to modulate information onto an RF carrier waveform, so as to transmit more information. This new book presents signal processing techniques for reducing impairments of analog and RF circuits in wireless communications systems. Engineers, researchers, and students

will find full coverage of the topic, including vector modulators, power amplifiers, vector demodulators, group delay distortion in analog/RF filters, digital beamforming networks, and dual polarization systems. Several applications are discussed, including both single carrier and multi-carrier scenarios.

Starting Digital Signal Processing in Telecommunication Engineering - Tomasz P. Zieliński 2021-01-29

This hands-on, laboratory driven textbook helps readers understand principles of digital signal processing (DSP) and basics of software-based digital communication, particularly software-defined networks (SDN) and software-defined radio (SDR). In the book only the most important concepts are presented. Each book chapter is an introduction to computer laboratory and is accompanied by complete laboratory exercises and ready-to-go Matlab programs with figures and comments (available at the book webpage and running also in GNU Octave 5.2 with free software packages), showing all or most details of relevant algorithms. Students are tasked to understand programs, modify them, and apply presented concepts to recorded real RF signal or simulated received signals, with modelled transmission condition and hardware imperfections. Teaching is done by showing examples and their modifications to different real-world telecommunication-like applications. The book consists of three parts: introduction to DSP (spectral analysis and digital filtering), introduction to DSP advanced topics (multi-rate, adaptive, model-based and multimedia - speech, audio, video - signal analysis and processing) and introduction to software-defined modern telecommunication systems (SDR technology, analog and digital modulations, single- and multi-carrier systems, channel estimation and correction as well as synchronization issues). Many real signals are processed in the book, in the first part - mainly speech and audio, while in the second part - mainly RF recordings taken from RTL-SDR USB stick and ADALM-PLUTO module, for example captured IQ data of VOR avionics signal, classical FM radio with RDS, digital DAB/DAB+ radio and 4G-LTE digital telephony. Additionally, modelling and simulation of some transmission scenarios are tested in software in the book, in

particular TETRA, ADSL and 5G signals. Provides an introduction to digital signal processing and software-based digital communication; Presents a transition from digital signal processing to software-defined telecommunication; Features a suite of pedagogical materials including a laboratory test-bed and computer exercises/experiments.

The Signal - Ted G Lewis 2019-06-03

Computers are the foundation of the information age, but communication technology is the foundation of the foundation. Without the theories and practical applications of theory brought to us by the pioneers of communication, the computer age would perhaps have remained in the back office, hidden away as infrastructure like electricity or running water - critical to modern life, but not as transforming as the combination of communications and computing. The information age exploded once machines were endowed with the ability to talk among themselves. The Signal connects everything to everything else, in both communication, and in the metaphorical sense as the link between and among people. Features Identifies the key ideas underlying modern communications technology, and documents the contributions of its inventors Explores the signal in communication, and also in the metaphorical sense as the link between and among people Leads the reader through a journey from ancient number systems to Voyager II to radio and MP3s to quantum cryptography Includes coverage of "Signals from Hell," including memes and "fake news" on the Internet Looks to the future of communication, with emergent 5G

Modern Communication Systems Using MATLAB - Gerhard Bauch 2011-12

Featuring a variety of applications that motivate students, this book serves as a companion or supplement to any of the comprehensive textbooks in communication systems. The book provides a variety of exercises that may be solved on the computer using MATLAB. By design, the treatment of the various topics is brief. The authors provide the motivation and a short introduction to each topic, establish the necessary notation, and then illustrate the basic concepts by means of an example.

Essentials of Modern Communications - Djafar K. Mynbaev

2020-07-14

Explore Modern Communications and Understand Principles of Operations, Appropriate Technologies, and Elements of Design of Communication Systems Modern society requires a different set of communication systems than has any previous generation. To maintain and improve the contemporary communication systems that meet ever-changing requirements, engineers need to know how to recognize and solve cardinal problems. In Essentials of Modern Communications, readers will learn how modern communication has expanded and will discover where it is likely to go in the future. By discussing the fundamental principles, methods, and techniques used in various communication systems, this book helps engineers assess, troubleshoot, and fix problems that are likely to occur. In this reference, readers will learn about topics like: How communication systems respond in time and frequency domains Principles of analog and digital modulations Application of spectral analysis to modern communication systems based on the Fourier series and Fourier transform Specific examples and problems, with discussions around their optimal solutions, limitations, and applications Approaches to solving the concrete engineering problems of modern communications based on critical, logical, creative, and out-of-box thinking For readers looking for a resource on the fundamentals of modern communications and the possible issues they face, Essentials of Modern Communications is instrumental in educating on real-life problems that engineering students and professionals are likely to encounter.

Digital Signal Processing - Ashok Ambardar 2007

Intended for a one-semester junior or senior level undergraduate course, this book provides a modern and self-contained introduction to digital signal processing (DSP). It is supplemented by a vast number of end-of-chapter problems such as worked examples, drill exercises, and application oriented problems that require the use of computational resources such as MATLAB. Also, many figures have been included to help the student grasp and visualize critical concepts. Results are tabulated and summarized for easy reference and access. It also

attempts to provide a broader perspective by introducing useful applications and additional special topics in each chapter. These form the background for more advanced graduate courses, and also allow the book to be used as a source of basic reference for professionals across various disciplines interested in DSP.

Programmable Digital Signal Processors - Yu Hen Hu 2001-12-06

"Presents the latest developments in the programming and design of programmable digital signal processors (PDSPs) with very-long-instruction word (VLIW) architecture, algorithm formulation and implementation, and modern applications for multimedia processing, communications, and industrial control."

Foundations of Signal Processing - Martin Vetterli 2014-09-04

This comprehensive and engaging textbook introduces the basic principles and techniques of signal processing, from the fundamental ideas of signals and systems theory to real-world applications. Students are introduced to the powerful foundations of modern signal processing, including the basic geometry of Hilbert space, the mathematics of Fourier transforms, and essentials of sampling, interpolation, approximation and compression. The authors discuss real-world issues and hurdles to using these tools, and ways of adapting them to overcome problems of finiteness and localization, the limitations of uncertainty, and computational costs. It includes over 160 homework problems and over 220 worked examples, specifically designed to test and expand students' understanding of the fundamentals of signal processing, and is accompanied by extensive online materials designed to aid learning, including Mathematica® resources and interactive demonstrations.

Principles of Modern Communication Systems - Samuel O. Agbo 2017-02-06

An accessible, yet mathematically rigorous, one-semester textbook, engaging students through use of problems, examples, and applications.
Digital Signal Processing in Modern Communication Systems - Andreas O. Schwarzinger 2013-02-28

Digital Signal Processing in Modern Communication Systems takes you on a journey that starts with basic DSP principles and ends with a

treatment of modern wireless modems like OFDM and single-tone transceivers. Throughout this journey, we will cover signal processing topics that are applicable not just to the field of communications but to many engineering disciplines. This text steps outside the often dry mathematical presentation of more traditional DSP books and provides a more intuitive approach to this fascinating topic. Some of this book's uniqueness can be summarized as follows: - An intuitive approach to the topic of digital signal processing. - Working in-book MatLab examples supporting all important concepts. - A large scope covering basic concepts (correlation, convolution, DFT, FIR filters ...) as well as advanced topics (optimization, adaptive signal processing, equalization, OFDM, MIMO ...). - MatLab modeling of analog/RF effects (multipath channel, thermal noise, phase noise, IQ imbalances, DC and frequency offsets) that must be addressed and solved in modern modem design. - Real world topics that go beyond the ordinary communication textbooks such as signal synchronization, modem rate management, and fixed-point effects. All in all, this book is a must-have for students and practicing engineers who want to build upon the principles of Digital Signal Processing, enrich their understanding with advanced topics, and then apply that knowledge to the design of modern wireless modems.

Digital Communications with Emphasis on Data Modems - Richard W. Middlestead 2017-03-07

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.

Fundamentals of Communications Systems - Michael P. Fitz
2007-04-30

Get a Solid Account of Physical Layer Communications Theory, Illustrated with Numerous Interactive MATLAB Mini-Projects You can rely on Fundamentals of Communications Systems for a solid introduction to physical layer communications theory, filled with modern implementations and MATLAB examples. This state-of-the-art guide covers essential theory and current engineering practice, carefully explaining the real-world tradeoffs necessary among performance, spectral efficiency, and complexity. Written by an award-winning communications expert, the book first takes readers through analog communications basics, amplitude modulations, analog angle modulation, and random processes. This essential resource then explains noise in bandpass communications systems...bandpass Gaussian random processes...digital communications basics...complexity of optimum demodulation...spectrally efficient data transmission...and more. Fundamentals of Communications Systems features: A modern approach

to communications theory, reflecting current engineering applications Numerous MATLAB problems integrated throughout, with software available for download Detailed coverage of tradeoffs among performance, spectral efficiency, and complexity in engineering design Text written in four parts for easy modular presentation Inside This On-Target Communications Engineering Tool • Mathematical Foundations • Analog Communications Basics • Amplitude Modulations • Analog Angle Modulation • More Topics in Analog Communications • Random Processes • Noise in Bandpass Communications Systems • Bandpass Gaussian Random Processes • Digital Communications Basics • Optimal Single Bit Demodulation Structures • Transmitting More than One Bit • Complexity of Optimum Demodulation • Spectrally Efficient Data Transmission

Digital Signal Processing - Winser Alexander 2016-11-14

Digital signal processing (DSP) has been applied to a very wide range of applications. This includes voice processing, image processing, digital communications, the transfer of data over the internet, image and data compression, etc. Engineers who develop DSP applications today, and in the future, will need to address many implementation issues including mapping algorithms to computational structures, computational efficiency, power dissipation, the effects of finite precision arithmetic, throughput and hardware implementation. It is not practical to cover all of these in a single text. However, this text emphasizes the practical implementation of DSP algorithms as well as the fundamental theories and analytical procedures that form the basis for modern DSP applications. Digital Signal Processing: Principles, Algorithms and System Design provides an introduction to the principals of digital signal processing along with a balanced analytical and practical treatment of algorithms and applications for digital signal processing. It is intended to serve as a suitable text for a one semester junior or senior level undergraduate course. It is also intended for use in a following one semester first-year graduate level course in digital signal processing. It may also be used as a reference by professionals involved in the design of embedded computer systems, application specific integrated circuits

or special purpose computer systems for digital signal processing, multimedia, communications, or image processing. Covers fundamental theories and analytical procedures that form the basis of modern DSP Shows practical implementation of DSP in software and hardware Includes Matlab for design and implementation of signal processing algorithms and related discrete time systems Bridges the gap between reference texts and the knowledge needed to implement DSP applications in software or hardware

Electromagnetism for Signal Processing, Spectroscopy and Contemporary Computing - Khurshed Ahmad Shah 2021-10-07

This comprehensive textbook will help readers to acquire a thorough understanding of the fundamentals of electromagnetism and its applications in various areas including spectroscopy, signal processing and contemporary computation. The text introduces the principals and applications of electricity, magnetism and electromagnetic theory which is foundation for communication systems, spectroscopy, and modern computing. It is followed by discussing the digital systems and their importance in computing, difference between digital signal transmission and wireless media, visualization techniques and useful simulation and computational techniques, besides advances in quantum computing. Aimed at senior undergraduate and graduate students in the field of electrical engineering, electronics and communication engineering, this textbook: Provides fundamentals of electromagnetism and its applications in a single volume. Covers recent developments in computing and artificial intelligence. Discussion digital signal processing and wireless communication in depth. Covers advanced applications of electromagnetism in communication, spectroscopy, and computing. Discusses Computer Modelling & Simulation, Artificial Intelligence, and Quantum Computing.

Modern Digital Signal Processing - Roberto Cristi 2004

Roberto Cristi conveys the excitement of the Digital Signal Processing field in which students can experiment with sounds, images, and video. Using a wealth of applications, the book covers Digital Signal Processing material well suited to today's diverse student population. The author

presents the material in a logical sequence so that students can appreciate how concepts develop. The book can be effectively used in a university classroom or as a base for self-study.s

Digital Signal Processing for Communication Systems - Tadeusz Wysocki 1997-07-31

Digital Signal Processing for Communication Systems examines the plans for the future and the progress that has already been made, in the field of DSP and its applications to communication systems. The book pursues the progression from communication and information theory through to the implementation, evaluation and performance enhancing of practical communication systems using DSP technology. Digital Signal Processing for Communication Systems looks at various types of coding and modulation techniques, describing different applications of Turbo-Codes, BCH codes and general block codes, pulse modulations, and combined modulation and coding in order to improve the overall system performance. The book examines DSP applications in measurements performed for channel characterisation, pursues the use of DSP for design of effective channel simulators, and discusses equalization and detection of various signal formats for different channels. A number of system design issues are presented where digital signal processing is involved, reporting on the successful implementation of the system components using DSP technology, and including the problems involved with implementation of some DSP algorithms. Digital Signal Processing for Communication Systems serves as an excellent resource for professionals and researchers who deal with digital signal processing for communication systems, and may serve as a text for advanced courses on the subject.

Millimeter Wave Communication Systems - Kao-Cheng Huang 2011-04-20

The aim of this book is to present the modern design and analysis principles of millimeter-wave communication system for wireless devices and to give postgraduates and system professionals the design insights and challenges when integrating millimeter wave personal communication system. Millimeter wave communication system are

going to play key roles in modern gigabit wireless communication area as millimeter-wave industrial standards from IEEE, European Computer Manufacturing Association (ECMA) and Wireless High Definition (Wireless HD) Group, are on their way to the market. The book will review up-to-date research results and utilize numerous design and analysis for the whole system covering from Millimeter wave frontend to digital signal processing in order to address major topics in a high speed wireless system. This book emphasizes the importance and the requirements of high-gain antennas, low power transceiver, adaptive equalizer/modulation, channel coding and adaptive multi-user detection for gigabit wireless communications. In addition, the book will include the updated research literature and patents in the topics of transceivers, antennas, MIMO, channel capacity, coding, equalizer, Modem and multi-user detection. Finally the application of these antennas will be discussed in light of different forthcoming wireless standards at V-band and E-band.

Fundamentals of Digital Communication - Upamanyu Madhow
2008-03-06

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.

[Digital Signal Processing in Modern Communication Systems \(Edition 2\)](#)

- Andreas Schwarzinger 2022-01-13

The second edition of Digital Signal Processing in Modern Communication Systems (www.signal-processing.net) takes you on a journey that starts with basic DSP principles and ends with a treatment of modern wireless modems such as single-tone and OFDM transceivers which are found in GSM, WLAN, LTE and 5G technologies. Throughout this journey, we will cover signal processing topics that are applicable not just to the field of communications but to many engineering disciplines. This text steps outside the often dry mathematical presentation of more traditional DSP books and provides a more intuitive approach to this fascinating topic. Some of this book's uniqueness can be summarized as follows: - An intuitive approach to the topic of digital signal processing. - Working in-book MatLab examples supporting all important concepts. - A large scope covering basic concepts (correlation, convolution, DFT, FIR filters ...) as well as advanced topics (optimization, adaptive signal processing, equalization, OFDM, MIMO ...). - MatLab modeling of analog/RF effects (multipath channel, thermal noise, phase noise, IQ imbalances, DC and frequency offsets) that must be addressed and solved in modern modem design. - Real world topics that go beyond the ordinary communication textbooks such as signal synchronization, modem rate management, and fixed-point effects. All in all, this book is a must-have for students and practicing engineers who want to build upon the principles of Digital Signal Processing, enrich their understanding with advanced topics, and then apply that knowledge to the design of modern wireless modems.

Advanced Signal Processing and Digital Noise Reduction - Saeed V. Vaseghi 1996-07-25

Noise cancellation is particularly important in the new mobile communications field, with respect to background noise and acoustic interference in moving vehicles. This comprehensive text develops a coherent and structured presentation of a broad range of the theory and application of statistical signal processing, with emphasis on digital noise reduction algorithms. Other applications covered are spectral estimation, channel equalisation, speech coding over noisy channels, speech

transmission techniques, algorithms, analog-digital conversion, hardware design, and more. Includes many real-world examples. 430 line drawings.

Digital Signal Processing in Communications Systems - Marvin Frerking 2013-03-14

An engineer's introduction to concepts, algorithms, and advancements in Digital Signal Processing. This lucidly written resource makes extensive use of real-world examples as it covers all the important design and engineering references.

Introduction to Wireless Digital Communication - Robert W. Heath Jr. 2017-04-04

The Accessible Guide to Modern Wireless Communication for Undergraduates, Graduates, and Practicing Electrical Engineers
Wireless communication is a critical discipline of electrical engineering and computer science, yet the concepts have remained elusive for students who are not specialists in the area. This text makes digital communication and receiver algorithms for wireless communication broadly accessible to undergraduates, graduates, and practicing electrical engineers. Notably, the book builds on a signal processing foundation and does not require prior courses on analog or digital communication. Introduction to Wireless Digital Communication establishes the principles of communication, from a digital signal processing perspective, including key mathematical background, transmitter and receiver signal processing algorithms, channel models, and generalizations to multiple antennas. Robert Heath's "less is more" approach focuses on typical solutions to common problems in wireless

engineering. Heath presents digital communication fundamentals from a signal processing perspective, focusing on the complex pulse amplitude modulation approach used in most commercial wireless systems. He describes specific receiver algorithms for implementing wireless communication links, including synchronization, carrier frequency offset estimation, channel estimation, and equalization. While most concepts are presented for systems with single transmit and receive antennas, Heath concludes by extending those concepts to contemporary MIMO systems. To promote learning, each chapter includes previews, bullet-point summaries, examples, and numerous homework problems to help readers test their knowledge. Basics of wireless communication: applications, history, and the central role of signal processing Digital communication essentials: components, channels, distortion, coding/decoding, encryption, and modulation/demodulation Signal processing: linear time invariant systems, probability/random processes, Fourier transforms, derivation of complex baseband signal representation and equivalent channels, and multi-rate signal processing Least-squared estimation techniques that build on the linear algebra typically taught to electrical engineering undergraduates Complex pulse amplitude modulation: symbol mapping, constellations, signal bandwidth, and noise Synchronization, including symbol, frame, and carrier frequency offset Frequency selective channel estimation and equalization MIMO techniques using multiple transmit and/or receive antennas, including SIMO, MISO, and MIMO-OFDM Register your product at informit.com/register for convenient access to downloads, updates, and corrections as they become available.