

# Simulation Of Digital Communication Systems Using Matlab

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 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

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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.

Modeling of Digital Communication Systems Using SIMULINK John Wiley & Sons

This second edition of Digital Optical Communications provides a comprehensive treatment of the modern aspects of coherent homodyne and self-coherent reception techniques using algorithms incorporated in digital signal processing (DSP) systems and DSP-based transmitters to overcome several linear and nonlinear transmission impairments and frequency mismatching between the local oscillator and the carrier, as well as clock recovery and cycle slips. These modern transmission systems have emerged as the core technology for Tera-bits per second (bps) and Peta-bps optical Internet for the near future. Featuring extensive updates to all existing chapters, Advanced Digital Optical Communications, Second Edition: Contains new chapters on optical fiber structures and propagation, optical coherent receivers, DSP equalizer algorithms, and high-order spectral DSP receivers Examines theoretical foundations, practical case studies, and MATLAB® and Simulink® models for simulation transmissions

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Includes new end-of-chapter practice problems and useful appendices to supplement technical information Downloadable content available with qualifying course adoption Advanced Digital Optical Communications, Second Edition supplies a fundamental understanding of digital communication applications in optical communication technologies, emphasizing operation principles versus heavy mathematical analysis. It is an ideal text for aspiring engineers and a valuable professional reference for those involved in optics, telecommunications, electronics, photonics, and digital signal processing.

This book gathers the Proceedings of the 12th International Conference on Broad-Band Wireless Computing, Communication and Applications, held on November 8–10, 2017 in Barcelona, Spain. Information networking is currently undergoing a rapid evolution. Different kinds of networks with different characteristics are emerging and being integrated in heterogeneous networks. As a result, there are many interconnected problems that can occur at different levels of the hardware and software design of communicating entities and communication networks. These networks are expected to manage increasing usage demand, provide support for a significant number of services, guarantee Quality of Service (QoS), and optimize the use of network resources. The success of all-IP networking and wireless technology has changed the lifestyles of people around the world, and advances in electronic integration and wireless communications will pave the way to providing access to wireless networks on the fly, as electronic devices can increasingly exchange information with each other virtually anytime and anywhere. The aim of this book is to provide the latest findings, methods and development techniques from both theoretical and practical perspectives regarding the emerging areas of broad-band and wireless computing.

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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. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

With current advancements in the modeling and simulation of systems and networks, researchers and developers are better able to determine the probable state of current systems and envision the state of future systems during the design stage. The uses and accuracies of these models are essential to every aspect of communication systems. *Integrated Models for Information Communication Systems and Networks: Design and Development* explores essential information and current research findings on information communication systems and networks. This reference source aims to assist professionals in the desire to enhance their knowledge of modeling at systems level with the aid of modern software packages.

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,

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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. Carefully structured to provide practical knowledge on fundamental issues, Optical Fiber Communications Systems: Theory and Practice with MATLAB® and Simulink® Models explores advanced modulation and transmission techniques of lightwave communication systems. With coverage ranging from fundamental to modern aspects, the text presents optical communication techniques and applications, employing single mode optical fibers as the transmission medium. With MATLAB and Simulink models that illustrate methods, it supplies a deeper understanding of future development of optical systems and networks. The book begins with an overview of the development of optical fiber communications technology over the last three decades of the 20th century. It describes the optical transmitters for direct and external modulation technique and discusses the detection of optical signals under direct coherent and

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incoherent reception. The author also covers lumped and distributed optical amplifiers with extensive models for the amplification of signals and structuring the amplifiers on the Simulink platform. He outlines a design strategy for optically amplified transmission systems coupled with MATLAB Simulink models, including dispersion and attenuation budget methodology and simulation techniques. The book concludes with coverage of advanced modulation formats for long haul optical fiber transmission systems with accompanied Simulink models. Although many books have been written on this topic over the last two decades, most of them present only the theory and practice of devices and subsystems of the optical fiber communications systems in the fields, but do not illustrate any computer models to represent the true practical aspects of engineering practice. This book fills the need for a text that emphasizes practical computing models that shed light on the behavior and dynamics of the devices.

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

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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.

Since the first edition of this book was published seven years ago, the field of modeling and simulation of communication systems has grown and matured in many ways, and the use of simulation as a day-to-day tool is now even more common practice. With the current interest in digital mobile communications, a primary area of application of modeling and simulation is now in wireless systems of a different flavor from the 'traditional' ones. This second edition represents a substantial revision of the first, partly to accommodate the new applications that have arisen. New chapters include material on modeling and simulation of nonlinear systems, with a complementary section on related measurement techniques, channel modeling and three new case studies; a consolidated set of problems is provided at the end of the book.

PSpice for Digital Communications Engineering shows how to simulate digital communication systems and modulation methods using the very powerful Cadence Orcad PSpice version 10.5 suite of software programs. Fourier series and Fourier transform are applied to signals to set the ground work for the modulation techniques introduced in later chapters. Various baseband signals, including duo-binary baseband

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signaling, are generated and the spectra are examined to detail the unsuitability of these signals for accessing the public switched network. Pulse code modulation and time-division multiplexing circuits are examined and simulated where sampling and quantization noise topics are discussed. We construct a single-channel PCM system from transmission to receiver i.e. end-to-end, and import real speech signals to examine the problems associated with aliasing, sample and hold. Companding is addressed here and we look at the A and mu law characteristics for achieving better signal to quantization noise ratios. Several types of delta modulators are examined and also the concept of time division multiplexing is considered. Multi-level signaling techniques such as QPSK and QAM are analyzed and simulated and "home-made meters"™, such as scatter and eye meters, are used to assess the performance of these modulation systems in the presence of noise. The raised-cosine family of filters for shaping data before transmission is examined in depth where bandwidth efficiency and channel capacity is discussed. We plot several graphs in Probe to compare the efficiency of these systems. Direct spread spectrum is the last topic to be examined and simulated to show the advantages of spreading the signal over a wide bandwidth and giving good signal security at the same time.

Introduction to Digital Communications explores the basic principles in the analysis and design of digital communication systems, including design objectives, constraints and trade-offs. After portraying the big picture and laying the background material, this book

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lucidly progresses to a comprehensive and detailed discussion of all critical elements and key functions in digital communications. The first undergraduate-level textbook exclusively on digital communications, with a complete coverage of source and channel coding, modulation, and synchronization. Discusses major aspects of communication networks and multiuser communications Provides insightful descriptions and intuitive explanations of all complex concepts Focuses on practical applications and illustrative examples. A companion Web site includes solutions to end-of-chapter problems and computer exercises, lecture slides, and figures and tables from the text

Simulation is a widely used mechanism for validating the theoretical models of networking and communication systems. Although the claims made based on simulations are considered to be reliable, how reliable they really are is best determined with real-world implementation trials. Simulation Technologies in Networking and Communications: Selecting the Best Tool for the Test addresses the spectrum of issues regarding the different mechanisms related to simulation technologies in networking and communications fields. Focusing on the practice of simulation testing instead of the theory, it presents the work of more than 50 experts from around the world. Considers superefficient Monte Carlo simulations Describes how to simulate and evaluate multicast routing algorithms Covers simulation tools for cloud computing and broadband passive optical networks Reports on recent developments in simulation tools for WSNs Examines modeling and simulation of vehicular networks The book compiles expert

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perspectives about the simulation of various networking and communications technologies. These experts review and evaluate popular simulation modeling tools and recommend the best tools for your specific tests. They also explain how to determine when theoretical modeling would be preferred over simulation. This book does not provide a verdict on the best suitable tool for simulation. Instead, it supplies authoritative analyses of the different kinds of networks and systems. Presenting best practices and insights from global experts, the book provides you with an understanding of what to simulate, where to simulate, whether to simulate or not, when to simulate, and how to simulate for a wide range of issues.

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

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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.

The design of communication systems has grown too complicated for the traditional design tools--mathematical analysis and laboratory breadboards. Enter the computer simulation, a powerful and versatile tool that is becoming essential for anyone who designs signal transmission or storage systems. This volume explains in detail how to use simulation programs as a software breadboard to analyze and evaluate the performance of data communications links. It describes the engineering principles of signal transmission and its simulation, explores programming issues, and provides a comprehensive reference for models of signal processes. The book clearly demonstrates how simulation techniques can be used to:

- \* Create valid models of signal processes
- \* Provide exhibity through the use of modules
- \* Simulate various elements of communications systems, from filters and modulators to test instruments
- \* Explore alternative models for a given system
- \* Circumvent the mathematical intractability of modern transmission links
- \* Plan and construct a computer model in a matter of hours or days, versus the weeks or months needed for laboratory breadboards
- \* Make parameter changes in minutes once a link has been modeled
- \* Provide engineers and students with complete training on the elements of simulation

A must have for designers, practicing engineers, and graduate students, this volume presents real-world techniques that can be used with the authors' ST?DT program (a companion work also published by Wiley), or

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independently with other commercially available simulators.

Designed to help teach and understand communication systems using a classroom-tested, active learning approach. Discusses communication concepts and algorithms, which are explained using simulation projects, accompanied by MATLAB and Simulink Provides step-by-step code exercises and instructions to implement execution sequences Includes a companion website that has MATLAB and Simulink model samples and templates (password: matlab) With the growing complexity of personal mobile communication systems demanding higher data-rates and high levels of integration using low-cost CMOS technology, overall system performance has become more sensitive to RF analog front-end impairments. Designing integrated transceivers requires a thorough understanding of the whole transceiver chain including RF analog front-end and digital baseband. Communication system engineers have to include RF analog imperfections in their simulation benches in order to study and quantify their impact on the system performance. Here the author explores key RF analog impairments in a transceiver and demonstrates how to model their impact from a communication system design view-point. He discusses the design aspects of the front end of transceivers (both receivers and transmitters) and provides the reader with a way to optimize a complex mixed-signal platform by taking into account the characteristics of the RF/analog front-end. Key features of this book include: Practical examples illustrated by system simulation results based on WiFi and mobile WiMAX OFDM transceivers An overview of the digital estimation and compensation of the RF analog impairments such as power amplifier distortion, quadrature imbalance, and carrier and sampling frequency offsets An exposition of the challenges involved in the design of both RF analog circuits and DSP communication circuits in deep

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submicron CMOS technology MATLAB® codes for RF analog impairments models hosted on the companion website Uniquely the book bridges the gap between RFIC design specification needs and communication systems simulation, offering readers RF analog impairments modeling knowledge and a comprehensive approach to unifying theory and practice in system modelling. It is of great value to communication systems and DSP engineers and graduate students who design communication processing engines, RF/analog systems and IC design engineers involved in the design of communication platforms.

This paperback is a black & white edition. Link to the color edition: <https://www.amazon.com/dp/1712321633> .

A learner-friendly, practical and example driven book, Digital Modulations using Python gives you a solid background in building simulation models for digital modulation systems in Python version 3. This book, an essential guide for understanding the implementation aspects of a digital modulation system, shows how to simulate and model a digital modulation system from scratch. The implemented simulation models shown in this book, provide an opportunity for an engineer to understand the basic implementation aspects of modeling various building blocks of a digital modulation system. It presents the key topics with required theoretical background along with the implementation details in the form of Python scripts. Key topics: ? Basics of signal processing, essential for implementing digital modulation techniques - generation of test signals, interpreting FFT results, power and energy of a signal, methods to compute convolution, analytic signal and applications. ? Waveform and complex baseband equivalent simulation models. ? Digital modulation techniques covered: BPSK and its variants, QPSK and its variants, M-ary PSK, M-ary QAM, M-ary PAM, CPM, MSK, GMSK, M-ary FSK. ? Simulation for ascertaining

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performance of digital modulation techniques in AWGN and fading channels - Eb/N0 Vs BER curves. ? Design and implementation of linear equalizers - zero forcing and MMSE equalizers, using them in a communication link, LMS algorithm for adaptive equalization. ? Simulation and performance of modulation systems with receiver impairments. ? Examples using object oriented programming. ? Simulation scripts using SciPy, Numpy and Matplotlib packages. A comprehensive and detailed treatment of the program SIMULINK® that focuses on SIMULINK® for simulations in Digital and Wireless Communications Modeling of Digital Communication Systems Using SIMULINK® introduces the reader to SIMULINK®, an extension of the widely-used MATLAB modeling tool, and the use of SIMULINK® in modeling and simulating digital communication systems, including wireless communication systems. Readers will learn to model a wide selection of digital communications techniques and evaluate their performance for many important channel conditions. Modeling of Digital Communication Systems Using SIMULINK® is organized in two parts. The first addresses Simulink® models of digital communications systems using various modulation, coding, channel conditions and receiver processing techniques. The second part provides a collection of examples, including speech coding, interference cancellation, spread spectrum, adaptive signal processing, Kalman filtering and modulation and coding techniques currently implemented in mobile wireless systems. Covers case examples, progressing from basic to complex Provides applications for mobile communications, satellite communications, and fixed wireless systems that reveal the power of SIMULINK modeling Includes access to useable SIMULINK® simulations online All models in the text have been updated to R2018a; only problem sets require updating to the latest release by the user Covering both the use of

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SIMULINK® in digital communications and the complex aspects of wireless communication systems, Modeling of Digital Communication Systems Using SIMULINK® is a great resource for both practicing engineers and students with MATLAB experience.

Digital Communication using MATLAB and Simulink is intended for a broad audience. For the student taking a traditional course, the text provides simulations of the MATLAB and Simulink systems, and the opportunity to go beyond the lecture or laboratory and develop investigations and projects. For the professional, the text facilitates an expansive review of and experience with the tenets of digital communication systems.

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

\* A learner-friendly, practical and example driven book, Wireless Communication Systems in Matlab gives you a solid background in building simulation models for wireless systems in Matlab. This book, an essential guide for understanding the basic implementation aspects of a wireless system, shows how to simulate and model such a system from scratch. The implemented simulation models shown in this book, provide an opportunity for an engineer to understand the basic implementation aspects of modeling various building blocks of a wireless communication system. It presents the following key topics with the required theoretical background, along with the implementation details in the form of Matlab scripts. \* Random variables for simulating probabilistic systems and applications like Jakes filter design and colored noise

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generation. \* Models for Shannon's channel capacity, unconstrained awgn channel, binary symmetric channel (BSC), binary erasure channel (BEC), constellation constrained capacities and ergodic capacity over fading channel. The theory of linear block codes, decoding techniques using soft-decisions and hard-decisions, and their performance simulations. \* Monte Carlo simulation for ascertaining performance of digital modulation techniques in AWGN and fading channels -  $E_b/N_0$  Vs BER curves. Pulse shaping techniques, matched filtering and partial response signaling, Design and implementation of linear equalizers - zero forcing and MMSE equalizers, using them in a communication link and modulation systems with receiver impairments. \* Large-scale propagation models like Friis free space model, log distance model, two ray ground reflection model, single knife-edge diffraction model, Hata Okumura model. \* Essentials of small-scale propagation models for wireless channels, such as, power delay profile, Doppler power spectrum, Rayleigh and Rice processes. Modeling flat fading and frequency selective channels. \* Diversity techniques for multiple antenna systems: Alamouti space-time coding, maximum ratio combining, equal gain combining and selection combining. \* Simulation models for direct sequence spread spectrum, frequency hopping spread spectrum and OFDM.

Annotation Digital Communication Systems Using SystemView describes the analysis and design of modern digital communication systems and the benefits of using this software. The concepts of digital communications system design, in particular the

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presence of noise, cannot be conveyed with simple calculations. It allows students and professionals to investigate the what-ifs of such design in a convenient simulation design environment. Professional engineers actively designing communication circuits who were not exposed to such systems or design simulation tools in their coursework are allowed to experiment with the what-ifs of digital communication systems design without conventional programming through the materials provided in this book. Senior undergraduate or first level graduate students in electrical and computer engineering in a required or elective course in digital communication systems will find this the only complete description of the SystemView simulation environment.

This volume presents an overview of computer-based simulation models and methodologies for communication systems. Topics covered include probability, random, process, and estimation theory and roles in the design of computer-based simulations. This book covers the principles of modeling and simulation of nonlinear distortion in wireless communication systems with MATLAB simulations and techniques. In this book, the author describes the principles of modeling and simulation of nonlinear distortion in single and multichannel wireless communication systems using both deterministic and stochastic signals. Models and simulation methods of nonlinear amplifiers explain in detail how to analyze and evaluate the performance of data communication links under nonlinear amplification. The book addresses the analysis of nonlinear systems with stochastic inputs and establishes the performance metrics of

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communication systems with regard to nonlinearity. In addition, the author also discusses the problem of how to embed models of distortion in system-level simulators such as MATLAB and MATLAB Simulink and provides practical techniques that professionals can use on their own projects. Finally, the book explores simulation and programming issues and provides a comprehensive reference of simulation tools for nonlinearity in wireless communication systems. Key Features: Covers the theory, models and simulation tools needed for understanding nonlinearity and nonlinear distortion in wireless systems Presents simulation and modeling techniques for nonlinear distortion in wireless channels using MATLAB Uses random process theory to develop simulation tools for predicting nonlinear system performance with real-world wireless communication signals Focuses on simulation examples of real-world communication systems under nonlinearity Includes an accompanying website containing MATLAB code This book will be an invaluable reference for researchers, RF engineers, and communication system engineers working in the field. Graduate students and professors undertaking related courses will also find the book of interest. This cutting-edge, first-of-its-kind resource gives you a comprehensive understanding of the simulation and evaluation methods used for today's mobile communication systems. Written by two highly regarded experts in the field, the book focuses on the performance of both the physical and protocol layer transmission scheme. It defines and presents several invaluable simulation tools written in MATLAB® code, along with

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clear examples that explain their use.

Digital Transmission – A Simulation-Aided Introduction with VisSim/Comm is a book in which basic principles of digital communication, mainly pertaining to the physical layer, are emphasized. Nevertheless, these principles can serve as the fundamentals that will help the reader to understand more advanced topics and the associated technology. In this book, each topic is addressed in two different and complementary ways:

theoretically and by simulation. The theoretical approach encompasses common subjects covering principles of digital transmission, like notions of probability and stochastic processes, signals and systems, baseband and passband signaling, signal-space representation, spread spectrum, multi-carrier and ultra wideband transmission, carrier and symbol-timing recovery, information theory and error-correcting codes. The simulation approach revisits the same subjects, focusing on the capabilities of the communication system simulation software VisSim/Comm on helping the reader to fulfill the gap between the theory and its practical meaning. The presentation of the theory is made easier with the help of 357 illustrations. A total of 101 simulation files supplied in the accompanying CD support the simulation-oriented approach. A full evaluation version and a viewer-only version of VisSim/Comm are also supplied in the CD.

Discover the basic telecommunications systems principles in an accessible learn-by-doing format Communication Systems Principles Using MATLAB covers a variety of systems principles in telecommunications in an accessible format without the need to

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master a large body of theory. The text puts the focus on topics such as radio and wireless modulation, reception and transmission, wired networks and fiber optic communications. The book also explores packet networks and TCP/IP as well as digital source and channel coding, and the fundamentals of data encryption. Since MATLAB® is widely used by telecommunications engineers, it was chosen as the vehicle to demonstrate many of the basic ideas, with code examples presented in every chapter. The text addresses digital communications with coverage of packet-switched networks. Many fundamental concepts such as routing via shortest-path are introduced with simple and concrete examples. The treatment of advanced telecommunications topics extends to OFDM for wireless modulation, and public-key exchange algorithms for data encryption. Throughout the book, the author puts the emphasis on understanding rather than memorization. The text also: Includes many useful take-home skills that can be honed while studying each aspect of telecommunications Offers a coding and experimentation approach with many real-world examples provided Gives information on the underlying theory in order to better understand conceptual developments Suggests a valuable learn-by-doing approach to the topic Written for students of telecommunications engineering, Communication Systems Principles Using MATLAB® is the hands-on resource for mastering the basic concepts of telecommunications in a learn-by-doing format.

This is probably the first book that employs the technique of simulation experiments as

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a means of reinforcing the basic concepts of communication theory. Undergraduate students are generally exposed to a mathematically rigorous treatment of communications theory but seldom have the benefit of a practical-orientated approach employing modelling and simulation for a thorough assimilation of the subject. This book can supplement any standard textbook to cover this significant lacuna in the existing learning methodology. It uses MATLAB®, the language of the technical computing fraternity, for the purpose. The introductory chapters provide an overview of computer simulation and MATLAB programming concepts. Thereafter, communications concepts are presented in the traditional manner but followed up with appropriate simulations in MATLAB/Simulink®. Relevant MATLAB source code is given whenever it is used to illustrate a point. All the source code given in the text has been tested on MATLAB kernel version 7.10 (Release R2010a) and is provided in the accompanying CD.

With the current advances in technology innovation, the field of medicine and healthcare is rapidly expanding and, as a result, many different areas of human health diagnostics, treatment and care are emerging. Wireless technology is getting faster and 5G mobile technology allows the Internet of Medical Things (IoMT) to greatly improve patient care and more effectively prevent illness from developing. This book provides an overview and review of the current and anticipated changes in medicine and healthcare due to new technologies and faster communication between users and

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devices. This groundbreaking book presents state-of-the-art chapters on many subjects including: A review of the implications of VR and AR healthcare applications A review of current augmenting dental care An overview of typical human-computer interaction (HCI) that can help inform the development of user interface designs and novel ways to evaluate human behavior to responses in virtual reality (VR) and other new technologies A review of telemedicine technologies Building empathy in young children using augmented reality AI technologies for mobile health of stroke monitoring & rehabilitation robotics control Mobile doctor brain AI App An artificial intelligence mobile cloud computing tool Development of a robotic teaching aid for disabled children Training system design of lower limb rehabilitation robot based on virtual reality

This paperback is a color edition. Link to the black & white edition: <https://www.amazon.com/gp/product/152149388X>

Digital Modulations using Matlab is a learner-friendly, practical and example driven book, that gives you a solid background in building simulation models for digital modulation systems in Matlab. This book, an essential guide for understanding the implementation aspects of a digital modulation system, shows how to simulate and model a digital modulation system from scratch. The implemented simulation models shown in this book, mostly will not use any of the inbuilt communication toolbox functions and hence provide an opportunity for an engineer to understand the basic implementation aspects of modeling various building blocks of a digital modulation system. It presents the following key topics with required

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theoretical background along with the implementation details in the form of Matlab scripts. \* Basics of signal processing essential for implementing digital modulation techniques - generation of test signals, interpreting FFT results, power and energy of a signal, methods to compute convolution, analytic signal and applications. \* Waveform and complex equivalent baseband simulation models. \* Digital modulation techniques covered: BPSK and its variants, QPSK and its variants, M-ary PSK, M-ary QAM, M-ary PAM, CPM, MSK, GMSK, M-ary FSK. \* Monte Carlo simulation for ascertaining performance of digital modulation techniques in AWGN and fading channels -  $E_b/N_0$  Vs BER curves. \* Design and implementation of linear equalizers - zero forcing and MMSE equalizers, using them in a communication link. \* Simulation and performance of modulation systems with receiver impairments.

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.

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