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Channel coding lies at the heart of digital communication and data storage, and this detailed introduction describes the core theory as well as decoding algorithms, implementation details, and performance analyses. In this book, Professors Ryan and Lin provide clear information on modern channel codes, including turbo and low-density parity-check (LDPC) codes. They also present detailed

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coverage of BCH codes, Reed-Solomon codes, convolutional codes, finite geometry codes, and product codes, providing a one-stop resource for both classical and modern coding techniques. Assuming no prior knowledge in the field of channel coding, the opening chapters begin with basic theory to introduce newcomers to the subject. Later chapters then extend to advanced topics such as code ensemble performance analyses and algebraic code design. 250 varied and stimulating end-of-chapter

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problems are also included to test and enhance learning, making this an essential resource for students and practitioners alike.

The focus of this book is broadband telecommunications: both fixed (DSL, fiber) and wireless (1G-4G). It uniquely covers the broadband telecom field from technological, business and policy angles. The reader learns about the necessary technologies to a certain depth in order to be able to evaluate and analyse

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competing technologies. The student can then apply the results of the technology analysis to business (revenues and costs, market size, etc) to evaluate how successful a technology may be in the market place. Technology and business analyses lead to policy analysis and how government deal with rolling out of broadband networks; content (such as text, audio and video) delivered over them. Furthermore, how government may ensure a competitive and fair environment is maintained

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for service provision. The book is unique in its approach as it prepares the student to evaluate products from three different viewpoints of technology-business and policy. The book provides a unified vision for broadband communications, offering the required background as well a description of existing broadband systems, finishing with a business scenario. The book breaks new ground by discussing telecommunication technologies in a business and policy context.

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The easy way to learn programming fundamentals with Python Python is a remarkably powerful and dynamic programming language that's used in a wide variety of application domains. Some of its key distinguishing features include a very clear, readable syntax, strong introspection capabilities, intuitive object orientation, and natural expression of procedural code. Plus, Python features full modularity, supporting hierarchical packages, exception-based error

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handling, and modules easily written in C, C++, Java, R, or .NET languages, such as C#. In addition, Python supports a number of coding styles that include: functional, imperative, object-oriented, and procedural. Due to its ease of use and flexibility, Python is constantly growing in popularity—and now you can wear your programming hat with pride and join the ranks of the pros with the help of this guide. Inside, expert author John Paul Mueller gives a complete step-by-step overview of all there is to know about

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Python. From performing common and advanced tasks, to collecting data, to interacting with package—this book covers it all! Use Python to create and run your first application Find out how to troubleshoot and fix errors Learn to work with Anaconda and use Magic Functions Benefit from completely updated and revised information since the last edition If you've never used Python or are new to programming in general, Beginning Programming with Python For Dummies is a helpful resource that will set

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*A comprehensive
introduction to the complex
fields of signal coding and
signal processing.*

*The H.264 Advanced Video
Compression Standard*

Digital Communications

Bounds, Codes, Decoders,

Analysis and Applications

*Essentials of Error-Control
Coding*

Elements of Information

Theory

Information Theory,

Inference and Learning

Algorithms

Rapid advances in electronic and optical technology have enabled the

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implementation of powerful error-control codes, which are now used in almost the entire range of information systems with close to optimal performance. These codes and decoding methods are required for the detection and correction of the errors and erasures which inevitably occur in digital information during transmission, storage and processing because of noise, interference and other imperfections. Error-control coding is a complex, novel and unfamiliar area, not yet widely understood and appreciated. This book sets out to provide a clear description of the essentials of the subject, with comprehensive and up-to-date coverage of the most useful codes and their decoding algorithms. A practical

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engineering and information technology emphasis, as well as relevant background material and fundamental theoretical aspects, provides an in-depth guide to the essentials of Error-Control Coding. Provides extensive and detailed coverage of Block, Cyclic, BCH, Reed-Solomon, Convolutional, Turbo, and Low Density Parity Check (LDPC) codes, together with relevant aspects of Information Theory EXIT chart performance analysis for iteratively decoded error-control techniques Heavily illustrated with tables, diagrams, graphs, worked examples, and exercises Invaluable companion website features slides of figures, algorithm software, updates and solutions to problems Offering a

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complete overview of Error Control Coding, this book is an indispensable resource for students, engineers and researchers in the areas of telecommunications engineering, communication networks, electronic engineering, computer science, information systems and technology, digital signal processing and applied mathematics.

This book discusses both the theory and practical applications of self-correcting data, commonly known as error-correcting codes. The applications included demonstrate the importance of these codes in a wide range of everyday technologies, from smartphones to secure communications and transactions. Written in a readily understandable style, the book presents

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the authors' twenty-five years of research organized into five parts: Part I is concerned with the theoretical performance attainable by using error correcting codes to achieve communications efficiency in digital communications systems. Part II explores the construction of error-correcting codes and explains the different families of codes and how they are designed. Techniques are described for producing the very best codes. Part III addresses the analysis of low-density parity-check (LDPC) codes, primarily to calculate their stopping sets and low-weight codeword spectrum which determines the performance of these codes. Part IV deals with decoders designed to realize optimum performance. Part V

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describes applications which include combined error correction and detection, public key cryptography using Goppa codes, correcting errors in passwords and watermarking. This book is a valuable resource for anyone interested in error-correcting codes and their applications, ranging from non-experts to professionals at the forefront of research in their field. This book is open access under a CC BY 4.0 license.

The latest edition of this classic is updated with new problem sets and material The Second Edition of this fundamental textbook maintains the book's tradition of clear, thought-provoking instruction. Readers are provided once again with an instructive mix of mathematics, physics, statistics,

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and information theory. All the essential topics in information theory are covered in detail, including entropy, data compression, channel capacity, rate distortion, network information theory, and hypothesis testing. The authors provide readers with a solid understanding of the underlying theory and applications. Problem sets and a telegraphic summary at the end of each chapter further assist readers. The historical notes that follow each chapter recap the main points. The Second Edition features:

- * Chapters reorganized to improve teaching
- * 200 new problems
- * New material on source coding, portfolio theory, and feedback capacity
- * Updated references

Now current and enhanced, the Second Edition of

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Elements of Information Theory remains the ideal textbook for upper-level undergraduate and graduate courses in electrical engineering, statistics, and telecommunications. Essentials of Error-Control Coding Techniques presents error-control coding techniques with an emphasis on the most recent applications. It is written for engineers who use or build error-control coding equipment. Many examples of practical applications are provided, enabling the reader to obtain valuable expertise for the development of a wide range of error-control coding systems. Necessary background knowledge of coding theory (the theory of error-correcting codes) is also included so that the reader is able to assimilate the concepts and the

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techniques. The book is divided into two parts. The first provides the reader with the fundamental knowledge of the coding theory that is necessary to understand the material in the latter part. Topics covered include the principles of error detection and correction, block codes, and convolutional codes. The second part is devoted to the practical applications of error-control coding in various fields. It explains how to design cost-effective error-control coding systems. Many examples of actual error-control coding systems are described and evaluated. This book is particularly suited for the engineer striving to master the practical applications of error-control coding. It is also suitable for use as a graduate text for an

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advanced course in coding theory.
Coding Theorems for Discrete
Memoryless Systems
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Quantum Information Processing and
Quantum Error Correction
Mathematical Methods and Algorithms
Essentials of Error-Control Coding
Techniques
Mobile Communications Handbook
***H.264 Advanced Video Coding
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technology. Offering a detailed overview of the system, it explains the syntax, tools and features of H.264 and equips readers with practical advice on how to get the most out of the standard. Packed with clear examples and illustrations to explain H.264 technology in an accessible and practical way. Covers basic video coding concepts, video formats and visual quality. Explains how to measure and optimise the performance of H.264 and how to balance bitrate, computation and video quality. Analyses recent work on scalable and multi-view

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versions of H.264, case studies of H.264 codecs and new technological developments such as the popular High Profile extensions. An invaluable companion for developers, broadcasters, system integrators, academics and students who want to master this burgeoning state-of-the-art technology. "[This book] unravels the mysteries behind the latest H.264 standard and delves deeper into each of the operations in the codec. The reader can implement (simulate, design, evaluate, optimize) the codec with all profiles and levels. The book ends with extensions and

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directions (such as SVC and MVC) for further research." Professor K. R. Rao, The University of Texas at Arlington, co-inventor of the Discrete Cosine Transform 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

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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

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communications. It will be an essential reference for all students and practitioners in the electrical engineering field.

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

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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

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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.

Error Control

Coding Fundamentals and

Applications Prentice Hall

Error Correction Coding

A Practical Guide to Error-

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**Control Coding Using MATLAB
Signal Coding and Processing
Error-Correction Coding and
Decoding
Fault-Tolerant Systems
Non-Binary Error Control
Coding for Wireless
Communication and Data
Storage**

Fundamentals of Convolutional Coding, Second Edition, regarded as a bible of convolutional coding brings you a clear and comprehensive discussion of the basic principles of this field Two new chapters on low-density parity-check (LDPC) convolutional codes and iterative coding Viterbi, BCJR, BEAST,

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list, and sequential decoding of convolutional codes
Distance properties of convolutional codes
Includes a downloadable solutions manual

This book is an introduction to information and coding theory at the graduate or advanced undergraduate level. It assumes a basic knowledge of probability and modern algebra, but is otherwise self-contained. The intent is to describe as clearly as possible the fundamental issues involved in these subjects, rather than covering all aspects in an encyclopedic fashion. The first quarter of the book is devoted to information theory, including a

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proof of Shannon's famous Noisy Coding Theorem. The remainder of the book is devoted to coding theory and is independent of the information theory portion of the book. After a brief discussion of general families of codes, the author discusses linear codes (including the Hamming, Golary, the Reed-Muller codes), finite fields, and cyclic codes (including the BCH, Reed-Solomon, Justesen, Goppa, and Quadratic Residue codes). An appendix reviews relevant topics from modern algebra. There are two main approaches in the theory of network error correction coding. In this

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SpringerBrief, the authors summarize some of the most important contributions following the classic approach, which represents messages by sequences similar to algebraic coding, and also briefly discuss the main results following the other approach, that uses the theory of rank metric codes for network error correction of representing messages by subspaces. This book starts by establishing the basic linear network error correction (LNEC) model and then characterizes two equivalent descriptions. Distances and weights are defined in order to characterize

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the discrepancy of these two vectors and to measure the seriousness of errors. Similar to classical error-correcting codes, the authors also apply the minimum distance decoding principle to LNEC codes at each sink node, but use distinct distances. For this decoding principle, it is shown that the minimum distance of a LNEC code at each sink node can fully characterize its error-detecting, error-correcting and erasure-error-correcting capabilities with respect to the sink node. In addition, some important and useful coding bounds in classical coding theory are generalized to

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linear network error correction coding, including the Hamming bound, the Gilbert-Varshamov bound and the Singleton bound. Several constructive algorithms of LNEC codes are presented, particularly for LNEC MDS codes, along with an analysis of their performance. Random linear network error correction coding is feasible for noncoherent networks with errors. Its performance is investigated by estimating upper bounds on some failure probabilities by analyzing the information transmission and error correction. Finally, the basic theory of subspace codes

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is introduced including the encoding and decoding principle as well as the channel model, the bounds on subspace codes, code construction and decoding algorithms.

First-ever comprehensive introduction to the major new subject of quantum computing and quantum information.

Error Coding for Arithmetic Processors

Error Control Coding
Communicating Pictures
Beginning Programming with
Python For Dummies
An Introduction

This book is intended to

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attract the attention of practitioners and researchers in academia and industry interested in challenging paradigms of coding theory and computer vision. The chapters in this comprehensive reference explore the latest developments, methods, approaches, and applications of coding theory in a wide variety of fields and endeavours. This book is compiled with a view to provide researchers, academicians, and readers with an in-depth discussion of the latest advances in this field. It consists of twelve chapters from academicians, practitioners,

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and researchers from different disciplines of life. All the chapters are authored by various researchers around the world covering the field of coding theory and image and video processing. This book mainly focusses on researchers who can do quality research in the area of coding theory and image and video processing and related fields. Each chapter is an independent research study, which will motivate young researchers to think about. These twelve chapters are presented in three sections and will be an eye-opener for all who systematic researchers in these fields.

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Fault-Tolerant Systems is the first book on fault tolerance design with a systems approach to both hardware and software. No other text on the market takes this approach, nor offers the comprehensive and up-to-date treatment that Koren and Krishna provide. This book incorporates case studies that highlight six different computer systems with fault-tolerance techniques implemented in their design. A complete ancillary package is available to lecturers, including online solutions manual for instructors and PowerPoint slides. Students, designers, and architects of

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high performance processors will value this comprehensive overview of the field. The first book on fault tolerance design with a systems approach

Comprehensive coverage of both hardware and software fault tolerance, as well as information and time redundancy Incorporated case studies highlight six different computer systems with fault-tolerance techniques implemented in their design Available to lecturers is a complete ancillary package including online solutions manual for instructors and PowerPoint slides

From a review of the first

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edition: "Modern Data Science with R... is rich with examples and is guided by a strong narrative voice. What's more, it presents an organizing framework that makes a convincing argument that data science is a course distinct from applied statistics" (The American Statistician). Modern Data Science with R is a comprehensive data science textbook for undergraduates that incorporates statistical and computational thinking to solve real-world data problems. Rather than focus exclusively on case studies or programming syntax, this book illustrates how

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statistical programming in the state-of-the-art R/RStudio computing environment can be leveraged to extract meaningful information from a variety of data in the service of addressing compelling questions. The second edition is updated to reflect the growing influence of the tidyverse set of packages. All code in the book has been revised and styled to be more readable and easier to understand. New functionality from packages like `sf`, `purrr`, `tidymodels`, and `tidytext` is now integrated into the text. All chapters have been

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revised, and several have been split, re-organized, or re-imagined to meet the shifting landscape of best practice.

"The security of information systems has not improved at a rate consistent with the growth and sophistication of the attacks being made against them. To address this problem, we must improve the underlying strategies and techniques used to create our systems. Specifically, we must build security in from the start, rather than append it as an afterthought. That's the point of Secure Coding in C and C++. In careful detail, this book shows software

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developers how to build high-quality systems that are less vulnerable to costly and even catastrophic attack. It's a book that every developer should read before the start of any serious project." --Frank Abagnale, author, lecturer, and leading consultant on fraud prevention and secure documents

Learn the Root Causes of Software Vulnerabilities and How to Avoid Them Commonly exploited software vulnerabilities are usually caused by avoidable software defects. Having analyzed nearly 18,000 vulnerability reports over the past ten years, the CERT/Coordination

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Center (CERT/CC) has determined that a relatively small number of root causes account for most of them. This book identifies and explains these causes and shows the steps that can be taken to prevent exploitation. Moreover, this book encourages programmers to adopt security best practices and develop a security mindset that can help protect software from tomorrow's attacks, not just today's. Drawing on the CERT/CC's reports and conclusions, Robert Seacord systematically identifies the program errors most likely to lead to security breaches, shows how they can

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be exploited, reviews the potential consequences, and presents secure alternatives. Coverage includes technical detail on how to Improve the overall security of any C/C++ application Thwart buffer overflows and stack-smashing attacks that exploit insecure string manipulation logic Avoid vulnerabilities and security flaws resulting from the incorrect use of dynamic memory management functions Eliminate integer-related problems: integer overflows, sign errors, and truncation errors Correctly use formatted output functions without introducing format-string

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vulnerabilities Avoid I/O vulnerabilities, including race conditions Secure Coding in C and C++ presents hundreds of examples of secure code, insecure code, and exploits, implemented for Windows and Linux. If you're responsible for creating secure C or C++ software--or for keeping it safe--no other book offers you this much detailed, expert assistance.

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Foundations of Coding

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Theory and Applications of
Error-Correcting Codes with
an Introduction to
Cryptography and Information
Theory

*Building on the success
of the first edition,
which offered a
practical introductory
approach to the
techniques of error
concealment, this book,
now fully revised and
updated, provides a
comprehensive treatment
of the subject and
includes a wealth of
additional features. The
Art of Error Correcting*

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Coding, Second Edition explores intermediate and advanced level concepts as well as those which will appeal to the novice. All key topics are discussed, including Reed-Solomon codes, Viterbi decoding, soft-output decoding algorithms, MAP, log-MAP and MAX-log-MAP. Reliability-based algorithms GMD and Chase are examined, as are turbo codes, both serially and parallel concatenated, as well as low-density parity-check

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(LDPC) codes and their iterative decoders. Features additional problems at the end of each chapter and an instructor's solutions manual Updated companion website offers new C/C++programs and MATLAB scripts, to help with the understanding and implementation of basic ECC techniques Easy to follow examples illustrate the fundamental concepts of error correcting codes Basic analysis tools are provided throughout to

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help in the assessment of the error performance block and convolutional codes of a particular error correcting coding (ECC) scheme for a selection of the basic channel models This edition provides an essential resource to engineers, computer scientists and graduate students alike for understanding and applying ECC techniques in the transmission and storage of digital information.

This practical resource

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provides you with a comprehensive understanding of error control coding, an essential and widely applied area in modern digital communications. The goal of error control coding is to encode information in such a way that even if the channel (or storage medium) introduces errors, the receiver can correct the errors and recover the original transmitted information. This book includes the most useful modern and

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classic codes, including block, Reed Solomon, convolutional, turbo, and LDPC codes. You find clear guidance on code construction, decoding algorithms, and error correcting performances. Moreover, this unique book introduces computer simulations integrally to help you master key concepts. Including a companion DVD with MATLAB programs and supported with over 540 equations, this hands-on reference provides you with an in-depth

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treatment of a wide range of practical implementation issues. The purpose of Error-Control Coding for Data Networks is to provide an accessible and comprehensive overview of the fundamental techniques and practical applications of the error-control coding needed by students and engineers. An additional purpose of the book is to acquaint the reader with the analytical techniques used to design an error-control

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coding system for many new applications in data networks. Error-control coding is a field in which elegant theory was motivated by practical problems so that it often leads to important useful advances. Claude Shannon in 1948 proved the existence of error-control codes that, under suitable conditions and at rates less than channel capacity, would transmit error-free information for all practical applications. The first

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practical binary codes were introduced by Richard Hamming and Marcel Golay from which the drama and excitement have infused researchers and engineers in digital communication and error-control coding for more than fifty years.

Nowadays, error-control codes are being used in almost all modem digital electronic systems and data networks. Not only is coding equipment being implemented to increase the energy and bandwidth efficiency of

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communication systems, but coding also provides innovative solutions to many related data-networking problems.

Comprehensive introduction to non-binary error-correction coding techniques Non-Binary Error Control Coding for Wireless Communication and Data Storage explores non-binary coding schemes that have been developed to provide an alternative to the Reed - Solomon codes, which are expected to become

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unsuitable for use in future data storage and communication devices as the demand for higher data rates increases. This book will look at the other significant non-binary coding schemes, including non-binary block and ring trellis-coded modulation (TCM) codes that perform well in fading conditions without any expansion in bandwidth use, and algebraic-geometric codes which are an extension of Reed-Solomon codes but with

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better parameters. Key Features: Comprehensive and self-contained reference to non-binary error control coding starting from binary codes and progressing up to the latest non-binary codes Explains the design and construction of good non-binary codes with descriptions of efficient non-binary decoding algorithms with applications for wireless communication and high-density data storage Discusses the application to specific

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cellular and wireless channels, and also magnetic storage channels that model the reading of data from the magnetic disc of a hard drive. Includes detailed worked examples for each coding scheme to supplement the concepts described in this book Focuses on the encoding, decoding and performance of both block and convolutional non-binary codes, and covers the Kötter-Vardy algorithm and Non-binary LDPC codes This book will be

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an excellent reference for researchers in the wireless communication and data storage communities, as well as development/research engineers in telecoms and storage companies. Postgraduate students in these fields will also find this book of interest.

Programming Embedded Systems

*An Engineering Approach
Fundamentals and Applications*

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Introduction with*

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or complicated Python tutorials. What this book offers... Python for Beginners Complex concepts are broken down into simple steps to ensure that you can easily master the Python language even if you have never coded before. Carefully Chosen Python Examples Examples are carefully chosen to illustrate all concepts. In addition, the output for all examples are provided immediately so you do not have to wait till you have access to your computer to test the examples. Learn The Python

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Programming Language Fast Concepts are presented in a "to-the-point" style to cater to the busy individual. With this book, you can learn Python in just one day and start coding immediately. How is this book different... The best way to learn Python is by doing. This book includes a complete project at the end of the book that requires the application of all the concepts taught previously. Working through the project will not only give you an immense sense of

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achievement, it'll also help you retain the knowledge and master the language. Are you ready to dip your toes into the exciting world of Python coding? This book is for you. Click the "Add to Cart" button to buy it now. What you'll learn: What is Python? What software you need to code and run Python programs? What are variables? What mathematical operators are there in Python? What are the common data types in Python? What are Lists and Tuples? How to format strings How to accept user

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inputs and display outputs
How to make decisions with
If statements How to
control the flow of
program with loops How to
handle errors and
exceptions What are
functions and modules? How
to define your own
functions and modules How
to work with external
files .. and more...
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028M> A reorganized and comprehensive major revision of a classic book, this edition provides a bridge between introductory digital communications and more advanced treatment of information theory.

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Contains the most recent developments of coded modulation, trellises for codes, soft-decision decoding algorithms, turbo coding for reliable data transmission and other areas. There are two new chapters on Reed-Solomon codes and concatenated coding schemes. Also contains hundreds of new and revised examples; and more than 200 illustrations of code structures, encoding and decoding circuits and error performance of many important codes and error control coding systems.

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complexity and maximum
creativity Reap the
benefits of collaborative
development Apply
defensive programming
techniques to reduce and
flush out errors Exploit
opportunities to
refactor—or evolve—code,
and do it safely Use
construction practices
that are right-weight for
your project Debug
problems quickly and
effectively Resolve
critical construction
issues early and correctly
Build quality into the
beginning, middle, and end
of your project

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101

Intelligent Image and

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Fundamentals of

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Error-Control Coding for

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Code Complete

Digital Signal Processing 101:
Everything You Need to Know to
Get Started provides a basic

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tutorial on digital signal processing (DSP). Beginning with discussions of numerical representation and complex numbers and exponentials, it goes on to explain difficult concepts such as sampling, aliasing, imaginary numbers, and frequency response. It does so using easy-to-understand examples and a minimum of mathematics. In addition, there is an overview of the DSP functions and implementation used in several DSP-intensive fields or applications, from error correction to CDMA mobile communication to airborne radar systems. This book is intended

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for those who have absolutely no previous experience with DSP, but are comfortable with high-school-level math skills. It is also for those who work in or provide components for industries that are made possible by DSP. Sample industries include wireless mobile phone and infrastructure equipment, broadcast and cable video, DSL modems, satellite communications, medical imaging, audio, radar, sonar, surveillance, and electrical motor control. Dismayed when presented with a mass of equations as an explanation of DSP? This is the book for you!

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technological achievements of modern times, and has made possible the great successes of streaming and social media and digital cinema. Their book, Intelligent Image and Video Compression covers all the salient topics ranging over visual perception, information theory, bandpass transform theory, motion estimation and prediction, lossy and lossless compression, and of course the compression standards from MPEG (ranging from H.261 through the most modern H.266, or VVC) and the open standards VP9 and AV-1. The book is replete with clear explanations and figures,

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including color where appropriate, making it quite accessible and valuable to the advanced student as well as the expert practitioner. The book offers an excellent glossary and as a bonus, a set of tutorial problems. Highly recommended!

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HEVC and VVC) as a vehicle for explaining block-based compression. Provides broad coverage of important topics such as visual quality assessment and video streaming. Although devoted to constructions of good codes for error control, secrecy or data compression, the emphasis is on the first direction. Introduces a number of important classes of error-detecting and error-correcting codes as well as their decoding methods. Background material on modern algebra is presented where required. The role of error-correcting codes in modern cryptography is treated

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as are data compression and other topics related to information theory. The definition-theorem proof style used in mathematics texts is employed through the book but formalism is avoided wherever possible. An unparalleled learning tool and guide to error correction coding

Error correction coding techniques allow the detection and correction of errors occurring during the transmission of data in digital communication systems. These techniques are nearly universally employed in modern communication systems, and are thus an important component of the modern information

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economy. Error Correction Coding: Mathematical Methods and Algorithms provides a comprehensive introduction to both the theoretical and practical aspects of error correction coding, with a presentation suitable for a wide variety of audiences, including graduate students in electrical engineering, mathematics, or computer science. The pedagogy is arranged so that the mathematical concepts are presented incrementally, followed immediately by applications to coding. A large number of exercises expand and deepen students' understanding.

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A unique feature of the book is a set of programming laboratories, supplemented with over 250 programs and functions on an associated Web site, which provides hands-on experience and a better understanding of the material. These laboratories lead students through the implementation and evaluation of Hamming codes, CRC codes, BCH and R-S codes, convolutional codes, turbo codes, and LDPC codes. This text offers both "classical" coding theory-such as Hamming, BCH, Reed-Solomon, Reed-Muller, and convolutional codes-as well as modern codes and decoding

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methods, including turbo codes, LDPC codes, repeat-accumulate codes, space time codes, factor graphs, soft-decision decoding, Guruswami-Sudan decoding, EXIT charts, and iterative decoding. Theoretical complements on performance and bounds are presented. Coding is also put into its communications and information theoretic context and connections are drawn to public key cryptosystems. Ideal as a classroom resource and a professional reference, this thorough guide will benefit electrical and computer engineers, mathematicians,

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Standards contains technical details of the standards we use every day, as well as insights into their development. Source Compression and Quality Assessment covers the compression techniques used to represent voice and video for transmission over mobile communications systems as well as how the delivered voice and video quality are assessed. Wireless Networks examines the wide range of current and developing wireless networks and wireless methodologies. Emerging Applications explores newly developed areas of vehicular communications and 60 GHz

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wireless communications. Written by experts from industry and academia, this book provides a succinct overview of each topic, quickly bringing the reader up to date, but with sufficient detail and references to enable deeper investigations. Providing much more than a "just the facts" presentation, contributors use their experience in the field to provide insights into how each topic has emerged and to point toward forthcoming developments in mobile communications. Providing the underlying principles of digital communication and the design

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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

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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.

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Processing and Quantum Error Correction is a self-contained, tutorial-based introduction to quantum information, quantum computation, and quantum error-correction. Assuming no knowledge of quantum mechanics and written at an intuitive level suitable for the engineer, the book gives all the essential principles needed to design and implement quantum electronic and photonic circuits. Numerous examples from a wide area of application are given to show how the principles can be implemented in practice. This book is ideal for the electronics, photonics and

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computer engineer who requires an easy-to-understand foundation on the principles of quantum information processing and quantum error correction, together with insight into how to develop quantum electronic and photonic circuits. Readers of this book will be ready for further study in this area, and will be prepared to perform independent research. The reader completed the book will be able design the information processing circuits, stabilizer codes, Calderbank-Shor-Steane (CSS) codes, subsystem codes, topological codes and entanglement-

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assisted quantum error correction codes; and propose corresponding physical implementation. The reader completed the book will be proficient in quantum fault-tolerant design as well. Unique Features Unique in covering both quantum information processing and quantum error correction - everything in one book that an engineer needs to understand and implement quantum-level circuits. Gives an intuitive understanding by not assuming knowledge of quantum mechanics, thereby avoiding heavy mathematics. In-depth coverage of the design and implementation of

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quantum information processing and quantum error correction circuits. Provides the right balance among the quantum mechanics, quantum error correction, quantum computing and quantum communication. Dr. Djordjevic is an Assistant Professor in the Department of Electrical and Computer Engineering of College of Engineering, University of Arizona, with a joint appointment in the College of Optical Sciences. Prior to this appointment in August 2006, he was with University of Arizona, Tucson, USA (as a Research Assistant Professor); University of the

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West of England, Bristol, UK; University of Bristol, Bristol, UK; Tyco Telecommunications, Eatontown, USA; and National Technical University of Athens, Athens, Greece. His current research interests include optical networks, error control coding, constrained coding, coded modulation, turbo equalization, OFDM applications, and quantum error correction. He presently directs the Optical Communications Systems Laboratory (OCSL) within the ECE Department at the University of Arizona. Provides everything an engineer needs in one tutorial-based

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introduction to understand and implement quantum-level circuits Avoids the heavy use of mathematics by not assuming the previous knowledge of quantum mechanics Provides in-depth coverage of the design and implementation of quantum information processing and quantum error correction circuits

Error Coding for Arithmetic Processors provides an understanding of arithmetically invariant codes as a primary technique of fault-tolerant computing by discussing the progress in arithmetic coding theory. The

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book provides an introduction to arithmetic error code, single-error detection, and long-distance codes. It also discusses algebraic structures, linear congruences, and residues. Organized into eight chapters, this volume begins with an overview of the mathematical background in number theory, algebra, and error control techniques. It then explains the basic mathematical models on a register and its number representation system. The reader is also introduced to arithmetic processors, as well as to error control techniques. The text also explores the

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functional units of a digital computer, including control unit, arithmetic processor, memory unit, program unit, and input/output unit.

Students in advanced undergraduate or graduate level courses, researchers, and readers who are interested in applicable knowledge on arithmetic codes will find this book extremely useful.

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presents mathematical models that involve independent random variables with finite range. This three-chapter text specifically describes the characteristic phenomena of information theory. Chapter 1 deals with information measures in simple coding problems, with emphasis on some formal properties of Shannon's information and the non-block source coding. Chapter 2 describes the properties and practical aspects of the two-terminal systems. This chapter also examines the noisy channel coding problem, the computation of channel capacity, and the arbitrarily varying channels. Chapter 3 looks into the theory and practicality of multi-terminal systems. This book is intended primarily for graduate students and research workers in mathematics, electrical engineering, and computer

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science.

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