

# Kindle File Format An Introduction To Signal Detection And Estimation Springer Texts In Electrical Engineering

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**An Introduction to Signal Detection and Estimation**-H. Vincent Poor 2013-06-29 The purpose of this book is to introduce the reader to the basic theory of signal detection and estimation. It is assumed that the reader has a working knowledge of applied probability and random processes such as that taught in a typical first-semester graduate engineering course on these subjects. This material is covered, for example, in the book by Wong (1983) in this series. More advanced concepts in these areas are introduced where needed, primarily in Chapters VI and VII, where continuous-time problems are treated. This book is adapted from a one-semester, second-tier graduate course taught at the University of Illinois. However, this material can also be used for a shorter or first-tier course by restricting coverage to Chapters I through V, which for the most part can be read with a background of only the basics of applied probability, including random vectors and conditional expectations. Sufficient background for the latter option is given for example in the book by Thomas (1986), also in this series.

**Signal Detection and Estimation**-Mourad Barkat 2005 This newly revised edition of a classic Artech House book provides you with a comprehensive

and current understanding of signal detection and estimation. Featuring a wealth of new and expanded material, the second edition introduces the concepts of adaptive CFAR detection and distributed CA-CFAR detection. The book provides complete explanations of the mathematics you need to fully master the material, including probability theory, distributions, and random processes.

**Signal Detection Theory**-Vyacheslav P. Tuzlukov 2013-03-14 Increasing the noise immunity of complex signal processing systems is the main problem in various areas of signal processing. At the present time there are many books and periodical articles devoted to signal detection, but many important problems remain to be solved. New approaches to complex problems allow us not only to summarize investigations, but also to improve the quality of signal detection in noise. This book is devoted to fundamental problems in the generalized approach to signal processing in noise based on a seemingly abstract idea: the introduction of an additional noise source that does not carry any information about the signal in order to improve the qualitative performance of complex signal processing systems. Theoretical and experimental studies carried out by the author lead to the conclusion that the proposed generalized approach to signal processing in noise allows



content area, including both one-dimensional and multidimensional models; \*separate, systematic coverage of sensitivity and response bias measurement; \*integrated treatment of threshold and nonparametric approaches; \*an organized, tutorial level introduction to multidimensional detection theory; \*popular discrimination paradigms presented as applications of multidimensional detection theory; and \*a new chapter on ideal observers and an updated chapter on adaptive threshold measurement. This up-to-date summary of signal detection theory is both a self-contained reference work for users and a readable text for graduate students and other researchers learning the material either in courses or on their own.

**An Introduction to Statistical Communication Theory**-David Middleton 1996-05-08 This IEEE Classic Reissue provides at an advanced level, a uniquely fundamental exposition of the applications of Statistical Communication Theory to a vast spectrum of important physical problems. Included are general analysis of signal detection, estimation, measurement, and related topics involving information transfer. Using the statistical Bayesian viewpoint, renowned author David Middleton employs statistical decision theory specifically tailored for the general tasks of signal processing. Dr. Middleton also provides a special focus on physical modeling of the canonical channel with real-world examples relating to radar, sonar, and general telecommunications. This book offers a detailed treatment and an array of problems and results spanning an exceptionally broad range of technical subjects in the communications field. Complete with special functions, integrals, solutions of integral equations, and an extensive, updated bibliography by chapter, *An Introduction to Statistical Communication Theory* is a seminal reference, particularly for anyone working in the field of communications, as well as in other areas of statistical physics. (Originally published in 1960.)

**Digital Signal Processing**-Zahir M. Hussain 2011-02-26 In three parts, this book contributes to the advancement of engineering education and that serves as a general reference on digital signal processing. Part I presents the basics of analog and digital signals and systems in the time and frequency domain. It covers the core topics: convolution, transforms, filters,

and random signal analysis. It also treats important applications including signal detection in noise, radar range estimation for airborne targets, binary communication systems, channel estimation, banking and financial applications, and audio effects production. Part II considers selected signal processing systems and techniques. Core topics covered are the Hilbert transformer, binary signal transmission, phase-locked loops, sigma-delta modulation, noise shaping, quantization, adaptive filters, and non-stationary signal analysis. Part III presents some selected advanced DSP topics.

**Signal Detection Theory**-Viacheslav Petrovich Tuzlukov 2001

**Advanced Theory of Signal Detection**-Ickho Song 2013-03-09 This monograph contains a number of problems with signal detection theory, presenting a generalized observation model for signal detection problems. The model includes several interesting and common special cases, such as those describing additive noise, multiplicative noise and signal-dependent noise.

**Statistical Theory of Signal Detection**-Carl W. Helstrom 2013-10-22 *Statistical Theory of Signal Detection, Second Edition* provides an elementary introduction to the theory of statistical testing of hypotheses that is related to the detection of signals in radar and communications technology. This book presents a comprehensive survey of digital communication systems. Organized into 11 chapters, this edition begins with an overview of the theory of signal detection and the typical detection problem. This text then examines the goals of the detection system, which are defined through an analogy with the testing of statistical hypotheses. Other chapters consider the noise fluctuations in terms of probability distributions whereby the statistical information is used to design a receiver that attains the maximum rate of successful detections in a long series of trials. This book discusses as well the criteria of success and failure in statistical situations. The final chapter deals with the types of stochastic signals. This book is a valuable resource for mathematicians and engineers.

**Detection of Signals in Noise**-Robert N. McDonough 1995-05-02 The Second Edition is an updated revision to the authors highly successful and widely used introduction to the principles and application of the statistical theory of signal detection. This book emphasizes those theories that have been found to be particularly useful in practice including principles applied to detection problems encountered in digital communications, radar, and sonar. Detection processing based upon the fast Fourier transform

**Principles of Signal Detection and Parameter Estimation**-Bernard C. Levy 2008-07-07 This textbook provides a comprehensive and current understanding of signal detection and estimation, including problems and solutions for each chapter. Signal detection plays an important role in fields such as radar, sonar, digital communications, image processing, and failure detection. The book explores both Gaussian detection and detection of Markov chains, presenting a unified treatment of coding and modulation topics. Addresses asymptotic of tests with the theory of large deviations, and robust detection. This text is appropriate for students of Electrical Engineering in graduate courses in Signal Detection and Estimation.

**Digital Signal Processing Fundamentals**-Vijay Madisetti 2017-12-19 Now available in a three-volume set, this updated and expanded edition of the bestselling The Digital Signal Processing Handbook continues to provide the engineering community with authoritative coverage of the fundamental and specialized aspects of information-bearing signals in digital form. Encompassing essential background material, technical details, standards, and software, the second edition reflects cutting-edge information on signal processing algorithms and protocols related to speech, audio, multimedia, and video processing technology associated with standards ranging from WiMax to MP3 audio, low-power/high-performance DSPs, color image processing, and chips on video. Drawing on the experience of leading engineers, researchers, and scholars, the three-volume set contains 29 new chapters that address multimedia and Internet technologies, tomography, radar systems, architecture, standards, and future applications in speech, acoustics, video, radar, and telecommunications. Emphasizing theoretical

concepts, Digital Signal Processing Fundamentals provides comprehensive coverage of the basic foundations of DSP and includes the following parts: Signals and Systems; Signal Representation and Quantization; Fourier Transforms; Digital Filtering; Statistical Signal Processing; Adaptive Filtering; Inverse Problems and Signal Reconstruction; and Time-Frequency and Multirate Signal Processing.

**Broadcasting and Optical Communication Technology**-Richard C. Dorf 2006-01-13 In two editions spanning more than a decade, The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering. Our knowledge continues to grow, and so does the Handbook. For the third edition, it has been expanded into a set of six books carefully focused on a specialized area or field of study. Broadcasting and Optical Communication Technology represents a concise yet definitive collection of key concepts, models, and equations in the fields of broadcasting and optical communication, thoughtfully gathered for convenient access. Addressing the challenges involved in modern communications networks, Broadcasting and Optical Communication Technology explores communications, information theory, and devices, covering all the basic information needed for a thorough understanding of these areas. It also examines the emerging areas of adaptive estimation and optical communication, including lightwave technology, long-distance fiber optic communications, and photonic networks. Articles include defining terms, references, and sources of further information. Encompassing the work of the world's foremost experts in their respective specialties, Broadcasting and Optical Communication Technology presents the latest developments, the broadest scope of coverage, and new material on mobile communications. It offers fast, convenient access to specialists in need of detailed reference on the job.

**The Electrical Engineering Handbook - Six Volume Set**-Richard C. Dorf 2018-12-14 In two editions spanning more than a decade, The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering. Our knowledge continues to grow, and so does the Handbook. For the third edition, it has grown into a set of six books carefully focused on specialized areas or fields of study.

Each one represents a concise yet definitive collection of key concepts, models, and equations in its respective domain, thoughtfully gathered for convenient access. Combined, they constitute the most comprehensive, authoritative resource available. Circuits, Signals, and Speech and Image Processing presents all of the basic information related to electric circuits and components, analysis of circuits, the use of the Laplace transform, as well as signal, speech, and image processing using filters and algorithms. It also examines emerging areas such as text to speech synthesis, real-time processing, and embedded signal processing. Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar delves into the fields of electronics, integrated circuits, power electronics, optoelectronics, electromagnetics, light waves, and radar, supplying all of the basic information required for a deep understanding of each area. It also devotes a section to electrical effects and devices and explores the emerging fields of microlithography and power electronics. Sensors, Nanoscience, Biomedical Engineering, and Instruments provides thorough coverage of sensors, materials and nanoscience, instruments and measurements, and biomedical systems and devices, including all of the basic information required to thoroughly understand each area. It explores the emerging fields of sensors, nanotechnologies, and biological effects. Broadcasting and Optical Communication Technology explores communications, information theory, and devices, covering all of the basic information needed for a thorough understanding of these areas. It also examines the emerging areas of adaptive estimation and optical communication. Computers, Software Engineering, and Digital Devices examines digital and logical devices, displays, testing, software, and computers, presenting the fundamental concepts needed to ensure a thorough understanding of each field. It treats the emerging fields of programmable logic, hardware description languages, and parallel computing in detail. Systems, Controls, Embedded Systems, Energy, and Machines explores in detail the fields of energy devices, machines, and systems as well as control systems. It provides all of the fundamental concepts needed for thorough, in-depth understanding of each area and devotes special attention to the emerging area of embedded systems. Encompassing the work of the world's foremost experts in their respective specialties, The Electrical Engineering Handbook, Third Edition remains the most convenient, reliable source of information available. This edition features the latest developments, the broadest scope of coverage, and new

material on nanotechnologies, fuel cells, embedded systems, and biometrics. The engineering community has relied on the Handbook for more than twelve years, and it will continue to be a platform to launch the next wave of advancements. The Handbook's latest incarnation features a protective slipcase, which helps you stay organized without overwhelming your bookshelf. It is an attractive addition to any collection, and will help keep each volume of the Handbook as fresh as your latest research.

**Detection of Signals in Noise**-Robert N. McDonough 1995 The updated revision to the authors' successful and widely used introduction to the principles and application of the statistical theory of signal detection. The book emphasizes those theories that have been found to be particularly useful in practice, including principles applied to detection problems encountered in digital communications, radar, and sonar.

**The Effect of the Introduction of a Paced Central Task on the Detection of Peripheral Stimuli**-Kaye Lorraine Shrimpton 1975

**Applied Neural Networks for Signal Processing**-Fa-Long Luo 1998 A comprehensive introduction to the use of neural networks in signal processing.

**Advances in VLSI, Communication, and Signal Processing**-Debashis Dutta 2019-12-03 This book comprises select proceedings of the International Conference on VLSI, Communication and Signal processing (VCAS 2018). It looks at latest research findings in VLSI design and applications. The book covers a wide range of topics in electronics and communication engineering, especially in the area of microelectronics and VLSI design, communication systems and networks, and image and signal processing. The contents of this book will be useful to researchers and professionals alike.

**Signal and Image Processing in Navigational Systems**-Vyacheslav Tuzlukov 2018-10-03 Classical and modern theories have given us a degree of noise immunity by defining the sufficient statistic of the mean of the likelihood function. The generalized theory moves beyond these limitations to determine the jointly sufficient statistics of the mean and variance of the likelihood function. Signal and Image Processing in Navigational Systems introduces us to the generalized approach, and then delves rigorously into the theory and practical applications of this approach. This volume represents the most in-depth discussion of the generalized approach to date, providing many examples and computer models to demonstrate how this approach raises the upper limits of noise immunity for navigation systems, leading to better detection performances. This book is vital for signal and image processing experts, radar, communications, acoustics, and navigational systems designers, as well as professionals in the fields of statistical pattern recognition, biomedicine, astronomy, and robotics who wish to extend the boundaries of noise immunity and improve qualitative performance of their systems.

**Academic Press Library in Signal Processing**- 2013-08-31 This third volume, edited and authored by world leading experts, gives a review of the principles, methods and techniques of important and emerging research topics and technologies in array and statistical signal processing. With this reference source you will: Quickly grasp a new area of research Understand the underlying principles of a topic and its application Ascertain how a topic relates to other areas and learn of the research issues yet to be resolved Quick tutorial reviews of important and emerging topics of research in array and statistical signal processing Presents core principles and shows their application Reference content on core principles, technologies, algorithms and applications Comprehensive references to journal articles and other literature on which to build further, more specific and detailed knowledge Edited by leading people in the field who, through their reputation, have been able to commission experts to write on a particular topic

**Invariant Hypothesis Testing with Sensor Arrays**-Sandip Bose 1995

**Introduction to Random Signals and Noise**-Wim C. Van Etten 2006-02-03 Random signals and noise are present in many engineering systems and networks. Signal processing techniques allow engineers to distinguish between useful signals in audio, video or communication equipment, and interference, which disturbs the desired signal. With a strong mathematical grounding, this text provides a clear introduction to the fundamentals of stochastic processes and their practical applications to random signals and noise. With worked examples, problems, and detailed appendices, Introduction to Random Signals and Noise gives the reader the knowledge to design optimum systems for effectively coping with unwanted signals. Key features: Considers a wide range of signals and noise, including analogue, discrete-time and bandpass signals in both time and frequency domains. Analyses the basics of digital signal detection using matched filtering, signal space representation and correlation receiver. Examines optimal filtering methods and their consequences. Presents a detailed discussion of the topic of Poisson processes and shot noise. An excellent resource for professional engineers developing communication systems, semiconductor devices, and audio and video equipment, this book is also ideal for senior undergraduate and graduate students in Electronic and Electrical Engineering.

**Cognitive Psychology and Information Processing**-R. Lachman 2015-12-22 First published in 1979. Routledge is an imprint of Taylor & Francis, an informa company.

**UTIAS Report**-University of Toronto. Institute for Aerospace Studies 1988

**Elementary Signal Detection Theory**-Thomas D. Wickens 2002 Detection theory has been applied to a host of varied problems (for example, measuring the accuracy of diagnostic systems or reliability of lie detection tests) and extends far beyond the detection of signals. This book is a primer on the subject.

**Bootstrap Techniques for Signal Processing**-Abdelhak M. Zoubir

2004-05-06 The statistical bootstrap is one of the methods that can be used to calculate estimates of a certain number of unknown parameters of a random process or a signal observed in noise, based on a random sample. Such situations are common in signal processing and the bootstrap is especially useful when only a small sample is available or an analytical analysis is too cumbersome or even impossible. This book covers the foundations of the bootstrap, its properties, its strengths and its limitations. The authors focus on bootstrap signal detection in Gaussian and non-Gaussian interference as well as bootstrap model selection. The theory developed in the book is supported by a number of useful practical examples written in MATLAB. The book is aimed at graduate students and engineers, and includes applications to real-world problems in areas such as radar and sonar, biomedical engineering and automotive engineering.

**Academic Press Library in Signal Processing**- 2013-09-10 This second volume, edited and authored by world leading experts, gives a review of the principles, methods and techniques of important and emerging research topics and technologies in communications and radar engineering. With this reference source you will: Quickly grasp a new area of research Understand the underlying principles of a topic and its application Ascertain how a topic relates to other areas and learn of the research issues yet to be resolved Quick tutorial reviews of important and emerging topics of research in array and statistical signal processing Presents core principles and shows their application Reference content on core principles, technologies, algorithms and applications Comprehensive references to journal articles and other literature on which to build further, more specific and detailed knowledge Edited by leading people in the field who, through their reputation, have been able to commission experts to write on a particular topic

**Signal Detection in Non-Gaussian Noise**-Saleem A. Kassam 2012-12-06

This book contains a unified treatment of a class of problems of signal detection theory. This is the detection of signals in additive noise which is not required to have Gaussian probability density functions in its statistical

description. For the most part the material developed here can be classified as belonging to the general body of results of parametric theory. Thus the probability density functions of the observations are assumed to be known, at least to within a finite number of unknown parameters in a known functional form. Of course the focus is on noise which is not Gaussian; results for Gaussian noise in the problems treated here become special cases. The contents also form a bridge between the classical results of signal detection in Gaussian noise and those of nonparametric and robust signal detection, which are not considered in this book. Three canonical problems of signal detection in additive noise are covered here. These allow between them formulation of a range of specific detection problems arising in applications such as radar and sonar, binary signaling, and pattern recognition and classification. The simplest to state and perhaps the most widely studied of all is the problem of detecting a completely known deterministic signal in noise. Also considered here is the detection random non-deterministic signal in noise. Both of these situations may arise for observation processes of the low-pass type and also for processes of the band-pass type.

**Advances in Heuristic Signal Processing and Applications**-Amitava Chatterjee 2013-06-05 There have been significant developments in the design and application of algorithms for both one-dimensional signal processing and multidimensional signal processing, namely image and video processing, with the recent focus changing from a step-by-step procedure of designing the algorithm first and following up with in-depth analysis and performance improvement to instead applying heuristic-based methods to solve signal-processing problems. In this book the contributing authors demonstrate both general-purpose algorithms and those aimed at solving specialized application problems, with a special emphasis on heuristic iterative optimization methods employing modern evolutionary and swarm intelligence based techniques. The applications considered are in domains such as communications engineering, estimation and tracking, digital filter design, wireless sensor networks, bioelectric signal classification, image denoising, and image feature tracking. The book presents interesting, state-of-the-art methodologies for solving real-world problems and it is a suitable reference for researchers and engineers in the areas of heuristics and signal processing.

### **Time-Frequency Analysis and Synthesis of Linear Signal Spaces**-Franz Hlawatsch 2013-03-14

Linear signal spaces are of fundamental importance in signal and system theory, communication theory, and modern signal processing. This book proposes a time-frequency analysis of linear signal spaces that is based on two novel time-frequency representations called the 'Wigner distribution of a linear signal space' and the 'ambiguity function of a linear signal space'. Besides being a useful display and analysis tool, the Wigner distribution of a linear signal space allows the design of high-resolution time-frequency filtering methods. This book develops such methods and applies them to the enhancement, decomposition, estimation, and detection of noisy deterministic and stochastic signals. Formulation of the filtering (estimation, detection) methods in the time-frequency plane yields a direct interpretation of the effect of adding or deleting information, changing parameters, etc. In a sense, the prior information and the signal processing tasks are brought to life in the time-frequency plane. The ambiguity function of a linear signal space, on the other hand, is closely related to a novel maximum-likelihood multipulse estimator of the range and Doppler shift of a slowly fluctuating point target - an estimation problem that is important in radar and sonar. Specifically, the ambiguity function of a linear signal space is relevant to the problem of optimally designing a set of radar pulses. The concepts and methods presented are amply illustrated by examples and pictures. Time-Frequency Analysis and Synthesis of Linear Signal Spaces: Time-Frequency Filters, Signal Detection and Estimation, and Range-Doppler Estimation is an excellent reference and may be used as a text for advanced courses covering the subject.

### **Cognitive Radio Techniques**-Kandeepan Sithamparamanathan 2012

Providing an in-depth treatment of the core enablers of cognitive radio technology, this unique book places emphasis on critical areas that have not been sufficiently covered in existing literature. You find expert guidance in the key enablers with respect to communications and signal processing. The book presents fundamentals, basic solutions, detailed discussions of important enabler issues, and advanced algorithms to save you time with your projects in the field. For the first time in any book, you find an adequately detailed treatment of spectrum sensing that covers nearly every

aspect of the subject. Moreover, this valuable resource provides you with thorough working knowledge of localization and interference mitigation as enablers of cognitive radio technology. The book includes all the necessary mathematics, statistical and probabilistic treatments, and performance analysis to give you a comprehensive understanding of the material.

### **Echo Signal Processing**-Dennis W. Ricker 2012-12-06

This book presents basic and advanced topics in the areas of signal theory and processing as applied to acoustic echo-location (sonar). It is written at the advanced undergraduate or graduate level, and assumes that the reader is conversant with the concepts and mathematics associated with introductory graduate courses in signal processing such as linear and complex algebra, Fourier analysis, probability, advanced calculus, and linear system theory. The material is presented in a tutorial fashion as a logical development starting with basic principles and leading to the development of topics in detection and estimation theory, waveform design, echo modeling, scattering theory, and spatial processing. Examples are provided throughout the book to illustrate important concepts and especially important relationships are boxed. The book addresses the practical aspects of receiver and waveform design, and therefore should be of interest to the practicing engineer as well as the student. Although much of the book is applicable to the general echo-location problem that includes radar, its emphasis is on acoustic echo location especially in regard to time mapping and the wideband or wavelet description of Doppler. Introductory signal theory material is included in the first chapter to provide a foundation for the material covered in the later chapters. A consistent notational convention is observed throughout the book so that the various mathematical entities are readily identified. This is described in the glossary and symbol list.

### **Signal Processing for Cognitive Radios**-Sudharman K. Jayaweera

2014-12-03 This book examines signal processing techniques for cognitive radios. The book is divided into three parts: Part I, is an introduction to cognitive radios and presents a history of the cognitive radio (CR), and introduce their architecture, functionalities, ideal aspects, hardware platforms, and state-of-the-art developments. Dr. Jayaweera also introduces

the specific type of CR that has gained the most research attention in recent years: the CR for Dynamic Spectrum Access (DSA). Part II of the book, Theoretical Foundations, guides the reader from classical to modern theories on statistical signal processing and inference. The author addresses detection and estimation theory, power spectrum estimation, classification, adaptive algorithms (machine learning), and inference and decision processes. Applications to the signal processing, inference and learning problems encountered in cognitive radios are interspersed throughout with concrete and accessible examples. Part III of the book, Signal Processing in Radios, identifies the key signal processing, inference, and learning tasks to be performed by wideband autonomous cognitive radios. The author provides signal processing solutions to each task by relating the tasks to materials covered in Part II. Specialized chapters then discuss specific signal processing algorithms required for DSA and DSS cognitive radios.

**Undergraduate Catalog**-University of Michigan--Dearborn 2006

**Acoustic Signal Processing for Ocean Exploration**-J.M.F Moura  
2012-12-06 Acoustic Signal Processing for Ocean Explortion has two major goals: (i) to present signal processing algorithms that take into account the models of acoustic propagation in the ocean and; (ii) to give a perspective of the broad set of techniques, problems, and applications arising in ocean exploration. The book discusses related issues and problems focused in model based acoustic signal processing methods. Besides addressing the problem of the propagation of acoustics in the ocean, it presents relevant acoustic signal processing methods like matched field processing, array processing, and localization and detection techniques. These more traditional contexts are herein enlarged to include imaging and mapping, and new signal representation models like time/frequency and wavelet transforms. Several applied aspects of these topics, such as the application of acoustics to fisheries, sea floor swath mapping by swath bathymetry and side scan sonar, autonomous underwater vehicles and communications in underwater are also considered.