

## *Antenna Handbook Springer*

This book presents the technology of millimetre waves and Terahertz (THz) antennas. It highlights the importance of moderate and high-gain aperture antennas as key devices for establishing point-to-point and point-to-multipoint radio links for far-field and near-field applications, such as high data-rate communications, intelligent transport, security imaging, exploration and surveillance systems. The book provides a comprehensive overview of the key antenna technologies developed for the mm wave and THz domains, including established ones – such as integrated lens antennas, advanced 2D and 3D horn antennas, transmit and reflect arrays, and Fabry-Perot antennas – as well as emerging metasurface antennas for near-field and far-field applications. It describes the pros and cons of each antenna technology in comparison with other available solutions, a discussion supplemented by practical examples illustrating the step-by-step implementation procedures for each antenna type. The measurement techniques available at these frequency ranges are also presented to close the loop of the antenna development cycle. In closing, the book outlines future trends in various antenna technologies, paving the way for further developments. Presenting content originating from the five-year ESF research networking program –Newfocus– and co-authored by the most active and highly cited research groups in the domain of mm- and sub-mm-wave antenna technologies, the book offers a valuable guide for researchers and engineers in both industry and academia.

This reference provides the reader with focused information about microstrip antenna design and applications. Readers are first introduced to the basic design of microstrip antennas.

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Subsequent chapters explain how microstrip antennas are suitable for practical applications. These chapters cover topics such as fractal and defected ground structure antennas, microstrip antenna evaluation, and the use of microstrip antennas in mobile communications and IoT applications. Scholars, researchers, and industrial professionals involved in the fields of electronics and electrical engineering as well as instrumentation will benefit from the information given in this book.

The Latest Resource for the Study of Antenna Theory! In a discipline that has experienced vast technological changes, this text offers the most recent look at all the necessary topics.

Highlights include: \* New coverage of microstrip antennas provides information essential to a wide variety of practical designs of rectangular and circular patches, including computer programs. \* Applications of Fourier transform (spectral) method to antenna radiation. \*

Updated material on moment methods, radar cross section, mutual impedances, aperture and horn antennas, compact range designs, and antenna measurements. A New Emphasis on Design! Balanis features a tremendous increase in design procedures and equations. This presents a solid solution to the challenge of meeting real-life situations faced by engineers. Computer programs contained in the book-and accompanying software-have been developed to help engineers analyze, design, and visualize the radiation characteristics of antennas. Seven years have passed since the publication of the previous edition of this book. During that time, sensor technologies have made a remarkable leap forward. The sensitivity of the sensors became higher, the dimensions became smaller, the sensitivity became better, and the prices became lower. What have not changed are the fundamental principles of the sensor design. They are still governed by the laws of Nature. Arguably one of the greatest geniuses who ever

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lived, Leonardo Da Vinci, had his own peculiar way of praying. He was saying, "Oh Lord, thanks for Thou do not violate your own laws." It is comforting indeed that the laws of Nature do not change as time goes by; it is just our appreciation of them that is being re?ned. Thus, this new edition examines the same good old laws of Nature that are employed in the designs of various sensors. This has not changed much since the previous edition. Yet, the sections that describe the practical designs are revised substantially. Recent ideas and developments have been added, and less important and nonessential designs were dropped. Probably the most dramatic recent progress in the sensor technologies relates to wide use of MEMS and MEOMS (micro-electro-mechanical systems and micro-electro-opto-mechanical systems). These are examined in this new edition with greater detail. This book is about devices commonly called sensors. The invention of a - croprocessor has brought highly sophisticated instruments into our everyday lives.

Rectangular Dielectric Resonator Antennas

Large Deployable Satellite Antennas

Analysis and Design

Theory, Applications, and Design

Theory and Design

This book, fully updated for Python version 3.6+, covers the key ideas that link probability, statistics, and machine learning illustrated using Python modules in these areas. All the figures and numerical results are reproducible using the Python codes

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provided. The author develops key intuitions in machine learning by working meaningful examples using multiple analytical methods and Python codes, thereby connecting theoretical concepts to concrete implementations. Detailed proofs for certain important results are also provided. Modern Python modules like Pandas, Sympy, Scikit-learn, Tensorflow, and Keras are applied to simulate and visualize important machine learning concepts like the bias/variance trade-off, cross-validation, and regularization. Many abstract mathematical ideas, such as convergence in probability theory, are developed and illustrated with numerical examples. This updated edition now includes the Fisher Exact Test and the Mann-Whitney-Wilcoxon Test. A new section on survival analysis has been included as well as substantial development of Generalized Linear Models. The new deep learning section for image processing includes an in-depth discussion of gradient descent methods that underpin all deep learning algorithms. As with the prior edition, there are new and updated \*Programming Tips\* that illustrate effective Python modules and methods for scientific programming and machine learning. There are 445 run-able code blocks with

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corresponding outputs that have been tested for accuracy. Over 158 graphical visualizations (almost all generated using Python) illustrate the concepts that are developed both in code and in mathematics. We also discuss and use key Python modules such as Numpy, Scikit-learn, SymPy, Scipy, Lifelines, CvxPy, Theano, Matplotlib, Pandas, Tensorflow, Statsmodels, and Keras. This book is suitable for anyone with an undergraduate-level exposure to probability, statistics, or machine learning and with rudimentary knowledge of Python programming.

Bendable wearable materials like conductive strands, fluid metallic mixes, and polymer in paper are generally utilized as a part of the current adaptable electronic gadgets. Extra necessities are implemented in wearable applications.

Characteristic elastic, for example, is an appealing exchange adaptable material that is biocompatible and offers high conductivity, low lost, simplicity to make, and most importantly, it is water/climate safe and condition amicable.

The wearable antenna is one of the key components to establish body area network (BAN) for wireless communication, which is why it has become such an important part of antenna research.

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Wearable antennas are being applied successfully in various parts of life such as health monitoring, physical training, navigation, RFID, medicine, military, and more. Emerging Materials and Advanced Designs for Wearable Antennas explores how wearable antenna technology is being employed to enhance the quality of life in various industries. The technologies implemented and success of these antenna technologies is essential in the emerging field of wearable computing and is discussed in detail within the contents of this book. While covering essential topics such as the optimization of antenna material, improvement in flexible antenna performance, synthesis and design aspects of antennas, and transmission and receiving of the bendable antenna, this book is ideal for the military field, scientists, the medical field, practitioners, stakeholders, researchers, academicians, and students looking for the most advanced and updated research on the technology and implementation of wearable antennas spanning multiple industries.

This book throws a lifeline to designers wading through mounds of antenna array patents looking for the most suitable systems

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for their projects. Drastically reducing the research time required to locate solutions to the latest challenges in automotive communications, it sorts and systematizes material on cutting-edge antenna arrays that feature multi-element communication systems with enormous potential for the automotive industry. These new systems promise to make driving safer and more efficient, opening up myriad applications, including vehicle-to-vehicle traffic that prevents collisions, automatic toll collection, vehicle location and fine-tuning for cruise control systems. This book's exhaustive coverage begins with currently deployed systems, frequency ranges and key parameters. It proceeds to examine system geometry, analog and digital beam steering technology (including "smart" beams formed in noisy environments), maximizing signal-to-noise ratios, miniaturization, and base station technology that facilitates in-car connectivity while on the move. An essential guide for technicians working in a fast-developing field, this new volume will be warmly welcomed as a powerful aid in their endeavors. Smart Antennas—State of the Art brings together the broad expertise of 41 European experts in smart antennas. They provide

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a comprehensive review and an extensive analysis of the recent progress and new results generated during the last years in almost all fields of smart antennas and MIMO (multiple-input multiple-output) transmission. The following represents a summarized table of content.

Receiver: space-time processing, antenna combining, reduced rank processing, robust beamforming, subspace methods, synchronization, equalization, multiuser detection, iterative methods

Channel: propagation, measurements and sounding, modelling, channel estimation, direction-of-arrival estimation, subscriber location estimation

Transmitter: space-time block coding, channel side information, unified design of linear transceivers, ill-conditioned channels, MIMO-MAC strategies

Network Theory: channel capacity, network capacity, multihop networks

Technology: antenna design, transceivers, demonstrators and testbeds, future air interfaces

Applications and Systems: 3G system and link level aspects, MIMO HSDPA, MIMO-WLAN/UMTS implementation issues

This book serves as a reference for scientists and engineers who need to be aware of the leading edge research in multiple-antenna communications, an essential technology for emerging broadband wireless systems.

Design and Optimization of Sensors and Antennas for Wearable  
Devices: Emerging Research and Opportunities  
MIMO Antennas for Wireless Communication  
Printed Antennas  
Microwave RF Antennas and Circuits  
Robotics

This volume provides a consolidated reference for the applications of frequency selective surfaces (FSS) technology in different sectors such as wireless communications, smart buildings, microwave and medical industries. It covers all aspects of metamaterial FSS technology starting from theoretical simulation, fabrication and measurement all the way to actual hardware implementation. Also included are in-depth discussions on the design methodologies of metamaterial FSS structures and their practical implementation in devices and components. It will be of interest to researchers and engineers working on developing metamaterial-FSS technology.

This comprehensive text on antenna theory explains the origin of radiation and discusses antenna parameters in-depth. This book offers an in-depth coverage of fundamental antenna theory, and shows how to apply this in practice. The author discusses electromagnetic radiation and antenna characteristics such as impedance, radiation

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pattern, polarization, gain and efficiency. In addition, the book provides readers with the necessary tools for analyzing complex antennas and for designing new ones. Furthermore, a refresher chapter on vector algebra, including gradient, divergence and curl operation is included. Throughout the book ample examples of employing the derived theory are given and all chapters are concluded with problems, giving the reader the opportunity to test his/her acquired knowledge. Key Features: Covers the mathematical and physical background that is needed to understand electromagnetic radiation and antennas Discusses the origin of radiation and provides an in-depth explanation of antenna parameters Explores all the necessary steps in antenna analysis allowing the reader to understand and analyze new antenna structures Contains a chapter on vector algebra, which is often a stumbling block for learners in this field Includes examples and a list of problems at the end of each chapter Accompanied by a website containing solutions to the problems (for instructors) and CST modeling files ([www.wiley.com/go/visser\\_antennas](http://www.wiley.com/go/visser_antennas)) This book will serve as an invaluable reference for advanced (last year Bsc, Msc) students in antenna and RF engineering, wireless communications, electrical engineering, radio engineers and other professionals needing a reference on antenna theory. It will also be of interest to advanced/senior radio engineers, designers and developers.

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Why yet another book on antennas ? The aim of the authors was to offer a didactic text appropriate for advanced graduate students, as well as a practical work for practicing engineers; to combine a solid theoretical treatment with a practical development which should allow the serious reader to undertake antenna design from first principles. To accomplish these goals, the authors bring together their contributions from both industry and the academic environment. The developments of the various topics start at a level which is accessible to a novice in the speciality, but give a treatment which culminates at an advanced level. Another important feature of the book is its use of practical examples illustrating real engineering problems and designs. In most cases, the explanation is sufficient to grasp the principles of operation of the related equipment, and, where appropriate, the reader is referred to a relevant bibliography for more complete and hence more sophisticated methodologies of design. Of particular note are the chapters on specialist subjects such as antennas and signal theory, and signal processing antennas, showing how the antenna may be combined with signal processing techniques in imaging applications, in angular superresolution, and in adaptive arrays to suppress interference and jamming. Another example is the chapter on the use of polarimetry to enhance the wealth of information which may be extracted, for example, from radar

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signals.

Offers an accessible text and reference (a cosmic-ray manual) for graduate students entering the field and high-energy astrophysicists will find this an accessible cosmic-ray manual Easy to read for the general astronomer, the first part describes the standard model of cosmic rays based on our understanding of modern particle physics.

Presents the acceleration scenario in some detail in supernovae explosions as well as in the passage of cosmic rays through the Galaxy. Compares experimental data in the atmosphere as well as underground are compared with theoretical models

Lattice Point Identities and Shannon-Type Sampling

State of the Art

Springer Handbook of Global Navigation Satellite Systems

Microstrip Patch Antennas: A Designer's Guide

Space Antenna Handbook

Volume II covers antenna theory and design, describing a number of antenna types, including receiving, wire and loop, horn, frequency-independent, microstrip, reflector, and lens antennas. This section also includes arrays, providing array theory as well as exploring waveguide-fed slot arrays, periodic arrays, and aperiodic arrays.

This book provides current R&D trends and novel approaches in design and analysis of broadband, multiband, and smart antennas for 5G and B5G mobile and wireless applications, as well as the identification of integration techniques of these antennas in a diverse range of devices. The book

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presents theoretical and experimental approaches to help the reader in understanding the unique design issues and more advanced research. Moreover, the book includes chapters on the fundamentals of antenna theory. The book is pertinent to professionals and researchers working in the field of antenna engineering; it is written for graduate students, researchers, academics, and industry practitioners who want to improve their understanding in the current research trends in design analysis of broadband, multiband, and smart antennas for wireless applications.

Handbook of Neural Computation explores neural computation applications, ranging from conventional fields of mechanical and civil engineering, to electronics, electrical engineering and computer science. This book covers the numerous applications of artificial and deep neural networks and their uses in learning machines, including image and speech recognition, natural language processing and risk analysis. Edited by renowned authorities in this field, this work is comprised of articles from reputable industry and academic scholars and experts from around the world. Each contributor presents a specific research issue with its recent and future trends. As the demand rises in the engineering and medical industries for neural networks and other machine learning methods to solve different types of operations, such as data prediction, classification of images, analysis of big data, and intelligent decision-making, this book provides readers with the latest, cutting-edge research in one comprehensive text. Features high-quality research articles on multivariate adaptive regression splines, the minimax probability machine, and more Discusses machine learning techniques, including classification, clustering, regression, web mining, information retrieval and natural language processing Covers supervised, unsupervised, reinforced, ensemble, and nature-inspired learning methods

Handbook of Antenna Technologies Springer

Modern Antenna Handbook

Wideband, Multiband, and Smart Antenna Systems

Wearable Antennas and Body Centric Communication

Antenna Theory and Applications

Volume III Applications

**Techniques based on the method of modal expansions, the Rayleigh-Stevenson expansion in inverse powers of the wavelength, and also the method of moments solution of integral equations are essentially restricted to the analysis of electromagnetic radiating structures which are small in terms of the wavelength. It therefore becomes necessary to employ approximations based on "high-frequency techniques" for performing an efficient analysis of electromagnetic radiating systems that are large in terms of the wavelength. One of the most versatile and useful high-frequency techniques is the geometrical theory of diffraction (GTD), which was developed around 1951 by J. B. Keller [1,2,3]. A class of diffracted rays are introduced systematically in the GTD via a generalization of the concepts of classical geometrical optics (GO). According to the GTD these diffracted rays exist in addition to the usual incident, reflected, and transmitted rays of GO. The diffracted rays in the GTD originate from certain "localized" regions on the surface of a radiating structure, such as at discontinuities in the geometrical and electrical properties of a surface, and at points of grazing**

incidence on a smooth convex surface as illustrated in Fig. 1. In particular, the diffracted rays can enter into the GO shadow as well as the lit regions. Consequently, the diffracted rays entirely account for the fields in the shadow region where the GO rays cannot exist.

The desired objective of this book is to investigate diversity and mutual coupling effects on MIMO antenna designs for WLAN/WiMAX/LTE applications, controlled with diversity and ground modification techniques including equivalent circuit diagrams. Diversity techniques in MIMO antennas leading to the performance improvement ratings are demonstrated and deliberated. The book contributes towards the development of 2:1 VSWR MIMO antennas with diversity techniques for indoor/outdoor applications for high data rate, QoS, and SNR. The improved MIMO antenna structures are investigated and presented in this book including part of massive MIMO to provide the important aspects of emerging technology. Aimed at researchers, professionals and graduate students in electrical engineering, electromagnetics, communications and signal processing including antenna theory and design, smart antennas, communication systems, this book: Investigates real time MIMO antenna designs for WLAN/WiMAX/LTE applications. Covers effects of ECC, MEG, TARC, and equivalent circuit. Addresses the coupling and diversity aspects of

antenna design problem for MIMO systems. Focus on the MIMO antenna designs for the real time applications. Exclusive chapter on 5G Massive MIMO along with case studies throughout the book. This handbook covers a wealth of topics from number theory, special attention being given to estimates and inequalities. As a rule, the most important results are presented, together with their refinements, extensions or generalisations. These may be applied to other aspects of number theory, or to a wide range of mathematical disciplines. Cross-references provide new insight into fundamental research. Audience: This is an indispensable reference work for specialists in number theory and other mathematicians who need access to some of these results in their own fields of research. Technology has advanced to such a degree over the last decade that it has been almost impossible to find up-to-date coverage of antennas. Antenna Handbook, edited by two of the world's most distinguished antenna speciallists, presents the most advanced antenna theory and designs and demonstrates their application in a wide variety of technical fields. They offer a staggering amount of in-depth data and analysis on a wide range of topics, supported by formulas, curves, and results, as well as derivations. Antenna Arrays and Automotive Applications Present and Future

**The Antenna Handbook**  
**Handbook of Modern Sensors**  
**Modern Antennas**

*This book describes a new concept for analyzing RF/microwave circuits, which includes RF/microwave antennas. The book is unique in its emphasis on practical and innovative microwave RF engineering applications. The analysis is based on nonlinear dynamics and chaos models and shows comprehensive benefits and results. All conceptual RF microwave circuits and antennas are innovative and can be broadly implemented in engineering applications. Given the dynamics of RF microwave circuits and antennas, they are suitable for use in a broad range of applications. The book presents analytical methods for microwave RF antennas and circuit analysis, concrete examples, and geometric examples. The analysis is developed systematically, starting with basic differential equations and their bifurcations, and subsequently moving on to fixed point analysis, limit cycles and their bifurcations. Engineering applications include microwave RF circuits and antennas in a variety of topological structures, RFID ICs and antennas, microstrips, circulators, cylindrical RF network antennas, Tunnel Diodes (TDs), bipolar transistors, field effect transistors (FETs), IMPATT amplifiers, Small Signal (SS) amplifiers, Bias-T circuits, PIN diode circuits, power amplifiers, oscillators, resonators, filters, N-turn antennas, dual spiral coil*

*antennas, helix antennas, linear dipole and slot arrays, and hybrid translinear circuits. In each chapter, the concept is developed from the basic assumptions up to the final engineering outcomes. The scientific background is explained at basic and advanced levels and closely integrated with mathematical theory. The book also includes a wealth of examples, making it ideal for intermediate graduate level studies. It is aimed at electrical and electronic engineers, RF and microwave engineers, students and researchers in physics, and will also greatly benefit all engineers who have had no formal instruction in nonlinear dynamics, but who now desire to bridge the gap between innovative microwave RF circuits and antennas and advanced mathematical analysis methods.*

*The Handbook of Antenna Technologies aims to present the rapid development of antenna technologies, particularly in the past two decades, and also showcasing the newly developed technologies and the latest applications. The handbook will provide readers with the comprehensive updated reference information covering theory, modeling and optimization methods, design and measurement, new electromagnetic materials, and applications of antennas. The handbook will widely cover not only all key antenna design issues but also fundamentals, issues related to antennas (transmission, propagation, feeding structure, materials, fabrication, measurement, system, and unique design challenges in specific applications). This handbook will*

*benefit the readers as a full and quick technical reference with a high-level historic review of technology, detailed technical descriptions and the latest practical applications.*

*This book discusses the innovative design, cable-net design and analysis, control, deployment, development and applications of large space-deployable antennas. Drawing on the authors' own work in this field, it describes and analyzes various typical deployable antennas, membrane antennas and super-large space-assembled antennas, while chiefly focusing on mesh antennas due to their wide range of applications. It also investigates forming–finding design and the analysis of cable-truss structures for high-precision reflector antennas, as well as deployment process control and deployment reliability based on flexible multibody dynamic analysis. The book covers not only mechanical structure performance, but also electromagnetic performance realization and stability. Lastly, it proposes an electrical equivalent method for mesh reflector antennas and a coupling model for the structural displacement field and electrostatic field. Given the nature of its content, the book is intended for researchers, graduate students and engineers in the field of space antennas.*

*This completely revised third edition of an Artech House classic, Phased Array Antenna Handbook, Second Edition, offers an up-to-date and comprehensive treatment*

*of array antennas and systems. This edition provides a wealth of new material, including expanded coverage of phased array and multiple beam antennas. New modern machine learning techniques used for analysis are included. Additional material on wideband antennas and wideband coverage in array antennas are incorporated in this book, including new methods, devices, and technologies that have developed since the second edition. A detailed treatment of antenna system noise, sections on antenna pattern synthesis, developments in subarray technology, and in-depth coverage of array architecture and components are additional new features of this book. The book explores design elements that demonstrate how to size an array system with speed and confidence. Moreover, this resource provides expanded coverage of systems aspects of arrays for radar and communications. Supported with numerous equations and illustrations, this practical book helps evaluate basic antenna parameters such as gain, sidelobe levels, and noise. Readers learn how to compute antenna system noise, design subarray geometries for given bandwidth, scan and sidelobe constraints, and choose array illumination tapers for given sidelobe levels.*

*Antenna and Sensor Technologies in Modern Medical Applications*

*Antenna theory*

*Antenna Handbook*

### ***High Energy Cosmic Rays***

*The most up-to-date, comprehensive treatment of classical and modern antennas and their related technologies Modern Antenna Handbook represents the most current and complete thinking in the field of antennas. The handbook is edited by one of the most recognizable, prominent, and prolific authors, educators, and researchers on antennas and electromagnetics. Each chapter is authored by one or more leading international experts and includes cover-age of current and future antenna-related technology. The information is of a practical nature and is intended to be useful for researchers as well as practicing engineers. From the fundamental parameters of antennas to antennas for mobile wireless communications and medical applications, Modern Antenna Handbook covers everything professional engineers, consultants, researchers, and students need to know about the recent developments and the future direction of this fast-paced field. In addition to antenna topics, the handbook also covers modern technologies such as metamaterials, microelectromechanical systems (MEMS), frequency selective surfaces (FSS), and radar cross sections (RCS) and*

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*their applications to antennas, while five chapters are devoted to advanced numerical/computational methods targeted primarily for the analysis and design of antennas.*

*A guide to the theory and recent development in the medical use of antenna technology Antenna and Sensor Technologies in Modern Medical Applications offers a comprehensive review of the theoretical background, design, and the latest developments in the application of antenna technology. Written by two experts in the field, the book presents the most recent research in the burgeoning field of wireless medical telemetry and sensing that covers both wearable and implantable antenna and sensor technologies. The authors review the integrated devices that include various types of sensors wired within a wearable garment that can be paired with external devices. The text covers important developments in sensor-integrated clothing that are synonymous with athletic apparel with built-in electronics. Information on implantable devices is also covered. The book explores technologies that utilize both inductive coupling and far field propagation. These include minimally invasive microwave ablation antennas, wireless targeted drug delivery,*

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*and much more. This important book: Covers recent developments in wireless medical telemetry Reviews the theory and design of in vitro/in vivo testing Explores emerging technologies in 2D and 3D printing of antenna/sensor fabrication Includes a chapter with an annotated list of the most comprehensive and important references in the field Written for students of engineering and antenna and sensor engineers, Antenna and Sensor Technologies in Modern Medical Applications is an essential guide to understanding human body interaction with antennas and sensors. This book covers resonating modes inside device and gives insights into antenna design, impedance and radiation patterns. It discusses how higher-order modes generation and control impact bandwidth and antenna gain. The text covers new approaches in antenna design by investigation hybrid modes,  $H_z$  and  $E_z$  fields available simultaneously, and analysis and modelling on modes with practical applications in antenna design. The book will be prove useful to students, researchers and professionals alike.*

*This Handbook presents a complete and rigorous overview of the fundamentals, methods and applications of the multidisciplinary*

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*field of Global Navigation Satellite Systems (GNSS), providing an exhaustive, one-stop reference work and a state-of-the-art description of GNSS as a key technology for science and society at large. All global and regional satellite navigation systems, both those currently in operation and those under development (GPS, GLONASS, Galileo, BeiDou, QZSS, IRNSS/NAVIC, SBAS), are examined in detail. The functional principles of receivers and antennas, as well as the advanced algorithms and models for GNSS parameter estimation, are rigorously discussed. The book covers the broad and diverse range of land, marine, air and space applications, from everyday GNSS to high-precision scientific applications and provides detailed descriptions of the most widely used GNSS format standards, covering receiver formats as well as IGS product and meta-data formats. The full coverage of the field of GNSS is presented in seven parts, from its fundamentals, through the treatment of global and regional navigation satellite systems, of receivers and antennas, and of algorithms and models, up to the broad and diverse range of applications in the areas of positioning and navigation, surveying, geodesy and geodynamics, and remote sensing and*

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*timing. Each chapter is written by international experts and amply illustrated with figures and photographs, making the book an invaluable resource for scientists, engineers, students and institutions alike.*

*Physics, Designs, and Applications*

*Emerging Materials and Advanced Designs for Wearable Antennas*

*Antenna Theory*

*Modelling, Planning and Control*

*Nonlinearity Applications in Engineering*

This resource covers all areas of interest for the practicing engineer as well as for the student at various levels and educational institutions. It features the work of authors from all over the world who have contributed their expertise and support the globally working engineer in finding a solution for today's mechanical engineering problems. Each subject is discussed in detail and supported by numerous figures and tables.

Based on the successful *Modelling and Control of Robot Manipulators* by Sciavicco and Siciliano (Springer, 2000),

Robotics provides the basic know-how on the foundations of robotics: modelling, planning and control. It has been expanded to include coverage of mobile robots, visual control and motion planning. A variety of problems is raised throughout, and the proper tools to find engineering-oriented solutions are introduced and explained. The text includes coverage of fundamental topics like kinematics, and trajectory planning and related technological aspects including actuators and sensors. To impart practical skill, examples and case studies are carefully worked out and interwoven through the text, with frequent resort to simulation. In addition, end-of-chapter exercises are proposed, and the book is accompanied by an electronic solutions manual containing the MATLAB® code for computer problems; this is available free of charge to those adopting this volume as a textbook for courses.

Lattice Point Identities and Shannon-Type Sampling demonstrates that significant roots of many recent facets of Shannon's sampling theorem for multivariate signals rest on

basic number-theoretic results. This book leads the reader through a research excursion, beginning from the Gaussian circle problem of the early nineteenth century, via the classical Hardy-Landau lattice point identity and the Hardy conjecture of the first half of the twentieth century, and the Shannon sampling theorem (its variants, generalizations and the fascinating stories about the cardinal series) of the second half of the twentieth century. The authors demonstrate how all these facets have resulted in new multivariate extensions of lattice point identities and Shannon-type sampling procedures of high practical applicability, thereby also providing a general reproducing kernel Hilbert space structure of an associated Paley-Wiener theory over (potato-like) bounded regions (cf. the cover illustration of the geoid), as well as the whole Euclidean space. All in all, the context of this book represents the fruits of cross-fertilization of various subjects, namely elliptic partial differential equations, Fourier inversion theory, constructive approximation involving Euler and

Poisson summation formulas, inverse problems reflecting the multivariate antenna problem, and aspects of analytic and geometric number theory. Features: New convergence criteria for alternating series in multi-dimensional analysis Self-contained development of lattice point identities of analytic number theory Innovative lattice point approach to Shannon sampling theory Useful for students of multivariate constructive approximation, and indeed anyone interested in the applicability of signal processing to inverse problems.

This book presents state-of-the-art technologies, trends and applications with a focus on the healthcare domain for ultra-wideband (3.1–10.6 GHz) and 60 GHz (57–66 GHz) wireless communication systems. Due to various key features such as miniaturized antenna design, low power, high data rate, less effects on the human body, relatively less crowded spectrum, these technologies are becoming popular in various fields of biomedical applications and day-to-day life. The book highlights various aspects of these technologies related to body-centric communication, including antenna design

requirements, channel modeling and characterization for WBANs, current fabrication and antenna design strategies for textile, flexible and implanted antennas. Apart from the general requirements and study related to these frequency bands, various application specific topics such as localization and tracking, physical activity recognition and assessment, vital sign monitoring and medical imaging are covered in detail. The book concludes with the glimpses of future aspects of the UWB and 60 GHz technology which includes IoT for healthcare and smart living, novel antenna materials and application of machine learning algorithms for overall performance enhancement.

Phased Array Antenna Handbook, Third Edition

Python for Probability, Statistics, and Machine Learning

Smart Antennas: Recent Trends in Design and Applications

Handbook of Neural Computation

Handbook of Antenna Technologies

This book addresses a broad range of topics on antennas for space applications. First, it introduces the fundamental methodologies of space antenna design, modelling and

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analysis as well as the state-of-the-art and anticipated future technological developments. Each of the topics discussed are specialized and contextualized to the space sector. Furthermore, case studies are also provided to demonstrate the design and implementation of antennas in actual applications. Second, the authors present a detailed review of antenna designs for some popular applications such as satellite communications, space-borne synthetic aperture radar (SAR), Global Navigation Satellite Systems (GNSS) receivers, science instruments, radio astronomy, small satellites, and deep-space applications. Finally it presents the reader with a comprehensive path from space antenna development basics to specific individual applications. Key Features: Presents a detailed review of antenna designs for applications such as satellite communications, space-borne SAR, GNSS receivers, science instruments, small satellites, radio astronomy, deep-space applications Addresses the space antenna development from different angles, including electromagnetic, thermal and mechanical design strategies required for space qualification Includes numerous case studies to demonstrate how to design and implement antennas in practical scenarios Offers both an introduction for students in the field and an in-depth reference for antenna engineers who develop space antennas This book serves as an excellent reference for researchers, professionals and graduate students in the fields of antennas and propagation, electromagnetics, RF/microwave/millimetrewave systems, satellite communications, radars, satellite

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remote sensing, satellite navigation and spacecraft system engineering, It also aids engineers technical managers and professionals working on antenna and RF designs. Marketing and business people in satellites, wireless, and electronics area who want to acquire a basic understanding of the technology will also find this book of interest. Printed antennas have become an integral part of next-generation wireless communications and have been found to be commonly used to improve system capacity, data rate, reliability, etc. This book covers theory, design techniques, and the chronological regression of the printed antennas for various applications. This book will provide readers with the basic conceptual knowledge about antennas along with advanced techniques for antenna design. It covers a variety of analytical techniques and their CAD applications and discusses new applications of printed antenna technology such as sensing. The authors also present special reconfigurable antennas such as ME dipole, polarization, feeding, and DGS. The book will be useful to students as an introduction to design and applications of antennas. Additionally, experienced researchers in this field will find this book a ready reference and benefit from the techniques of research in printed antennas included in this book. Following are some of the salient features of this book: Covers a variety of analytical techniques and their CAD applications Discusses new applications of printed antenna technology such as sensing Examines the state of design techniques of printed antenna Presents special reconfigurable antennas such as ME dipole, polarization, feeding, and DGS

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A comprehensive guide to antenna design, manufacturing processes, antenna integration, and packaging *Antenna-in-Package Technology and Applications* contains an introduction to the history of AiP technology. It explores antennas and packages, thermal analysis and design, as well as measurement setups and methods for AiP technology. The authors—well-known experts on the topic—explain why microstrip patch antennas are the most popular and describe the myriad constraints of packaging, such as electrical performance, thermo-mechanical reliability, compactness, manufacturability, and cost. The book includes information on how the choice of interconnects is governed by JEDEC for automatic assembly and describes low-temperature co-fired ceramic, high-density interconnects, fan-out wafer level packaging-based AiP, and 3D-printing-based AiP. The book includes a detailed discussion of the surface laminar circuit-based AiP designs for large-scale mm-wave phased arrays for 94-GHz imagers and 28-GHz 5G New Radios. Additionally, the book includes information on 3D AiP for sensor nodes, near-field wireless power transfer, and IoT applications. This important book:

- Includes a brief history of antenna-in-package technology
- Describes package structures widely used in AiP, such as ball grid array (BGA) and quad flat no-leads (QFN)
- Explores the concepts, materials and processes, designs, and verifications with special consideration for excellent electrical, mechanical, and thermal performance

Written for students in electrical engineering, professors, researchers, and RF engineers, *Antenna-in-Package Technology and*

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Applications offers a guide to material selection for antennas and packages, antenna design with manufacturing processes and packaging constraints, antenna integration, and packaging.

This useful tool provides the reader with a current overview of where microstrip patch antenna technology is at, and useful information on how to design this form of radiator for their given application and scenario. Practical design cases are provided for each goal.

Handbook of Metamaterial-Derived Frequency Selective Surfaces

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Smart Antennas

Wearable continuous monitoring systems are necessary in risky environments such as mining and diving and are especially important in the medical monitoring of patients both in medical facilities and at home. All these applications of monitoring with data transmission functions can be achieved by using wearable antennas. Recently, possibilities of connecting completely independent appliances with textiles have emerged. However, full success will be achieved only when antennas and all related components are entirely converted into 100%

textile materials. Design and Optimization of Sensors and Antennas for Wearable Devices: Emerging Research and Opportunities provides innovative insights on the development of adaptable materials and textile antennas that can be used in the construction of wearable devices that are biocompatible and offer high conductivity, low cost, simplistic manufacturing, are comfortable for the wearer, and are water/climate safe and condition amicable. The content within this publication examines data transmission, wearable computing, and medical applications. It is designed for engineers, manufacturers, researchers, academicians, and scientists who are interested in the development of wearable technologies.

Emerging Research and Opportunities

Antenna-in-Package Technology and Applications

Design Theory, Methods and Applications