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*Publishers*

*Practical, concise and complete reference for the basics of modern antenna design Antennas: from Theory to Practice discusses the basics of modern antenna design and theory. Developed*

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*specifically for engineers and designers who work with radio communications, radar and RF engineering, this book offers practical and hands-on treatment of antenna theory and techniques, and provides its*

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*readers the skills to analyse, design and measure various antennas. Key features: Provides thorough coverage on the basics of transmission lines, radio waves and propagation, and antenna analysis and design*

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*Discusses industrial  
standard design software  
tools, and antenna  
measurement equipment,  
facilities and techniques  
Covers electrically small  
antennas, mobile antennas,  
UWB antennas and new*

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*materials for antennas Also discusses reconfigurable antennas, RFID antennas, Wide-band and multi-band antennas, radar antennas, and MIMO antennas Design examples of various antennas are provided Written in a*

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*practical and concise manner  
by authors who are experts  
in antenna design, with  
experience from both  
academia and industry This  
book will be an invaluable  
resource for engineers and  
designers working in RF*

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*engineering, radar and radio communications, seeking a comprehensive and practical introduction to the basics of antenna design. The book can also be used as a textbook for advanced students entering a*



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*profession in this field.  
This book comprehensively  
reviews ultra-wideband (UWB)  
and UWB multi-input multi-  
output (MIMO) antennas with  
band-notched  
characteristics, with a  
focus on interference*

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*cancellation functionality. The book is organized into seven chapters that cover single band, dual band, and multi band-notched UWB antennas, followed by band-notched characteristics in UWB (MIMO) antennas.*

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*Further, it explains the mechanism of reconfigurability and tunability in band-notched UWB antennas, including advanced applications of UWB systems. Overall, it covers different techniques of*

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*canceling the  
electromagnetic interference  
in UWB in a concise volume.  
Features Provides a  
comprehensive presentation  
of avoiding interference in  
UWB systems Reviews state of  
the art literature related*

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*to UWB antennas, filtennas,  
and various reconfigurable  
technologies Explains  
different techniques for  
producing band-notch  
characteristics in UWB  
systems Includes discussion  
on historical perspectives*

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*of UWB technology  
Consolidates different  
research activities carried  
out on the electromagnetic  
interference cancellation  
techniques in the UWB  
communication systems Band-  
Notch Characteristics in*

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*Ultra-Wideband Antennas is aimed at researchers and graduate students in electrical and antenna engineering. Taimoor Khan has been an Assistant Professor at the Department of Electronics and*

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*Communication Engineering,  
National Institute of  
Technology Silchar since  
2014. In addition to this,  
Dr. Khan has also worked as  
a Visiting Assistant  
Professor at Asian Institute  
of Technology Bangkok,*



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*Thailand during  
September–December, 2016.  
His active research  
interests include Printed  
Microwave Circuits,  
Electromagnetic Bandgap  
Structures, Ultra-wideband  
Antennas, Dielectric*

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*Resonator Antennas, Ambient Microwave Energy Harvesting, and Artificial Intelligence Paradigms in Electromagnetics. Dr. Khan has successfully guided three Ph.D. theses, and is supervising six Ph.D.*

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*students. He has published over 75 research articles in well-indexed journals and in world-renowned conference proceedings. Currently, he is executing three funded research projects, including two international*

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*collaborative SPARC and VAJRA research projects. In September 2020, Dr. Khan has been awarded a prestigious national IETE-Prof SVC Aiya Memorial Award for the year 2020. Yahia M. M. Antar has been a Professor at the*

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*Department of Electrical and Computer Engineering, Royal Military College of Canada since 1990. He served as the Chair of CNC, URSI from 1999 to 2008, Commission B from 1993 to 1999, and has a cross appointment at Queen's*

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*University in Kingston. He has authored and co-authored over 250 journal papers, several books and chapters in books, over 500 refereed conference papers, holds several patents, has chaired several national and*

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*international conferences, and has given plenary talks at many conferences. Dr. Antar is a fellow of the Engineering Institute of Canada, the Electromagnetic Academy, and an International Union of Radio*

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*Science (URSI). He was elected by the URSI to the Board as the Vice President in 2008 and in 2014, and to the IEEE AP AdCom in 2009. In 2011, he was appointed as a member of the Canadian Defence Advisory Board (DAB)*



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*of the Canadian Department of National Defence. He serves as an Associate Editor for many IEEE and IET Journals, and as an IEEE-APS Distinguished Lecturer. Presently, he is working as President-Elect for IEEE*

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*Antenna and Propagation  
Society for the year 2020.  
This book highlights  
technology trends and  
challenges that trace the  
evolution of antenna design,  
starting from 3rd generation  
phones and moving towards*

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*the latest release of LTE-A. The authors explore how the simple monopole and whip antenna from the GSM years have evolved towards what we have today, an antenna design that is compact, multi-band in nature and*

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*caters to multiple elements on the same patch to provide high throughput connectivity. The scope of the book targets a broad range of subjects, including the microstrip antenna, PIFA antenna, and the monopole*

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*antenna to be used for different applications over three different mobile generations. Beyond that, the authors take a step into the future and look at antenna requirements for 5G communications, which*

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*already has the 5G drive in place with prominent scenarios and use-cases emerging. They examine these, and put in place the challenges that lie ahead for antenna design, particularly in mm-Wave*

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*design. The book provides a reference for practicing engineers and under/post graduate students working in this field.*

*Band-Notch Characteristics in Ultra-Wideband Antennas  
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*Wireless Communications  
Theory and Design  
From Theory to Practice  
Compact Antennas for High  
Data Rate Communication  
Millimeter Wave Antennas for  
5G Mobile Terminals and Base  
Stations*



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*This book focuses on the understanding of the Cylindrical Dielectric Resonator Antennas (CDRA). The book introduces the fundamentals of DRA, CDRA, identifying the modes in a CDRA, excitation techniques and recent*

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*advancements pertaining to the research of the CDRAs. The latest trends in the field are discussed, including wide bandwidth of operation, high gain, modal stability, mode and impedance matching techniques, Circularly Polarized*

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*CDRAs, beam forming and MIMO applications for modern wireless systems. The experimental validation, testing, fabrication methods and machining to achieve cylindrical and its reformed shapes are also presented.*

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*This book discusses the revolution of cycles and rhythms that is expected to take place in different branches of science and engineering in the 21st century, with a focus on communication and information processing. It presents*

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*high-quality papers in vibration sciences, rhythms and oscillations, neurosciences, mathematical sciences, and communication. It includes major topics in engineering and structural mechanics, computer sciences, biophysics and*

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*biomathematics, as well as other related fields. Offering valuable insights, it also inspires researchers to work in these fields. The papers included in this book were presented at the 1st International Conference on Engineering*

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*Vibration, Communication and  
Information Processing  
(ICoEVCI-2018), India.*

*The book is a collection of high-  
quality, peer-reviewed innovative  
research papers from the  
International Conference on*

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*Signals, Machines and Automation (SIGMA 2018) held at Netaji Subhas Institute of Technology (NSIT), Delhi, India. The conference offered researchers from academic and industry the opportunity to present their original work and*



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*exchange ideas, information, techniques and applications in the field of computational intelligence, artificial intelligence and machine intelligence. The book is divided into two volumes discussing a wide variety of industrial, engineering and*

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*scientific applications of the  
emerging techniques.*

*IMDC-SDSP conference offers an  
exceptional platform and  
opportunity for practitioners,  
industry experts, technocrats,  
academics, information scientists,*

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*innovators, postgraduate students, and research scholars to share their experiences for the advancement of knowledge and obtain critical feedback on their work. The timing of this conference coincides with the rise of Big Data, Artificial*

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*Intelligence powered applications,  
Cognitive Communications, Green  
Energy, Adaptive Control and  
Mobile Robotics towards  
maintaining the Sustainable  
Development and Smart Planning  
and management of the future*

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*technologies. It is aimed at the knowledge generated from the integration of the different data sources related to a number of active real-time applications in supporting the smart planning and enhance and sustain a healthy*

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*environment. The conference also covers the rise of the digital health, well-being, home care, and patient-centred era for the benefit of patients and healthcare providers; in addition to how supporting the development of a platform of smart*

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*Dynamic Health Systems and self-management.*

*Frequency Reconfigurable Mobile Handsets MIMO Antennas*

*Multifunctional Ultrawideband Antennas*

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*Engineering Vibration,  
Communication and Information  
Processing  
Advances in Electrical and  
Computer Technologies  
Antennas*

The book provides a



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comprehensive overview of antennas for 5G technology, such as MIMO, multiband antennas, Magneto-Electric Dipole Antenna and PIFA Antenna for 5G networks, phased array antennas for 5G access, beam-forming and beam-steering issues, 5G antennas for

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specific applications (smartphone, cognitive radio) and advance antenna concept and materials for 5G. The book also covers optimizations methods for passive and active devices in mm-Wave 5G networks. It explores topics which influence the design and

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characterization of antennas such as data rates, high isolation, pattern and spatial diversity, making 5G antennas more suitable for a multipath environment. The book represents a learning tool for researchers in the field, and enables engineers, designers and

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manufacturers to identify key design challenges of antennas for 5G networks, and characterize novel antennas for 5G networks. Mobile wireless communication systems have affected every aspect of life. By providing seamless connectivity, these systems enable

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almost all the smart devices in the world to communicate with high speed throughput and extremely low latency. The next generation of cellular mobile communications, 5G, aims to support the tremendous growth of interconnected things/devices (i.e., internet of

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things [IoT]) using the current technologies and extending them to be used in higher frequencies to cope with the huge number of different devices. In addition, 5G will provide massive capacity, high throughput, lower end-to-end delay, green communication, cost

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reduction, and extended coverage area. Fundamental and Supportive Technologies for 5G Mobile Networks provides detailed research on technologies used in 5G, their benefits, practical designs, and recent challenges and focuses on future applications that could

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exploit 5G network benefits. The content within this publication examines cellular communication, data transmission, and high-speed communication. It is designed for network analysts, IT specialists, industry professionals, software engineers, researchers,



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academicians, students, and scientists.

This book discusses the development of promising technologies for compact antennas for high data-rate communications. It discusses and analyzes the design of compact ultra-wideband

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(UWB) and multiple input, multiple output (MIMO) antennas, providing essential know-how for designers, practicing engineers and scientists. These wireless communication technologies enable consumers to have convenient access to a wide range of services – anytime,

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anywhere. And the introduction of wireless mobile access points eliminates the limitations to communication imposed by geographical location. The Internet has allowed people to access and share information much more rapidly, but in order to achieve

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higher data rates with the limited available resources and imposed constraints, wireless communication technology needs to be pushed beyond the physical limits of the propagation channel. This book contributes to achieving this goal.

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Wireless communications has made a huge leap during the past two decades. The multiple-input-multiple-output (MIMO) technology was proposed in the 1990's as a viable solution that can overcome the data rate limit experienced by single-input-single-output (SISO)

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systems. This resource is focused on printed MIMO antenna system design. Printed antennas are widely used in mobile and handheld terminals due to their conformity with the device, low cost, good integration within the device elements and mechanical parts, as

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well as ease of fabrication. A perfect design companion for practicing engineers, this book provides full design examples from literature, along with detailed illustrations for the various antenna geometries. This resource overviews the various applications

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that currently depend on printed MIMO antennas, and provides design guidelines and remarks throughout the book for guidance.

Printed Antennas

Wideband, Multiband, and Smart

Reconfigurable Antennas for

Modern Wireless Communications



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SIGMA 2018, Volume 1

ICoEVCI 2018, India

Advances in Communication and  
Computational Technology

Proceedings of the 1st International  
Multi-Disciplinary Conference

Theme: Sustainable Development  
and Smart Planning, IMDC-SDSP

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2020, Cyperspace, 28-30 June 202

This book comprises select proceedings of the International Conference on Advances in Electrical and Computer Technologies 2020 (ICAECT 2020). The papers presented in

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this book are peer-reviewed and cover latest research in electrical, electronics, communication and computer engineering. Topics covered include smart grids, soft computing techniques in power

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systems, smart energy  
management systems, power  
electronics, feedback control  
systems, biomedical  
engineering, geo informative  
systems, grid computing, data  
mining, image and signal

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processing, video processing,  
computer vision, pattern  
recognition, cloud computing,  
pervasive computing, intelligent  
systems, artificial intelligence,  
neural network and fuzzy logic,  
broad band communication,

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mobile and optical communication, network security, VLSI, embedded systems, optical networks and wireless communication. The volume can be useful for students and researchers

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working in the different overlapping areas of electrical, electronics and communication engineering.

This book presents a comprehensive approach to antenna designs for various

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applications, including 5G communication, the internet of things (IoT), and wearable devices. It discusses models, designs, and developments of MIMO antennas, antenna performance measurement, 5G



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communication challenges and opportunities, and MIMO antennas for LTE/ISM applications. It covers important topics including mmWave antennas, antenna arrays for MIMO applications,

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reconfigurable/band-notched  
MIMO antennas, multiband  
MIMO antennas, wideband  
MIMO antennas, and fractal-  
based compact multiband hybrid  
antennas. FEATURES

Discusses antenna design

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optimization techniques in detail  
Covers MIMO antenna  
performance measurement,  
multiband MIMO antennas, and  
wideband MIMO antennas  
Discusses modeling, simulation,  
and specific absorption rate

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(SAR) analysis of antennas  
Provides applications including  
radio-frequency identification  
(RFID), wearable antennas, and  
antennas for IoT Multifunctional  
MIMO Antennas: Fundamentals  
and Application is useful for

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undergraduate and graduate students and academic researchers in areas including electrical engineering, electronics, and communication engineering.

This comprehensive resource

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presents antenna fundamentals balanced with the design of printed antennas. Over 70 antenna projects, along with design dimensions, design flows and antenna performance results are discussed, including

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antennas for wireless communication, 5G antennas and beamforming. Examples of smartphone antennas, MIMO antennas, aerospace and satellite remote sensing array antennas, automotive antennas

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and radar systems and many more printed antennas for various applications are also included. These projects include design dimensions and parameters that incorporate the various techniques used by



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industries and academia. This book is intended to serve as a practical microstrip and printed antenna design guide to cover various real-world applications. All Antenna projects discussed in this book are designed, analyzed

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and simulated using full-wave electromagnetic solvers. Based on several years of the author's research in antenna design and development for RF and microwave applications, this book offers an in-depth coverage

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of practical printed antenna design methodology for modern applications.

The gold-standard reference on the design and application of classic and modern antennas—fully updated to

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technologies, including 5G, terahertz, and wearable electronics. Antenna Engineering Handbook, Fifth Edition, is bolstered by real-world examples, hundreds of illustrations, and an emphasis on

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the practical aspects of antennas. Featuring 60 chapters and contributions from more than 80 renowned experts, this acclaimed resource is edited by one of the world's leading antenna authorities. This edition

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features all of the classic antenna types, plus new and emerging designs, with 13 all-new chapters and important updates to nearly all chapters from past editions. Antenna Engineering Handbook, Fifth



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Edition, clearly explains cutting-edge applications in WLANs, automotive systems, PDAs, and handheld devices, making it an indispensable companion for today's antenna practitioners and developers. Coverage includes:

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- Wideband and multiband antennas
- Antennas for mobile devices and PDAs, automotive applications, and aircraft
- Base

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wearable, thin film, origami,  
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antennas • MIMO antennas and

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and Security

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Radio

Proceeding of Fifth International  
Conference on Microelectronics,  
Computing and Communication  
Systems

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State of the Art

*A perfect design companion for practicing engineers, this detailed book overviews the various applications that currently depend on printed MIMO antennas, and provides*



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*design guidelines and remarks throughout the book for guidance. --*

*This one-of-a-kind new resource presents cognitive radio from an antenna design perspective and introduces the concept of*

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*cognitive radio as a protocol that benefits from under-utilized regions of the spectrum. This book covers topics that govern the operation of a cognitive radio and discusses the use of reconfigurable antennas,*

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*reconfigurable filterennas, and MIMO antennas for cognitive radio. The analysis and design of different antenna systems are presented, compared and evaluated. New approaches to improve spectrum efficiency are*

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*explored by demonstrating how to design software controlled cognitive radio antenna systems. This new resource shows how to communicate using either interweave or underlay cognitive radio and demonstrates the*

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*benefits of designing appropriate sensing and communicating antennas. The first part of the book introduces the basic concept of cognitive radio and discusses the difference between cognitive radio and*

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*software defined radio from the RF system 's perspective. The second part of the book discusses the main antenna design requirements, procedures and challenges for cognitive radio. The third part of the book*

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*introduces new trends in cognitive radio implementation such as the implementation of MIMO antennas on cognitive radio, the use of machine learning techniques to optimize the performance of a cognitive*

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*radio environment, and the implementation of cognitive radar and cognitive radio in space.*

*This book provides current R&D trends and novel approaches in design and analysis of broadband, multiband, and smart*



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*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 presents theoretical and experimental approaches to help*

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*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*

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*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*

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*design analysis of broadband, multiband, and smart antennas for wireless applications.*

*Printed antennas, also known as microstrip antennas, have a variety of beneficial properties including mechanical durability,*

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*conformability, compactness and cheap manufacturing costs. As such, they have a range of applications in both the military and commercial sectors, and are often mounted on the exterior of aircraft and spacecraft as well as*

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*incorporated into mobile radio communication devices. Printed Antennas for Wireless Communications offers a practical guide to state-of-the-art printed antenna technology used for wireless systems.*

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*Contributions from renowned global experts within both academia and industry enable the reader to design printed antennas and associated technologies, and offer valuable insights into important*

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*breakthroughs in these areas.  
Divided into 3 sections covering  
fundamental wideband printed  
radiating elements for wireless  
systems, small printed antennas  
for wireless systems, and  
advanced concepts and*



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*applications in wireless systems.  
Provides experimental data and  
applies theoretical models to  
present design performance  
trends and to give the reader an  
in-depth coverage of the area.  
Presents summaries of different*

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*approaches used in solving wireless systems such as WPAN (wireless personal area network) and MIMO (multi-input/ multi-output), offering the reader an overall perspective of the pros and cons of each. Focuses on*

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*practical design, examples and 'real world' solutions. Printed Antennas for Wireless Communications offers an excellent insight on printed antennas from the theoretical to the practical; hence it will appeal*

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*to practicing design engineers  
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organisations, as well as  
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Design and Applications of  
Active Integrated Antennas*

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*Proceedings of NISS 2021*  
**Written by a leading expert  
in the field, this practical  
new resource presents the  
fundamentals of  
electromagnetics and**

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***antenna technology. This book covers the design, electromagnetic simulation, fabrication, and measurements for various types of antennas, including impedance***

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beamforming for  
ultrawideband dipoles,  
monopoles, loops, vector  
sensors for direction  
finding, HF curtain arrays,  
3D printed nonplanar patch***



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***antenna arrays,  
waveguides for portable  
radar, reflector antennas,  
and other antennas. It  
explores the essentials of  
phased array antennas and  
includes detailed***

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underpinnings of  
electromagnetics and  
antennas. It includes a  
complete chapter on the  
details of antenna and  
electromagnetic test and***

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***measurement. This book explores details on 3D printed non-planar circular patch array antenna technology and the design and analysis of a planar array-fed axisymmetric***

***gregorian reflector. The lumped-element impedance matched antennas are examined and include a look at an analytic impedance matching solution with a parallel LC***

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***network. This book provides key insight into many aspects of antenna technology that have broad applications in radar and communications. This book gathers best***

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presented at the  
International Conference on  
Networking, Intelligent  
Systems and Security, held  
in Kenitra, Morocco, during  
01-02 April 2021. The book***

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***highlights latest research and findings in the field of ICT, and it provides new solutions, efficient tools, and techniques that draw on modern technologies to increase urban services. In***



***addition, it provides a critical overview of the status quo, shares new propositions, and outlines future perspectives in networks, smart systems, security, information***

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***technologies, and computer science.***

***This completely revised and expanded edition of an Artech House classic Polarization in Electromagnetic Systems***

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***presents the principles of polarization as applied to electromagnetic systems. This edition emphasizes the concepts needed for functional aspects of systems calculations and***

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***addresses applications of polarization to practical systems. Antenna polarization is covered in detail, including omnidirectional, directional, and broadband***

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***antennas with emphasis on  
antennas for generating  
linear and circular  
polarization for each  
antenna type. This book  
provides detailed coverage  
of wave interaction with an***

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***antenna and dual-polarized systems. Additional topics covered in this edition include propagation through depolarizing media, polarization in wireless communication***



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***systems, including polarization diversity and polarization measurements. This hands-on resource provides a clear exposition on the understanding of polarization principles and***

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***evaluation of the  
performance of  
electromagnetic systems.  
Smart Antennas—State of  
the Art brings together the  
broad expertise of 41  
European experts in smart***

***antennas. They provide 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***

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***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:***

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

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

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***capacity, network capacity,  
multihop networks  
Technology: antenna  
design, transceivers,  
demonstrators and  
testbeds, future air  
interfaces Applications and***



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***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***

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***the leading edge research  
in multiple-antenna  
communications, an  
essential technology for  
emerging broadband  
wireless systems.  
Applications of Artificial***

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***Intelligence Techniques in  
Engineering  
Trends, Techniques and  
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Fundamental and  
Supportive Technologies  
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***Practical Antenna Design  
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IMDC-SDSP 2020  
Wideband, Multiband, and  
Smart Antenna Systems***

The demand for high data  
rate and channel bandwidth

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is always a primary area of concern in modern wireless communication systems. Henceforth, all modern wireless communication systems are shifting towards MIMO. The

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development of MIMO  
antennas and its  
performance evaluation for  
the portable wireless  
communication terminals  
have motivated researchers  
to improve channel

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capacity, bandwidth, gain, polarization diversity, and to reduce coupling between inter elements. Antenna designers have produced much work on the development of novel

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antenna systems for the new generation networks by improving radiation pattern diversity and reducing correlation coefficient to increase MIMO antenna performance.



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This thesis presents a patch reconfigurable diversity/MIMO antenna to be used over two frequency values: 1.85 GHz and 1.98 GHz. The proposed design has been simulated using

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two software Ansoft HFSS and CST microwave studio. The design can be used in GSM and UMTS. A credible analogy between simulated and fabricated results has been attained. Moreover,

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the antenna design parameters have been empirically formulated and followed by a validation procedure. The presented work is interesting because it merges

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reconfigurability with diversity/MIMO which calls for more difficulty in the design. Besides, majority of antennas reported in previous work have included the S parameters

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and radiation pattern study only with the absence of diversity/MIMO performance evaluation. The investigated antennas by various researchers have mainly focused on the

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non printed antennas such as planar inverted F antennas for diversity in MIMO applications whereas this printed antenna model has the advantage of a low cost of fabrication, low

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profile for easy  
integration with wireless  
communication equipment,  
and high conformability  
with planar and non planar  
surfaces.

This book presents high-

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quality peer-reviewed  
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on Advanced Communication  
and Computational  
Technology (ICACCT) 2019  
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Institute of Technology,  
Kurukshetra, India. The  
contents are broadly  
divided into four parts:  
(i) Advanced Computing,  
(ii) Communication and  
Networking, (iii) VLSI and

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Embedded Systems, and (iv) Optimization Techniques. The major focus is on emerging computing technologies and their applications in the domain of communication and

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networking. The book will prove useful for engineers and researchers working on physical, data link and transport layers of communication protocols. Also, this will be useful

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for industry professionals interested in manufacturing of communication devices, modems, routers etc. with enhanced computational and data handling capacities.

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This comprehensive treatment of ultrawideband (UWB) antennas and time-domain microwave engineering serves as an invaluable practical reference for anyone

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antennas, and integrate these antennas in an RF system. By applying time-domain thinking to problems of practical interest, the reader will not only learn how to

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build and analyze  
antennas, but also  
understand them at the  
most fundamental level.  
This second edition is  
updated and expanded  
throughout, providing



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readers with a history of antennas, numerous new problem sets and worked examples, along with new information on plotting time-domain field lines, time-domain reflectometry,

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matching techniques, and more. This book also addresses system issues like spectral control and antenna efficiency. This book presents cutting-edge research

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contributions that address various aspects of network design, optimization, implementation, and application of cognitive radio technologies. It demonstrates how to make

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better utilization of the available spectrum, cognitive radios and spectrum access to achieve effective spectrum sharing between licensed and unlicensed users. The book

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provides academics and researchers essential information on current developments and future trends in cognitive radios for possible integration with the upcoming 5G

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networks. In addition, it includes a brief introduction to cognitive radio networks for newcomers to the field.

Dielectric Resonator  
Antennas

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Design and Applications  
Ultra-wideband (UWB) and M  
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**Modern society thrives on  
communication that is instant  
and available at all times, a  
constant exchange of  
information that encompasses**



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**everything from video streaming to GPS navigation. Experts even suggest that in the near future everything from our cars to our kitchen appliances will be connected to the internet, a feat that**

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**would not be possible without  
advanced wireless technology.  
Wideband, Multiband, and  
Smart Reconfigurable  
Antennas for Modern Wireless  
Communications showcases  
current trends and novel**

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**approaches in the design and analysis of the antennas that make wireless applications possible, while also identifying unique integration opportunities for antennas and wireless applications to work**

**together. By featuring both theoretical and experimental approaches to integration, this book highlights specific design issues to assist a wide-range of readers including students, researchers,**

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**academics, and industry practitioners. This publication features chapters on a broad scope of topics including algorithms and antenna optimization, wireless infrastructure development,**

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**wireless applications of  
intelligent algorithms, antenna  
architecture, and antenna  
reconfiguration techniques.  
Printed antennas have become  
an integral part of next-  
generation wireless**

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**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**

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**the printed antennas for  
various applications. This  
book will provide readers with  
the basic conceptual  
knowledge about antennas  
along with advanced  
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**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**

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**antenna Presents special  
reconfigurable antennas such  
as ME dipole, polarization,  
feeding, and DGS**

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quality papers from the Fifth  
International Conference on**

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**Microelectronics, Computing & Communication Systems (MCCS 2020). It discusses the latest technological trends and advances in MEMS and nanoelectronics, wireless communication, optical**

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**communication,  
instrumentation, signal  
processing, image processing,  
bioengineering, green energy,  
hybrid vehicles, environmental  
science, weather forecasting,  
cloud computing, renewable**

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**an in-depth study,  
performance analysis and  
extensive characterization of  
novel antennas for 5G  
applications. The reader will  
learn about basic design  
methodology and techniques**

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**to develop antennas for 5G applications including concepts of path loss compensation, co-design of commercial 4G antennas with millimeter wave 5G antennas and antennas used in phase**

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**array and pattern diversity  
modules. Practical examples  
included in the book will help  
readers to build high  
performance antennas for 5G  
subsystems/systems using  
low cost technology. Key**

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**Features Provides simple design methodology of different antennas for handheld devices as well as base stations for 5G applications. Concept of path loss compensation**

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**introduced. Co-design of commercial 4G antennas with millimetre wave 5G antennas presented. Comparison of phased array versus pattern diversity modules discussed in detail. Fabrication and**



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**Measurement challenges at  
mmWaves and Research  
Avenues in antenna designs  
for 5G and beyond presented.  
Shiban Kishen Koul is an  
emeritus professor at the  
Centre for Applied Research in**

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**Electronics at the Indian  
Institute of Technology Delhi.  
He served as the chairman of  
Astra Microwave Products  
Limited, Hyderabad from  
2009-2018. He is a Life Fellow  
of the Institution of Electrical**

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**and Electronics Engineering  
(IEEE), USA, a Fellow of the  
Indian National Academy of  
Engineering (INAE), and a  
Fellow of the Institution of  
Electronics and  
Telecommunication Engineers**

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**(IETE). Karthikeya G S worked as an assistant professor in Visvesvaraya technological university from 2013 to 2016 and completed his PhD from the Centre for Applied Research in Electronics at the**

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**Indian Institute of Technology  
Delhi in Dec.2019. He is a  
member of IEEE-Antenna  
Propagation Society and  
Antenna Test and  
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Electromagnetics and Antenna**

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**Technology  
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## **Networks**

This comprehensive reference text discusses fundamental concepts, applications, design techniques, and challenges in the field of planar antennas. The text focuses on recent advances



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in the field of planar antenna design and their applications in various fields of research, including space communication, mobile communication, wireless communication, and wearable

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applications. This resource presents planar antenna design concepts, methods, and techniques to enhance the performance parameters and applications for IoTs and device-to-device communication. The latest

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techniques used in antenna design, including their structures defected ground, MIMO, and fractal design, are discussed comprehensively. The text will be useful for senior undergraduate students,

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graduate students, and academic researchers in fields including electrical engineering, electronics, and communication engineering.

This book addresses the true innovation in engineering

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design that may be promoted by blending together models and methodologies from different disciplines, and, in this book, the target was exactly to follow this approach to deliver a new disruptive architecture to

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deliver these next-generation mobile small cell technologies. According to this design philosophy, the work within this book resides in the intersection of engineering paradigms that includes "cooperation",

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"network coding", and "smart energy-aware frontends".

These technologies will not only be considered as individual building blocks, but re-engineered according to an inter-design approach resulting in the enabler for

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energy efficient femtocell-like services on the move. The book aims to narrow the gap between the current networking technologies and the foreseen requirements that are targeted at the future development of the 5G



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mobile and wireless communications networks in terms of the higher networking capacity, the ability to support more users, the lower cost per bit, the enhanced energy efficiency, and adaptability

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to new services and devices (for example, smart cities, and the Internet of things (IoT)).

This comprehensive new resource guides professionals in the latest methods used when designing

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active integrated antennas (AIA) for wireless communication devices for various standards. This book provides complete design procedures for the various elements of such active integrated antennas such as

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the matching network, the amplifier/active element as well as the antenna. This book offers insight into how active integration and co-design between the active components (amplifier, oscillator, mixer, diodes)

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and the antenna can provide better power transfer, higher gains, increased efficiencies, switched beam patterns and smaller design footprints. It introduces the co-design approach of active integrated antennas

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complete reference and design guide in the area of AIA.

Multifunctional Antennas (MFA) are comparatively a new area for antenna research and finds applications in various



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modern wireless radios, like Cognitive Radio (CR) in Software Defined Radio (SDR) technology and MIMO technology. This book is first attempt and an invaluable resource which deals with the design and

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realization of various kinds of multifunctional antennas. After clearly explaining the exclusive features of MFAs, the book presents various designs of such antennas considering versatile modern and upcoming applications.

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Written by three  
internationally known  
researchers, Multi-  
Functional Ultra Wideband  
Antennas: Trends, Techniques  
and Applications: Provides a  
lucid introduction on UWB  
systems, historical

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perspective and discusses various applications of such systems Discusses fundamentals of antennas and its characterization in time and frequency domains, primarily aimed for the beginners in the area

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Revisits the design and realization of various classical UWB antennas  
Discusses various techniques of designing frequency-notched UWB antennas and provide detailed comparison of the techniques Deals with

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the techniques of deriving multiple antenna functionalities from a single antenna Incorporates exclusive discussions on modern reconfigurable antennas and printed and dielectric resonator based

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MIMO antennas with clear focus on recent and upcoming technological requirements  
With Multi-Functional Ultra Wideband Antennas: Trends, Techniques and Applications,  
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engineers, graduate students, academic/industry researchers will gain a thorough knowledge on design of such antennas with clear physical insight and understanding. Chinmoy Saha, PHD, is an associate



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Professor in the Department  
of Avionics at Indian  
Institute of Space Science  
and Technology,  
Thiruvananthapuram, Kerala,  
India. His current research  
interest includes Microwave  
Circuits, Engineered

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Circuits, reconfigurable and  
multi-functional antennas  
for modern wireless  
applications, Dielectric  
Resonator antennas, THz  
antennas and wireless power

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transfer. He is the author or coauthor of several books, scientific journals and recipient of several prestigious awards. Jawad Yaseen Siddiqui, PHD, is an associate Professor in the Department of Radio Physics

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and Electronics at  
University of Calcutta,  
Kolkata, India. His current  
research interest includes  
ultra-wideband antennas,  
frequency reconfigurable  
antennas, tapered slot  
antennas and multi-

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functional antennas for cognitive radio application. He is the author or coauthor of several books, scientific journals and recipient of prestigious awards. He is a Co-Principal Investigator on Stratosphere Troposphere

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(ST) Radar Project at the University of Calcutta, Kolkata, India. Yahia M.M. Antar, PHD, is a Professor in the Department of Department of Electrical and Computer Engineering at the Royal Military College of

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Canada, Kingston, ON,  
Canada. He is the author or  
coauthor of several books,  
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General of Canada and many  
more.

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Antenna Fundamentals for  
Legacy Mobile Applications  
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Recent Technical

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Multifunctional MIMO  
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Antennas: Applications-Based  
Designs

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

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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

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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

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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

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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

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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 comprehensive resource



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covers both antenna fundamentals and practical implementation strategies, presenting antenna design with optimum performance in actual products and systems. The book helps readers bridge the gap between electromagnetic theory

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and its application in the design of practical antennas in real products. Practical implementation strategies in products and systems will be addressed in order to design antennas in the context of actual product environments, including

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PCB layout, component placement and casing design. Practical design examples on wearable electronic products are presented with a systematic approach to designing antennas for actual products. The book introduces antenna fundamentals

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to provide the basic concepts and necessary mathematics on electromagnetic analysis, followed by advanced antenna elements. The concept of electromagnetic simulation is presented. The advantages and disadvantages of different

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numerical methods in antenna modeling are also discussed. Several commercial antenna design and simulation tools are introduced, allowing hands-on practice of antenna modeling and simulation.

This book covers diverse aspects

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of advanced computer and communication engineering, focusing specifically on industrial and manufacturing theory and applications of electronics, communications, computing and information technology. Experts in research, industry, and

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academia present the latest developments in technology, describe applications involving cutting-edge communication and computer systems and explore likely future directions. In addition, access is offered to numerous new algorithms that

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assist in solving computer and communication engineering problems. The book is based on presentations delivered at ICOCOE 2014, the 1st International Conference on Communication and Computer Engineering. It will appeal to a



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wide range of professionals in the field, including telecommunication engineers, computer engineers and scientists, researchers, academics and students.