Preface

The wireless communication market is undergoing a major expansion with the deployment of new technologies and standards opening the prospect of significant impacts in many application areas. In this context, the growing demand of wireless and mobile application products needs highly integrated and low cost devices with more accuracy and best performance for modern transceivers. Moreover, innovative solutions are required to reduce the degree of complexity and difficulty in the design of wireless communication devices and systems.

The objective of this handbook is to showcase current R&D trends and novel approaches in design, analysis of broadband, multiband, and reconfigurable microwave devices and antennas for wireless and UWB applications, as well as to the advanced trends on emerging wireless communication technologies. This handbook will provide theoretical and experimental approach to some extent which is more useful to the reader and highlights unique design issues to help the reader to be able to understand more advanced research.

This handbook is divided into four sections:

1. Antennas, Electromagnetic Theory, and Applications
2. MMIC, RF Circuits, and Devices for Wireless Communication
3. Wireless Communication Systems, Wireless Sensors, and Vehicular Ad Hoc Networks
4. Radar, Signal and Image Processing, and Power Electronics

Section 1 (Chapters 1 to 5) exposes new techniques in antennas design, propagation and electromagnetic theory and applications. It contains five chapters dealing with topics such as design of new microstrip multiband fractal antennas, developments in efficient antenna designs using EBG structures, design of an UWB printed monopole antenna with Hilbert curve fractal shaped slots for multiple band rejection functionality, new technique to determine the complex permittivity of each layer for a bi-layer dielectric material at microwave frequency, and the assessment and optimization of EM-source localization in indoor environments by using an artificial neural network.

Section 2 (Chapters 6 to 10) presents design techniques of MMIC, RF circuits and devices for wireless communication. This section comprises five chapters which explore the design of new structures of planar diplexers using microstrip resonators, the associated techniques used for the achievement of planar filters, the design of microwave power protectors: attenuators and limiters, the review on 60GHz low noise amplifier design for low power and linearity, and the advances in wireless power transmission technology for autonomous systems.

Section 3 (Chapters 11 to 16) covers topics related to wireless sensor networks, wireless communication systems, MANET and vehicular Ad Hoc networks. It is composed of six chapters dealing with issues related to beamforming for relay assisted MIMO, detection and prevention of denial of service attacks in vehicular Ad-hoc networks, adjust fuzzy model parameters for head election in wireless sensor network protocols, enhanced lightweight Sybil attack detection technique, cyber-physical systems in vehicular communications, and adaptation of Winlink 2000 emergency amateur radio Email network to a VHF packet radio infrastructure.

Section 4 (Chapters 17 to 20) covers various topics such as radar, signal and image processing and power electronics. It gives an overview related to progress in automatic target recognition from inverse synthetic aperture radar images, signal transmission and crosstalk limited all-optical networks, mammogram classification using support vector machine and extracting parameters of single and double diode photovoltaic cells models.

Finally, the editors hope that this handbook will be helpful for graduate and postgraduate students but also for people involved in scientific research or even for experts working in the development of innovative solutions or applications in the area of microwave and communication engineering.

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