

Software Defined Cognitive Radio Using Matlab

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Software Defined Radio Using MATLAB & Simulink and the RTL-SDR, Software-Defined Radio for Engineers, Digital Communication Systems Engineering with Software-Defined Radio, Cognitive Radio Oriented Wireless Networks, Radio Engineering, Signals and Systems using MATLAB, Introduction to Stateflow with Applications, Cognitive Dynamic Systems, Cognitive Radio - An Enabler for Internet of Things, Cognitive Radio and Dynamic Spectrum Access

The availability of the RTL-SDR device for less than \$20 brings software defined radio (SDR) to the home and work desktops of EE students, professional engineers and the maker community. The RTL-SDR can be used to acquire and sample RF (radio frequency) signals transmitted in the frequency range 25MHz to 1.75GHz, and the MATLAB and Simulink environment can be used to develop receivers using first principles DSP (digital signal processing) algorithms. Signals that the RTL-SDR hardware can receive include: FM radio, UHF band signals, ISM signals, GSM, 3G and LTE mobile radio, GPS and satellite signals, and any that the reader can (legally) transmit of course! In this book we introduce readers to SDR methods by viewing and analysing downconverted RF signals in the time and frequency domains, and then provide extensive DSP enabled SDR design exercises which the reader can learn from. The hands-on SDR design examples begin with simple AM and FM receivers, and move on to the more challenging aspects of PHY layer DSP, where receive filter chains, real-time channelisers, and advanced concepts such as carrier synchronisers, digital PLL designs and QPSK timing and phase synchronisers are implemented. In the book we will also show how the RTL-SDR can be used with SDR transmitters to develop complete communication systems, capable of transmitting payloads such as simple text strings, images and audio across the lab desktop.

Based on the popular Artech House classic, Digital Communication Systems Engineering with Software-Defined Radio, this book provides a practical approach to quickly learning the software-defined radio (SDR) concepts needed for work in the field. This up-to-date volume guides readers on how to quickly prototype wireless designs using SDR for real-world testing and experimentation. This book explores advanced wireless communication techniques such as OFDM, LTE, WLA, and hardware targeting. Readers will gain an understanding of the core concepts behind wireless hardware, such as the radio frequency front-end, analog-to-digital and digital-to-analog converters, as well as various processing technologies. Moreover, this volume includes chapters on timing estimation, matched filtering, frame synchronization message decoding, and source coding. The orthogonal frequency division multiplexing is explained and details about HDL code generation and deployment are provided. The book concludes with coverage of the WLAN toolbox with OFDM beacon reception and the LTE toolbox with downlink reception. Multiple case studies are provided throughout the book. Both MATLAB and Simulink source code are included to assist readers with their projects in the field.

"This unique resource provides you with a practical approach to quickly learning the software-defined radio concepts you need to know for your work in the field. By prototyping and evaluating actual digital communication systems capable of performing "over-the-air" wireless data transmission and reception, this volume helps you attain a first-hand understanding of critical design trade-offs and issues. Moreover you gain a sense of the actual "real-world" operational behavior of these systems. With the purchase of the book, you gain access to several ready-made Simulink experiments at the publisher's website. This collection of laboratory experiments, along with several examples, enables you to successfully implement the designs discussed the book in a short period of time. These files can be executed using MATLAB version R2011b or later. "

This book constitutes the thoroughly refereed post-conference proceedings of the 10th International Conference on Cognitive Radio Oriented Wireless Networks, CROWNCOM 2015, held in Doha, Qatar, in April 2015. The 66 revised full papers presented were carefully reviewed and selected from 110 submissions and cover the evolution of cognitive radio technology pertaining to 5G networks. The papers are clustered to topics on dynamic spectrum access/management, networking protocols for CR, modeling and theory, HW architecture and implementations, next generation of cognitive networks, standards and business models, and emerging applications for cognitive networks.

Software radio ideally provides the opportunity to communicate with any radio communication standard by modifying only the software, without any modification to hardware components. However, taking into account the static behavior of current communications protocols, the spectrum efficiency optimization, and flexibility, the radio domain has become an important factor. From this thinking appeared the cognitive radio

paradigm. This evolution is today inescapable in the modern radio communication world. It provides an autonomous behavior to the equipment and therefore the adaptation of communication parameters to better match their needs. This collective work provides engineers, researchers and radio designers with the necessary information from mathematical analysis and hardware architectures to design methodology and tools, running platforms and standardization in order to understand this new cognitive radio domain.

This new textbook in signals and systems provides a pedagogically rich approach to what can commonly be a mathematically dry subject. With features like historical notes, highlighted common mistakes, and applications in controls, communications, and signal processing, Chaparro helps students appreciate the usefulness of the techniques described in the book. Each chapter contains a section with MatLab applications. Pedagogically rich introduction to signals and systems using historical notes, pointing out "common mistakes", and relating concepts to realistic examples throughout to motivate learning the material. Introduces both continuous and discrete systems early, then studies each (separately) in more depth later. Extensive set of worked examples and homework assignments, with applications to controls, communications, and signal processing throughout. Provides review of all the background math necessary to study the subject. MatLab applications in every chapter.

A groundbreaking book from Simon Haykin, setting out the fundamental ideas and highlighting a range of future research directions.

Internet of Things (IoT) deals with the interconnection of devices that can communicate with each other over the internet. Currently, several smart systems have evolved with the evolution in IoT. Cognitive Radio - an enabler for Internet of Things is a research level subject for all communication engineering students at undergraduate, post graduate and research levels. The contents of the book are designed to cover the prescribed syllabus for one semester course on the subject prescribed by universities. Concepts have been explained thoroughly in simple and lucid language. Mathematical analysis has been used wherever necessary followed by clear and lucid explanation of the findings and their implication. Key technologies presented include dynamic spectrum access, spectrum sensing techniques, IEEE 802.22 and different radio network architectures. Their role and use in the context of mobile broadband access in general is explained, giving both a high level overview and a detailed step by step explanation. The book includes a large number of diagrams, MATLAB examples, thereby enabling the readers to have a sound grasp of the concepts presented and their applications. This book is a must have resource for engineers and other professionals in the telecommunication industry working with cellular or wireless broadband technologies, helping comprehension of the process of utilization of the updated technology to enable being ahead competition.

Cognitive Radio for Dynamic Spectrum Access gives a comprehensive overview of the main concepts behind radio spectrum regulation, dynamic spectrum access and cognitive radio. Spectrum measurements are introduced to illustrate the inefficiencies in today's spectrum usage and the book also discusses enablers for horizontal and vertical spectrum sharing. Among others a game-theory-based approach for spectrum sharing is described and evaluated. Institution and standardisation approaches in academic research and industry are highlighted including IEEE SCC41, 802.11k/n/s/y and 802.22 which lead towards commercial exploitation of cognitive radio. In conclusion, this book looks at the initial steps towards the vision of true cognitive radio and the potential impact on telecommunication business. Introduces the benefits and challenges of cognitive radio. Presents cognitive radio in research and industry and covers implications for operators from the perspective of a telecom operator. Examines how cognitive radio techniques will considerably change the wireless communication market.

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