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Energy Detection Based Spectrum Sensing In Cognitive Radio

Performance analysis of Energy Detection Spectrum
Sensing Using RTL-SDR & GNU Radio



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Energy Detection For Spectrum Sensing In Cognitive Radio

**B.M.K. Prasad, Krishna Kant
Singh, Neelam Ruhil, Karan
Singh, Richard O'Kennedy**

Energy Detection For Spectrum Sensing In Cognitive Radio :

Energy Detection for Spectrum Sensing in Cognitive Radio Saman Atapattu,Chintha Tellambura,Hai Jiang,2014-02-15 This Springer Brief focuses on the current state of the art research on spectrum sensing by using energy detection a low complexity and low cost technique It includes a comprehensive summary of recent research fundamental theories possible architectures useful performance measurements of energy detection and applications of energy detection Concise practical chapters explore conventional energy detectors alternative forms of energy detectors performance measurements diversity techniques and cooperative networks The careful analysis enables reader to identify the most efficient techniques for improving energy detection performance Energy Detection for Spectrum Sensing in Cognitive Radio is a valuable tool for researchers and practitioners interested in spectrum sensing and cognitive radio networks Advanced level students studying wireless communication will also benefit from this brief *Energy Detection Based Spectrum Sensing in Cognitive Radio* Pranav Patel,2015-06-25 The rapid usage of wireless communications in personal commercial and governmental capacities efficient spectrum utilization has become a prime topic of interest Most of the licensed bands suffer from under utilization and less spectral occupancy of spectrum Cognitive radio technology promising solution to the problem of low spectral occupancy and inefficient utilization of the licensed radio spectrum A prime constituent of the cognitive radio technology is spectrum sensing Energy detection ED is one of the popular spectrum sensing technique for cognitive radio In this work I Proposed RTL 2832U SDR stick is suitable for energy detection based spectrum sensing method In this experiment we capture the real time signal coming from the BTS over the different city in rural urban area using an RTL 2832U SDR stick to decide the frequency band available or not The GNU Radio software allows for the implementation of Energy detection spectrum sensing technique using the RTL SDR *Analysis of Energy Detection in Cognitive Radio Networks* Saman U. B. Atapattu,2013 Cognitive radio is one of the most promising technologies to address the spectrum scarcity problem Cognitive radio requires spectrum sensing which is used by unlicensed users to opportunistically access the licensed spectrum Spectrum sensing using energy detection offers low cost and low complexity In this thesis a comprehensive performance analysis of energy detection based spectrum sensing is developed Detection performance over composite fading and shadowing channels is first investigated using the K and K_G channel models To further facilitate analysis of energy detection over different wireless channels a unified channel model based on a mixture gamma distribution is developed The unified model can accurately represent most existing channel models A single value performance metric the area under the receiver operating characteristic curve is proposed to measure the overall detection capability and is investigated over various wireless fading channels The energy detection based cooperative spectrum sensing is also studied which can largely improve the detection performance Since spectrum sensing is required to identify activities of licensed users at a very low signal to noise ratio SNR performance of energy detection with low SNR is also analyzed in this thesis

Spectrum sensing techniques in cognitive radio Joydeep Dutta,2022-05-09 Document from the year 2022 in the subject Physics Technical Physics grade A language English abstract Cognitive Radio offers non interfering use of spectrum which requires three main tasks Spectrum Sensing Spectrum Analysis and Spectrum Allocation The aim of this study is to focus on spectrum sensing in cognitive radio which is a recently introduced technology in order to increase the spectrum efficiency Increasing efficiency of the spectrum usage is an urgent need as the number of wireless users is increasing rapidly Cognitive radio arises to be a good solution to spectral crowding problem by introducing the opportunistic usage of frequency bands that are not heavily occupied by licensed users Primary user since they cannot be utilized by users other Secondary user than the license owners at the moment Cognitive radio can sense the spectrum and detect the idle frequency bands thus secondary users can be allocated in those bands when primary users do not use those in order to avoid any interference to primary user by secondary users Several Spectrum Sensing Methods proposed in the literature are theoretically analyzed and interpreted in the sense of advantages and drawbacks

Energy Based Spectrum Sensing for Enabling Dynamic Spectrum Access in Cognitive Radios Samson Sequeira,2011 Spectrum scarcity is increasingly becoming an obstacle for the implementation of new wireless technologies On the contrary recent studies have discovered considerable under utilization of the allocated spectrum by the licensed users This suggests that the solution to the problem is a transition from static spectrum allocation policies to dynamic spectrum access methodologies This can be accomplished through the use of Cognitive Radio technology Cognitive Radio is considered as an intelligent radio which is capable of altering its transmission or reception parameters in accordance to the radio environment and the network state to use the available spectrum optimally Significant research efforts have furthered Cognitive Radios since the idea was first conceived by Joseph Mitola in 1998 Cognitive Radio technology allows for the licensed spectrum of the primary users to be used on an opportunistic basis by unlicensed secondary users A vital requirement of such an opportunistic scheme is that the licensed primary users be protected from detrimental interference from the secondary users while at the same time optimizing the performance for the secondary users Thus the reliable detection of primary users offers better secondary system throughput via increased spectral efficiency in addition to safeguarding the primary system Spectrum sensing is a technique used to detect the presence of primary users in the licensed spectrum It is the estimation of the instantaneous occupancy of the frequency spectrum and is a key enabling factor for Cognitive Radios Various techniques exist for performing spectrum sensing In addition to primary user detection spectrum sensing can also be employed for secondary detection and co existence interference analysis in multi radio environments etc In this thesis we study adaptive spectrum sensing based on energy detection with a purpose of demonstrating Dynamic Spectrum Access The major focus has been to evaluate algorithms that can allow for estimation of noise in the presence of the signal which is essential for energy detection based schemes We also present the system level implementation and evaluation of a Dynamic Spectrum Access setup developed using the USRP2

GNU Radio platform on the ORBIT Wireless Testbed at WINLAB as part of the WINLAB NEC Collaborative Cognitive Radio Project

Recent Trends in Communication and Intelligent Systems Aditya Kumar Singh Pundir, Anupam Yadav, Swagatam Das, 2023-10-27 The book presents best selected research papers presented at the Fourth International Conference on Recent Trends in Communication and Intelligent Systems ICRTCIS 2023 organized by Arya College of Engineering and IT Jaipur on April 28 29 2023 It discusses the latest technologies in communication and intelligent systems covering various areas of communication engineering such as signal processing VLSI design embedded systems wireless communications and electronics and communications in general Featuring work by leading researchers and technocrats the book serves as a valuable reference resource for young researchers and academics as well as practitioners in industry

Power Energy and Secure Smart Technologies Thanikanti Sudhakar Babu, Mallala Balasubbareddy, Subramaniam M, Nnamdi Nwulu, Vigna Kumaran Ramachandaramurthy, Renu Sharma, 2025-07-16 This Book of Proceedings presents the collective research and insights shared at the conference on Power Energy and Secure Smart Technologies The event brings together leading minds from academia industry and research to explore innovations and address challenges in modern power systems sustainable energy solutions and secure smart technologies The papers compiled here reflect the latest developments case studies and forward looking ideas that contribute to the evolving landscape of intelligent and resilient energy systems We trust this volume will serve as a valuable resource for researchers professionals and students committed to advancing technology for a sustainable and secure energy future

Improve Performance Analysis of Energy Detection in Spectrum Sensing of Cognitive Radio Muhammad Syahmi Syazwan Abdul Halim, 2012

ICT for Intelligent Systems Jyoti Choudrie, Parikshit N. Mahalle, Thinagaran Perumal, Amit Joshi, 2025-11-22 This book gathers papers addressing state of the art research in all areas of information and communication technologies and their applications in intelligent computing cloud storage data mining and software analysis It presents the outcomes of the 9th International Conference on Information and Communication Technology for Intelligent Systems ICTIS 2025 held in Bangkok Thailand The book discusses the fundamentals of various data analysis techniques and algorithms making it a valuable resource for researchers and practitioners alike

Implementation of Cognitive Radio Spectrum sensing circuit using TSPRT algorithm Neha Pal, 2017-03-07 Master s Thesis from the year 2012 in the subject Engineering Communication Technology Indian Institute of Technology Delhi IIT Delhi course M Tech Communications language English abstract To ensure that cognitive radios would not interfere with primary users spectrum sensing is required to be efficient and accurate by reliably detecting primary user signals In this work we implemented a spectrum sensing methodology based on the Truncated Sequential Probability Ratio Test TSPRT The TSPRT is a combination of SPRT and Neyman Pearson We created and simulated the model and observed the variation of quantization error noise variance and dynamic range of the signal to achieve the minimum average sample number ASN and desired error probabilities of detection and false alarm for sine wave and similar input signals This report

comprises of theoretical analysis and practical implementation of spectrum sensing circuit in Xilinx system generator Simulations are done to observe the effect of various parameters on ASN and shown

Implementation of Energy Detector for Cognitive Radio Zahir A. Hussein Alsulaimawi,2013 Cognitive radio is a technology that provides a promising new way to improve the efficiency of the use of the electromagnetic spectrum that available Spectrum sensing helps in the detection of spectrum holes unused channels of the band and instantly move into vacant channels while avoiding occupied ones A brief overview of the energy detection based spectrum sensing for cognitive radio technology is introduced An energy detector with baseband sampling for cognitive radio is presented with mathematical analyses for an additive white Gaussian noise AWGN channel Practical implementation issues on Texas Instruments TMS320C6713 floating point DSP board are presented A new multiple antenna technique based energy detector is proposed As well as several algorithms for generating white noise are implemented

Applications of Advanced Computing in Systems Rajesh Kumar,R. K. Dohare,Harishchandra Dubey,V. P. Singh,2021-04-24 This book covers advances in system control and computing This book gathers selected high quality research papers presented at the International Conference on Advances in Systems Control and Computing AISCC 2020 held at MNIT Jaipur during February 27 28 2020 The first part is advances in systems and it is dedicated to applications of the artificial neural networks evolutionary computation swarm intelligence artificial immune systems fuzzy system autonomous and multi agent systems machine learning other intelligent systems and related areas In the second part machine learning and other intelligent algorithms for design of control control analysis are covered The last part covers advancements modifications improvements and applications of intelligent algorithms

Communication and Computing Systems B.M.K. Prasad,Krishna Kant Singh,Neelam Ruhil,Karan Singh,Richard O'Kennedy,2017-02-15 This book is a collection of accepted papers that were presented at the International Conference on Communication and Computing Systems ICCCS 2016 Dronacharya College of Engineering Gurgaon September 9 11 2016 The purpose of the conference was to provide a platform for interaction between scientists from industry academia and other areas of society to discuss the current advancements in the field of communication and computing systems The papers submitted to the proceedings were peer reviewed by 2 3 expert referees This volume contains 5 main subject areas 1 Signal and Image Processing 2 Communication Computer Networks 3 Soft Computing Intelligent System Machine Vision and Artificial Neural Network 4 VLSI Embedded System 5 Software Engineering and Emerging Technologies

Spectrum Sensing for Cognitive Radio Kamal M. Captain,Manjunath V. Joshi,2021-12-30 This comprehensive reference text discusses concepts of cognitive radio and the advances in the field of spectrum sensing This text discusses the concept of cognitive radio for next generation wireless communication and a very critical aspect of cognitive radio that is spectrum sensing in detail It covers important topics including narrowband spectrum sensing wideband spectrum sensing cooperative spectrum sensing system and channel models detection algorithms approximation of decision statistics and theoretical analysis of detection algorithms in

detail Separate chapters are dedicated to discussing the analysis and use of detection algorithms for narrowband spectrum sensing wideband spectrum sensing and cooperative wideband spectrum sensing Aimed at graduate students and academic researchers in the fields of electrical engineering and electronics and communication engineering this text Discusses concepts of cognitive radio and research in spectrum sensing Presents mathematical analysis of algorithms considering practical environment Explains novel wideband spectrum sensing algorithms with detailed analysis Provides mathematical derivations to help readers Discusses basic spectrum sensing algorithms from narrowband spectrum sensing to the more advanced wideband spectrum sensing **Planning and Optimisation of 3g and 4g Wireless Networks** J. I.

Agbinya,2010-02-15 Packed with details of the technologies that support each network type this cutting edge reference leads the reader step by step on how to plan and optimize various types of wireless networks It examines current and emerging network planning and enhancement techniques Adaptive Spectrum Sensing for Cognitive Radio Networks Arash

Vakili,2011 Spectrum sensing is an important functionality of cognitive radio as a means to detect the presence or absence of the primary user PU in a certain spectrum band Energy detection is a widely used spectrum sensing technique based on the assumption that the PU is either present or absent during the whole sensing period However this assumption is not realistic in a dynamic environment where the PU could appear or disappear at any time The performance of the conventional energy detector ED actually deteriorates in the scenario where the PU activity status changes during the sensing period Therefore it is crucial to design a detector which can adapt to such an environment and reliably detect a change in the PU activity Several sequential change detection techniques already exist in the literature however change detection in a fixed sensing duration has not been given enough attention In this dissertation three adaptive EDs are proposed to improve the Innovations in

Electronics and Communication Engineering H. S. Saini,R. K. Singh,Mirza Tariq Beg,J. S. Sahambi,2020-04-22 This book is a collection of the best research papers presented at the 8th International Conference on Innovations in Electronics and Communication Engineering at Guru Nanak Institutions Hyderabad India Featuring contributions by researchers technocrats and experts the book covers various areas of communication engineering like signal processing VLSI design embedded systems wireless communications and electronics and communications in general as well as cutting edge technologies As such it is a valuable reference resource for young researchers Mobile Multimedia Communications Luigi Atzori,Jaime

Delgado,Daniel Giusto,2012-04-29 This book constitutes the thoroughly refereed post conference proceedings of the 7th International ICST Conference on Mobile Multimedia Communications MOBIMEDIA 2011 held in Cagliari Italy in September 2011 The 26 revised full papers presented were carefully selected from numerous submissions and focus topics such as quality of experience dynamic spectrum access wireless networks in the TV white spaces media streaming mobile visual search image processing and transmission and mobile applications *Performance Analysis of Energy Detector Over*

Different Generalised Wireless Channels Based Spectrum Sensing in Cognitive Radio Hussien Al-Hmood,2015

Information Technology for Manufacturing Systems II Qi Luo, 2011-06-10 Selected peer reviewed papers from the 2011 International Conference on Information Technology for Manufacturing Systems ITMS 2011 Shanghai China May 7 8 2011

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