

Options

Title: Hardware tutorial
Author: Barry Duggan
Output Language: Python
Generate Options: QT GUI

QT GUI Range

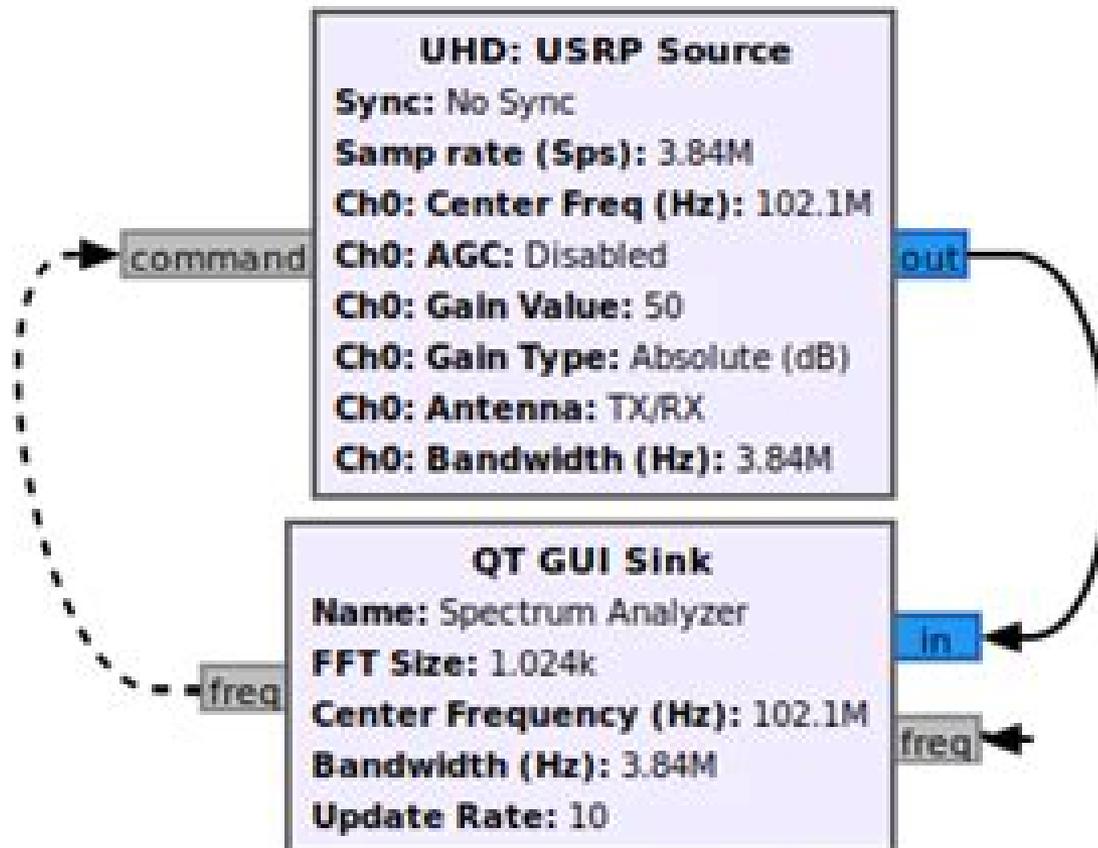
Id: samp_rate
Label: Sample Rate
Default Value: 3.84M
Start: 192k
Stop: 56M
Step: 1k

QT GUI Range

Id: tuning
Label: Frequency
Default Value: 102.1M
Start: 70M
Stop: 6G
Step: 200k

QT GUI Range

Id: rf_gain
Label: RF Gain
Default Value: 50
Start: 0
Stop: 76
Step: 1



Note: this block is rotated 180

Spectrum Sensing Measurement Using Gnu Radio And Usrcp

Nur Fatehah Othman



Spectrum Sensing Measurement Using Gnu Radio And Usrcp:

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 AISC 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 Theory and Applications of Applied Electromagnetics Hamzah Asyrani Sulaiman, Mohd Azlishah Othman, Mohamad Zoinol Abidin Abd. Aziz, Mohd Fareq Abd Malek, 2015-05-13 In this book experts from academia and industry present the latest advances in scientific theory relating to applied electromagnetics and examine current and emerging applications particularly within the fields of electronics communications and computer technology The book is based on presentations delivered at APPEIC 2014 the 1st Applied Electromagnetic International Conference held in Bandung Indonesia in December 2014 The conference provided an ideal platform for researchers and specialists to deliver both theoretically and practically oriented contributions on a wide range of topics relevant to the theme of nurturing applied electromagnetics for human technology Many novel aspects were addressed and the contributions selected for this book highlight the relevance of advances in applied electromagnetics to a variety of industrial engineering problems and identify exciting future directions for research **Informatics Engineering and Information Science, Part III** Azizah Abd Manaf, Shamsul Sahibuddin, Rabiah Ahmad, Salwani Mohd Daud, Eyas El-Qawasmeh, 2011-11-10 This 4 Volume Set CCIS 0251 CCIS 0254 constitutes the refereed proceedings of the International Conference on Informatics Engineering and Information Science ICIEIS 2011 held in Kuala Lumpur Malaysia in November 2011 The 210 revised full papers presented together with invited papers in the 4 volumes were carefully reviewed and selected from numerous submissions The papers are organized in topical sections on e learning information security software engineering image processing algorithms artificial intelligence and soft computing e commerce data mining neural networks social networks grid computing biometric technologies networks distributed and parallel computing wireless networks information and data management web applications and software systems multimedia ad hoc networks mobile computing as well as miscellaneous topics in digital information and communications e-Infrastructure and e-Services for Developing Countries Karl Jonas, Idris A. Rai, Maurice Tchente, 2013-10-17 This book constitutes the thoroughly refereed post conference proceedings of the 4th International ICST Conference on e Infrastructure and e Services for Developing Countries AFRICOMM 2012 held in Yaounde Cameroon in November 2012 The 24 revised full papers presented were carefully

reviewed and selected from numerous submissions The papers cover a wide range of topics in the field of information and communication infrastructures and are grouped in topical sections on e Infrastructure e Services e Society e Health and e Security *Handbook of Research on Multimedia Cyber Security* Gupta, Brij B.,Gupta, Deepak,2020-04-03 Because it makes the distribution and transmission of digital information much easier and more cost effective multimedia has emerged as a top resource in the modern era In spite of the opportunities that multimedia creates for businesses and companies information sharing remains vulnerable to cyber attacks and hacking due to the open channels in which this data is being transmitted Protecting the authenticity and confidentiality of information is a top priority for all professional fields that currently use multimedia practices for distributing digital data The Handbook of Research on Multimedia Cyber Security provides emerging research exploring the theoretical and practical aspects of current security practices and techniques within multimedia information and assessing modern challenges Featuring coverage on a broad range of topics such as cryptographic protocols feature extraction and chaotic systems this book is ideally designed for scientists researchers developers security analysts network administrators scholars IT professionals educators and students seeking current research on developing strategies in multimedia security *Advances in Signal Processing and Intelligent Recognition Systems* Sabu M. Thampi,Sri Krishnan,Juan Manuel Corchado Rodriguez,Swagatam Das,Michal Wozniak,Dhiya Al-Jumeily,2017-09-12 This Edited Volume gathers a selection of refereed and revised papers originally presented at the Third International Symposium on Signal Processing and Intelligent Recognition Systems SIRS 17 held on September 13 16 2017 in Manipal India The papers offer stimulating insights into biometrics digital watermarking recognition systems image and video processing signal and speech processing pattern recognition machine learning and knowledge based systems Taken together they offer a valuable resource for all researchers and scientists engaged in the various fields of signal processing and related areas *Multiple Access Communications* Boris Bellalta,Alexey Vinel,Magnus Jonsson,Jaume Barcelo,Roman Maslennikov,Periklis Chatzimisios,David Malone,2012-11-05 This book constitutes the refereed proceedings of the 5th International Workshop on Multiple Access Communications MACOM 2012 held in Maynooth Ireland in November 2012 The 13 full papers and 5 demo and poster papers presented were carefully reviewed and selected from various submissions The papers are organized in topical sections on network coding handling interference and localization techniques at PHY MAC layers wireless access networks and medium access control *Software Defined Radio for Cognitive Wireless Sensor Networks* Rafik Zitouni,2015 The Increasing number of Wireless Sensor Networks WSNs applications has led industries to design the physical layer PHY of these networks following the IEEE 802 15 4 standard The traditional design of that layer is on hardware suffering from a lack of flexibility of radio parameters such as changing both frequency bands and modulations This problem is emphasized by the scarcity of the radio frequency spectrum Software Defined Radio SDR is an attracting solution to easily reconfigure radio parameters In addition to SDR a cognitive radio

concept can be proposed by spectrum sensing and Dynamic Spectrum Access DSA both to overcome the spectrum scarcity problem This thesis proposes a new SDR solution for WSNs based on the IEEE 802 15 4 standard Our aim is to characterize an SDR platform that implements two standardized PHY layers and cognitive radio for WSNs In this thesis we carried out SDR implementations using a GNU Radio and Universal Software Peripheral Radio USRP platform We chose this particular platform because it is one of the most practical and well performed ones A thorough study was performed to analyze GNU Radio software architecture before its usage USRPs and their daughter boards were also analyzed through experimental radio frequency measurements The analysis of the GNU Radio USRP platform brought a detailed description of its architecture and performances as well as the way to implement an SDR This description particularly assists researchers to quickly develop efficient SDR receivers and transmitters We show through our experiments that the measured performances of daughter boards mounted on a USRP are lower than expected ones Despite these results some daughter boards have many interesting features such as large covered frequency bands and with a linear output power An empirical model was introduced to accurately characterize the average output power of a particular daughter board Then we implemented a new possible standardized PHY layer for the 868 915 MHz frequency band A reverse engineering process of another implementation was performed for the 2450 MHz frequency band These two PHY layers were described by communication chains or flow graphs We suggested a new Cognitive Radio by a reconfiguration of these flow graphs within the corresponding frequency bands The particularity of our cognitive radio is to reconfigure flow graphs in function to the selected frequency This selection is performed by DSA and spectrum sensing based on energy detection both through real wireless communications We introduced a message based algorithm in order to reconfigure the flow graphs and to synchronize the selection of a carrier frequency Our two implemented PHY layers for the 2450 MHz and the 868 915 frequency bands were found functional The first one was tested by exchanging data packets with real sensor nodes The second was also experienced by a packet exchange but via GNURadio USRP communications Both tests were carried out through real communications We were also able to measure two wireless communication parameters Bit Error Rate BER and the Packet Success Rate PSR The result of functional PHY layers was beneficial for realization and experiments of our cognitive radio We found that our DSA significantly improves the packet success rate compared to that obtained with static spectrum access in an indoor environment The results of this thesis lead to experiment a cognitive radio with an SDR not only for a WSN but for other wireless networks and radio standards

Wideband and Narrowband Spectrum Sensing Methods Using Software Defined Radios Jason Stegman,2014 The ability to accurately sense the surrounding wireless spectrum without having any prior information about the type of signals present is an important aspect for dynamic spectrum access and cognitive radio Energy detection is one viable method however its performance is limited at low SNR and must adhere to Nyquist sampling theorem Compressive sensing has emerged as a potential method to recover wideband signals

using sub Nyquist sampling rates under the presumption that the signals are sparse in a certain domain In this study the performance and some of the practical limitations of energy detection and compressive sensing are compared via simulation and also implementation using the Universal Software Radio Peripheral USRP software defined radio SDR platform The usefulness and simplicity of the USRP and GNU Radio software toolkit for simulation and experimentation as well as some other application areas of compressive sensing and SDR is also discussed

Wideband and Narrowband Spectrum Sensing Methods Using Software Defined Radios Jason Stegman (the author),2014 The ability to accurately sense the surrounding wireless spectrum without having any prior information about the type of signals present is an important aspect for dynamic spectrum access and cognitive radio Energy detection is one viable method however its performance is limited at low SNR and must adhere to Nyquist sampling theorem Compressive sensing has emerged as a potential method to recover wideband signals using sub Nyquist sampling rates under the presumption that the signals are sparse in a certain domain In this study the performance and some of the practical limitations of energy detection and compressive sensing are compared via simulation and also implementation using the Universal Software Radio Peripheral USRP software defined radio SDR platform The usefulness and simplicity of the USRP and GNU Radio software toolkit for simulation and experimentation as well as some other application areas of compressive sensing and SDR is also discussed

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

Spectrum Sensing Prototype Using Software Defined Radio USRP Nur Fatehah Othman,2015

Opportunistic Spectrum Sharing and White Space Access Oliver Holland,Hanna Bogucka,Arturas Medeisis,2015-06-15 Details the paradigms of opportunistic spectrum sharing and white space access as effective means to satisfy increasing demand for high speed wireless communication and for novel wireless communication applications This book addresses opportunistic spectrum sharing and white space access being particularly mindful of practical considerations and solutions In Part I spectrum sharing implementation issues are considered in terms of hardware platforms and software architectures for realization of flexible and spectrally agile transceivers Part II addresses practical mechanisms supporting spectrum sharing including spectrum sensing for opportunistic spectrum access machine learning

and decision making capabilities aggregation of spectrum opportunities and spectrally agile radio waveforms Part III presents the ongoing work on policy and regulation for efficient and reliable spectrum sharing including major recent steps forward in TV White Space TVWS regulation and associated geolocation database approaches policy management aspects and novel licensing schemes supporting spectrum sharing In Part IV business and economic aspects of spectrum sharing are considered including spectrum value modeling discussion of issues around disruptive innovation that are pertinent to opportunistic spectrum sharing and white space access and business benefits assessment of the novel spectrum sharing regulatory proposal Licensed Shared Access Part V discusses deployments of opportunistic spectrum sharing and white space access solutions in practice including work on TVWS system implementations standardization activities and development and testing of systems according to the standards Discusses aspects of pioneering standards such as the IEEE 802.22 Wi-Fi standard the IEEE 802.11af White-Fi standard the IEEE Dynamic Spectrum Access Networks Standards Committee standards and the ETSI Reconfiguration Radio Systems standards Investigates regulatory and regulatory linked solutions assisting opportunistic spectrum sharing and white space access including geolocation database approaches and licensing enhancements Covers the pricing and value of spectrum the economic effects and potentials of such technologies and provides detailed business assessments of some particularly innovative regulatory proposals The flexible and efficient use of radio frequencies is necessary to cater for the increasing data traffic demand worldwide This book addresses this necessity through its extensive coverage of opportunistic spectrum sharing and white space access solutions Opportunistic Spectrum Sharing and White Space Access The Practical Reality is a great resource for telecommunication engineers researchers and students

CRASH Jonathon Pendlum, 2014 The wireless spectrum has become more congested due to the rapid increase in the number of wireless devices As this trend continues the increased congestion will lead to further interference among wireless devices reducing spectrum efficiency and throughput To counteract this issue researchers have turned to Cognitive Radio programmable radios that cooperatively share the wireless spectrum Two key algorithms in Cognitive Radio are spectrum sensing and the spectrum decision Before accessing a wireless channel a cognitive radio must sense or detect channel occupancy and then make a transmit decision based on spectrum policies The parallelism of spectrum sensing algorithms map well to a Field Programmable Gate Array FPGA while the sequential processing of spectrum decision algorithms may be more easily implemented in software These processing requirements suggest a heterogeneous computing system where parallel algorithms are accelerated by being offloaded to the FPGA fabric Recently FPGA vendors have released System on Chip devices that tightly couple programmable logic and a multicore ARM processor Due to the low latency interconnect these SoCs show promise as an effective heterogeneous computing system We have developed CRASH Cognitive Radio Accelerated with Software and Hardware a new software and programmable logic framework for Xilinx's Zynq SoC to explore their potential in accelerating Cognitive Radio CRASH provides the framework

and interfaces for users to facilitate splitting algorithms between the Zynq's ARM processor and FPGA fabric. We implemented CRASH on a Xilinx ZC706 Zynq development board and used an Ettus Research USRP N210 software defined radio as the RF front end. Furthermore, CRASH has been integrated with the GNU Radio software defined toolkit and remains general enough to be integrated with other approaches such as MathWorks Simulink. To demonstrate CRASH, we implemented the spectrum decision in software and offloaded spectrum sensing to the FPGA fabric using our framework. For comparison, we also built a version with both algorithms in software. We determined the performance of each configuration by measuring the latency in sensing unoccupied spectrum and then transmitting in the spectrum. Compared to the purely software implementation, CRASH reduced turnaround time by 2x. CRASH creates a low latency, high performance cognitive radio platform that simplifies offloading algorithms to programmable logic. This research shows that heterogeneous computing systems such as CRASH can provide cognitive radios substantial processing gains without sacrificing programmability.

Automatic Real-time Spectrum Sensing Using Energy Detection in Software Defined Radio

Jyh-Chyuan Sun, 2012. The purpose of this graduate project is to design a real time spectrum sensing system using software defined radio. The uniqueness of software defined radio is the concept of replacing many of the hardware components in a traditional radio communication system with software algorithms and coding. The scope of this project will be on spectrum sensing to be able to automatically detect active signals in the desired frequency spectrum. The hardware components used in this graduate project are the Universal Software Radio Peripheral and the Agilent function generator. The graphical user interface and algorithm programming are performed in MATLAB. The spectrum sensing system will scan a portion of the frequency spectrum, determine the presence of signals, and display the three highest signal peaks in a given band. This paper will elucidate spectrum sensing's strengths and weaknesses as well as possible future work.

Communication Systems Engineering with GNU Radio, Jean-Michel Friedt, Herve Boeglen, 2024-10-15. An approachable guide to an invaluable radio frequency communication toolkit. Software defined radio (SDR), which emerged in the 1990s, has become a core development method in certain high profile fields including military and space communications. High cost and problems with hardware availability, however, prevented this technology from being widely disseminated. The advent of low cost hardware, beginning in the 2010s, however, has made GNU Radio the leading open source software toolkit for developing SDR systems, an increasingly viable and even critical tool for a new generation of radio frequency communication engineers. *Communication Systems Engineering with GNU Radio* provides an accessible overview of this toolkit and its applications. Beginning with the fundamentals of using GNU Radio for digital signal processing, the volume then moves to the practicalities of decoding data and the advantages of accessing raw data normally unavailable in hardware defined radio frequency receivers. The result is a potentially crucial tool for engineers looking to adopt this cost effective and flexible standard for transmitting and processing radio frequency signals. Readers will also find a careful balance of radio communications theory with GNU Radio.

practicalities Practical implementation examples employing well developed open source GNU Radio platforms Extensive accompanying documentation and explanation Communication Systems Engineering with GNU Radio is ideal for graduate and undergraduate students in communications systems courses as well as professionals working in SDR

White Space Communication Amit Kumar Mishra,David Lloyd Johnson,2014-10-13 This monograph presents a collection of major developments leading toward the implementation of white space technology an emerging wireless standard for using wireless spectrum in locations where it is unused by licensed users Some of the key research areas in the field are covered These include emerging standards technical insights from early pilots and simulations software defined radio platforms geo location spectrum databases and current white space spectrum usage in India and South Africa

Mixed-Signal Architectures for Spectrum Sensing Kevin Banovic,2016 The radio spectrum is subject to temporal and geographic variations and measurements indicate low utilization below 6GHz In response the Federal Communications Commission sent a notice of proposed rulemaking to facilitate cognitive radio use in the licensed digital television bands Cognitive radios identify unused spectrum segments for data transmission while minimizing interference with licensed radios Spectrum sensing is the enabling technology and detects the presence of a signal within a frequency band Mixed signal architectures offer potential power savings by performing signal detection in the analog domain significantly reducing the analog to digital converter ADC sampling rate The integrating mixer is a novel mixed signal architecture for spectrum sensing that is based on the short time Fourier transform STFT The architecture consists of a folded double balanced mixer with capacitive loads that implements current domain windowing in the first stage while downconversion mixing and integration is implemented in the second stage A load capacitor array enables integration with programmable time constant A prototype was designed and fabricated in IBM s 0 13 m CMOS process The measured results indicate an average dynamic range DR of 24 2dB over a 2 2GHz bandwidth BW with a power dissipation of 1 55mW The integrating mixer architecture is extended by utilizing binary weighted load capacitors which integrates the STFT signal and acts as the sampling capacitors for a successive approximation register SAR ADC An array of folded mixers are utilized to remove current restrictions on the selection of the window function which improves side lobe reduction and fall off in the frequency domain A prototype was designed and fabricated in IBM s 0 13 m CMOS process The measured results indicate an average DR of 26 8dB over a 1 25GHz BW The integrated SAR ADC achieves a peak signal to noise and distortion ratio of 45 4dB at a sampling frequency of 200kHz for an effective number of bits of 7 25 The power dissipation is 0 88mW for a full quadrature implementation In comparison to recent spectrum sensing implementations the integrating mixer prototypes achieve the lowest power dissipation while obtaining a DR that falls within the reported range The prototypes are well suited for integration within low power cognitive radio transceivers that target portable IEEE 802 22 applications

Space-Time Spectrum Sensing for Cognitive Radio
Usama Yusuf Mohamad,2019-12-16

Spectrum Sensing Measurement Using Gnu Radio And Usrp Book Review: Unveiling the Magic of Language

In a digital era where connections and knowledge reign supreme, the enchanting power of language has been apparent than ever. Its ability to stir emotions, provoke thought, and instigate transformation is really remarkable. This extraordinary book, aptly titled "**Spectrum Sensing Measurement Using Gnu Radio And Usrp**," published by a highly acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound affect on our existence. Throughout this critique, we will delve into the book's central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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