Fpga Implementation Of Beamforming Receivers Based On Mrc

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Fpga Implementation Of Beamforming Receivers

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Interference implementation has two important contributions: real-time QR decomposition and back substitution for whitening input data, and adaptive beamforming The design is specifically intended to allow for real-time detection and synchronization ...

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The objective of the work presented is to implement a Digital Beamforming (DBF) plat- form for an antenna array receiver designed for the S-DMB system. Our project deals with the design of antenna arrays from a hardware point of view, in contrast to other theo-

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Digital Beamforming Implementation

on an FPGA Platform

The goal of the project described in this paper was to design an acoustic system for localization of the dominant noise source by implementation of the conventional delay-and-sum beamforming...

An Implementation of Beamforming Algorithm on FPGA ...

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Below is the Simulink model with the behavioral algorithm and its corresponding implementation algorithm for an FPGA. modelname = ' SimulinkBeamformingHDLWorkflowExample' ; open_system(modelname); % Ensure model is visible and not obstructed by scopes. open_system(modelname); set(allchild(0), 'Visible' , 'off');

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An example of a system for the implementation of the QR FPGA core is QinetiQ's Quixilica Callisto VXS switch card, which provides five Virtex-II Pro P50 FPGAs. This enables multiple beams to be calculated using multiple QR cores, each in a separate FPGA, or a larger number of rotate processors to be spread over multiple FPGAs, reducing the processing time required.

Real-time adaptive beamforming: FPGA implementation using ...

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abstract={the goal of the project described in this paper was to design an acoustic system for localization of the dominant noise source by implementation of the conventional delay-and-sum beamforming algorithm on fpga platform with a sound receiver system based on digital mems microphone array. the system consists of a platform for acoustic signal acquisition and data processing (microphone array, interface, and central block), and a platform for monitoring and control (a computer

with a ...

Field programmable gate arrays (FPGAs) are an increasingly popular technology for implementing digital signal processing (DSP) systems. By allowing designers to create circuit architectures developed for the specific applications, high levels of performance can be achieved for many DSP applications providing considerable improvements over conventional microprocessor and dedicated DSP processor solutions. The book addresses the key issue in this process specifically, the methods and tools needed for the design, optimization and implementation of

DSP systems in programmable FPGA hardware. It presents a review of the leading-edge techniques in this field, analyzing advanced DSP-based design flows for both signal flow graph- (SFG-) based and dataflow-based implementation, system on chip (SoC) aspects, and future trends and challenges for FPGAs. The automation of the techniques for component architectural synthesis, computational models, and the reduction of energy consumption to help improve FPGA performance, are given in detail. Written from a system level design perspective and with a DSP focus, the authors present many practical application examples of complex DSP implementation, involving: high-performance computing e.g. matrix operations such as matrix multiplication; high-speed filtering

including finite impulse response (FIR) filters and wave digital filters (WDFs); adaptive filtering e.g. recursive least squares (RLS) filtering; transforms such as the fast Fourier transform (FFT). FPGA-based Implementation of Signal Processing Systems is an important reference for practising engineers and researchers working on the design and development of DSP systems for radio, telecommunication, information, audio-visual and security applications. Senior level electrical and computer engineering graduates taking courses in signal processing or digital signal processing shall also find this volume of interest.

Revised edition of: FPGA-based implementation of signal processing systems / Roger Woods ... [et al.]. 2008.

The use of Global Positioning System (GPS) and upcoming Global Navigation Satellite System (GNSS) signals for Geostationary Orbit (GEO) and Highly Elliptical Orbit (HEO) space missions has special design challenges. Such missions are at an altitude above the altitude of the GNSS constellations. Consequently, the signals reaching an onboard receiver originate from GNSS satellites on the opposite side of Earth. The received signals are 10 to 100 times weaker with limited satellite spatial diversity. GNSS signal reception at GEO and beyond is dependent on accurately modelling the side lobes of the GNSS satellite transmit antenna array. Starting with the GPS Block III satellites, the GPS Interface Control Document (ICD) provides

specifications on the gain characteristics of the main lobe of the transmit antenna array. There is no information in the literature that describes the side lobes of the transmit antenna pattern. Pictures of antennas onboard the Galileo Full Operational Capability (FOC) satellites indicates a transmit array of 28 patch antennas. No information can be found in the literature that characterizes the gain pattern for the Galileo FOC transmit antenna array. In this dissertation, GPS Block III and Galileo FOC transmit array main and side lobe gain patterns have been reversed engineered using computational electromagnetics. Using the reverse engineered transmit antenna gain patterns, satellite visibility and accuracy is evaluated onboard a GEO satellite using a combined GPS plus

Galileo satellite constellation. Traditional ground-based satellite laser ranging has accuracy in the kilometer class. Leveraging both the main lobe and side lobes of a combined GPS plus Galileo constellation can result in at least two orders of improvement compared to ground-based approaches. Persistent autonomous RMS 3-D positioning accuracies of 9 -- 15 m can be achieved at GEO. Specular multipath resulting from the body structure and solar arrays is the dominant error source onboard Low Earth Orbit (LEO) satellites. In particular, solar panel induced specular reflections onboard the International Space Station (ISS) can cause up to 50m in GPS positioning error. Conventional multipath mitigation strategies are insufficient overcome this problem. In this work, a

novel implementation of adaptive digital beamforming and predictive antenna nulling is demonstrated to overcome multipath. Using live sky data, a 4x decrease in positioning errors is achieved using a simple four element antenna array. A combined GPS + Galileo system is chosen to leverage the common L1 signal which will be transmitted by both constellations. Given the rather weak signal reception at GEO and beyond, custom signal acquisition algorithms are required. Such implementation cannot be found in commercial GNSS receivers. A real-time L1 C/A receiver with adaptive digital beamforming has been developed. The receiver has been implemented on the Xilinx Virtex-5QV rad-hard FPGA. To overcome the need for an external coprocessor, a dual core LEON3

processor has also been implemented within the same FPGA. Receiver performance and design methodologies adopted in its implementation are discussed in this thesis.

With success of ICEEE 2010 in Wuhan, China, and December 4 to 5, 2010, the second International Conference of Electrical and Electronics Engineering (ICEEE 2011) will be held in Macau, China, and December 1 to 2, 2011. ICEEE is an annual conference to call together researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Electrical and Electronics Engineering along with Computer Science and Technology,

Communication Technology, Artificial Intelligence, Information Technology, etc. This year ICEEE is sponsored by International Industrial Electronics Center, Hong Kong. And based on the deserved reputation, more than 750 papers have been submitted to ICEEE 2011, from which about 98 high quality original papers have been selected for the conference presentation and inclusion in the “Electrical and Electronics Engineering” book based on the referees’ comments from peer-refereed. We expect that the Electrical and Electronics Engineering book will be a trigger for further related research and technology improvements in the importance subject including Power Engineering, Telecommunication, Integrated Circuit, Electronic amplifier , Nano-technologies, Circuits and networks, Microelectronics, Analog

circuits, Digital circuits, Circuits design, Silicon devices, Thin film technologies, VLSI, Sensors, CAD tools, Molecular computing, Superconductivity circuits, Antennas technology, System architectures, etc.

The automation of the techniques for component architectural synthesis, computational models, and the reduction of energy consumption to help improve FPGA performance, are given in detail." "FPGA-based Implementation of Signal Processing Systems is an important reference for practising engineers and researchers working on the design and development of DSP systems for radio, telecommunication, information, audio-visual and security applications. Senior level electrical and computer engineering graduates taking courses

in signal processing or digital signal processing shall also find this volume of interest."--BOOK JACKET.

This thesis presents research of a new method for an all-digital design and implementation for the TIGER radar receiver using FPGA techology. The purpose is to replace and upgrade the current analog receiver radar system. In many previous designs, most of the receivers are built separately from the phasing network. In this new method, the design incorporates all components including the phasing inside single chip. The immediate advantages are not only smaller size, less space required, easier/cheaper to build and maintain but also higher quality results. Since the design based on reconfigurable hardware, it would be possible to use the same hardware

to produce different scan modes, generate arbitrary waveforms etc. Another possible enhancement is recording and storing data could be done directly from individual receivers rather than summing the outputs first as is done in the current system. Post processing beam forming and interpolation within beams could be then performed independently. In the future, upgrading and adding new functions in the radar hardware would be easy as upgrading the software is today.

This book explore the use of new technologies in the area of satellite navigation receivers. In order to construct a reconfigurable receiver with a wide range of applications, the authors discuss receiver architecture based on software-defined radio

techniques. The presentation unfolds in a user-friendly style and goes from the basics to cutting-edge research. The book is aimed at applied mathematicians, electrical engineers, geodesists, and graduate students. It may be used as a textbook in various GPS technology and signal processing courses, or as a self-study reference for anyone working with satellite navigation receivers.

Satellite communication systems are now a major part of most telecommunications networks as well as our everyday lives through mobile personal communication systems and broadcast television. A sound understanding of such systems is therefore important for a wide range of system designers, engineers and users. This book provides a

comprehensive review of some applications that have driven this growth. It analyzes various aspects of Satellite Communications from Antenna design, Real Time applications, Quality of Service (QoS), Atmospheric effects, Hybrid Satellite-Terrestrial Networks, Sensor Networks and High Capacity Satellite Links. It is the desire of the authors that the topics selected for the book can give the reader an overview of the current trends in Satellite Systems, and also an in depth analysis of the technical aspects of each one of them.

This book contains research contributions from leading global scholars in nature-inspired computing. It includes comprehensive coverage of each respective topic, while also highlighting recent and future trends.

The contributions provides readers with a snapshot of the state of the art in the field of nature-inspired computing and its application. This book has focus on the current researches while highlighting the empirical results along with theoretical concepts to provide a comprehensive reference for students, researchers, scholars, professionals and practitioners in the field of Advanced Artificial Intelligence, Nature-Inspired Algorithms and Soft Computing.