

SYSTEMATIC DESIGN FOR OPTIMISATION OF PIPELINED ADCs

by

João Goes

Universidade Nova de Lisboa, Portugal

João C. Vital

Chipidea – Microelectronics, SA., Portugal

and

José Franco

Universidade Nova de Lisboa, Portugal

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Systematic Design For Optimisation Of Pipelined Adcs

Kimmo Koli, Kari A.I. Halonen



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Systematic Design for Optimisation of Pipelined ADCs João Goes, João C. Vital, José E. Franca, 2001-02-28 This excellent reference proposes and develops new strategies methodologies and tools for designing low power and low area CMOS pipelined A D converters The task is tackled by following a scientifically consistent approach The book may also be used as a text for advanced reading on the subject

Systematic Design for Optimisation of Pipelined ADCs João Goes, João C. Vital, José E. Franca, 2006-04-18 Systematic Design for Optimisation of Pipelined ADCs proposes and develops new strategies methodologies and tools for designing low power and low area CMOS pipelined A D converters The task is tackled by following a scientifically consistent approach First of all the state of the art in pipeline A D converters is analysed with a double purpose a to identify the best suited among different strategies reported in literature and taking into account the objectives pursued b to identify the drawbacks of these strategies as a basic first step to improve them Then the book proposes a top down design approach for implementing high performance low power and low area CMOS pipelined A D converters through The conception development and implementation of self calibrated techniques to extend the linearity of some critical stages in the architecture of pipelined ADCs The detailed analysis and modelling of some major non idealities that limit the physical realisation of pipelined ADCs and the proposal development and implementation of design methodologies to support systematic design of optimised instances of these converters which combine maximum performance with minimum power dissipation and minimum area occupation LIST Several implementations together with consistent measured results are presented In particular a practical realisation of a low power 14 bit 5MS s CMOS pipelined ADC with background analogue self calibration is fully described The proposed approach is fully in line with the best practice regarding the design of mixed signal integrated circuits On the one hand drawbacks of currently existing solutions are overcome through innovative strategies and on the other hand the expert knowledge is packaged and made available for re usability by the community of circuit designers Finally feasibility of the strategies and the associated encapsulated knowledge is granted through experimental validation of working silicon Systematic Design for Optimisation of Pipelined ADCs serves as an excellent reference for analogue design engineers especially designers of low power CMOS A D converters The book may also be used as a text for advanced reading on the subject

Device-Level Modeling and Synthesis of High-Performance Pipeline ADCs Jesús Ruiz-Amaya, Manuel Delgado-Restituto, Ángel Rodríguez-Vázquez, 2011-07-15 This book presents models and procedures to design pipeline analog to digital converters compensating for device inaccuracies so that high performance specs can be met within short design cycles These models are capable of capturing and predicting the behavior of pipeline data converters within less than half a bit deviation versus transistor level simulations As a result far fewer model iterations are required across the design cycle Models described in this book accurately predict transient behaviors which are key to the performance of discrete time systems and hence to the performance of pipeline data

converters **Design Criteria for Low Distortion in Feedback Opamp Circuits** Bjørnar Hernes, Trond Sæther, 2006-04-18 Broadband opamps for multi channel communication systems make strong demands on linearity performance This book written for Analog CMOS designers presents a thorough analysis of the nonlinear behaviour of circuits to obtain opamps with low distortion CMOS Circuit Design for RF Sensors Gunnar Gudnason, Erik Bruun, 2006-04-18 CMOS Circuit Design for RF Sensors is about CMOS circuit design for sensor and actuators to be used in wireless RF systems The main application is implantable transducers for biomedical purposes such as sensing of nerve signals and electrical stimulation of nerves Special focus is put on the power and data link in a wireless system with transducers which are powered via the RF link Novel principles and methods are presented for the regulation of power to the sensors and for the distribution of data and power in an implanted transducer system One of the main problems in such systems is the transmission of power via an RF link This problem is analyzed in detail and solutions incorporating an RF magnetic link to the transducers are identified The theoretical results are supported by experiments from CMOS chips including a system chip for functional electrical stimulation FES **Multi-Standard CMOS Wireless Receivers: Analysis and Design** Xiaopeng Li, Mohammed Ismail, 2005-12-19 This is the first book on the subject of multi standard wireless receivers It covers both the analysis and design aspects of CMOS radio receivers with primary focus on receivers for mobile terminals The subject of multi standard data converter design for base stations is also covered Design of High-Performance CMOS Voltage-Controlled Oscillators Liang Dai, Ramesh Harjani, 2012-12-06 Design of High Performance CMOS Voltage Controlled Oscillators presents a phase noise modeling framework for CMOS ring oscillators The analysis considers both linear and nonlinear operation It indicates that fast rail to rail switching has to be achieved to minimize phase noise Additionally in conventional design the flicker noise in the bias circuit can potentially dominate the phase noise at low offset frequencies Therefore for narrow bandwidth PLLs noise up conversion for the bias circuits should be minimized We define the effective Q factor Q_{eff} for ring oscillators and predict its increase for CMOS processes with smaller feature sizes Our phase noise analysis is validated via simulation and measurement results The digital switching noise coupled through the power supply and substrate is usually the dominant source of clock jitter Improving the supply and substrate noise immunity of a PLL is a challenging job in hostile environments such as a microprocessor chip where millions of digital gates are present Model Engineering in Mixed-Signal Circuit Design Sorin Alexander Huss, 2006-04-18 For the first time this up to date text combines the main issues of the hardware description language VHDL AMS aimed at model representation of mixed signal circuits and systems characterization methods and tools for the extraction of model parameters and modelling methodologies for accurate high level behavioural models *Introduction to Avionics Systems* R.P.G. Collinson, 2002-12-31 Evaluation copies are available Please contact textbooks wkap com Provide the course number number of students and present textbook used Introduction to Avionics Systems Second Edition explains the basic principles and underlying theory of

modern avionic systems and how they are implemented with current technology for both civil and military aircraft in a clear and easy to read manner All systems are explained so that their design and performance can be understood and analysed Worked examples are included to illustrate the application of the theory and principles covered The latest developments and directions of research for future systems are included This new second edition has approximately 25% new material and takes into account the technology developments which have taken place since the first edition was published in January 1996 The book is well illustrated with line drawings and photos with some in colour where appropriate Readership Graduates or equivalent from a range of disciplines entering the avionics and aerospace industries Engineers at all levels engaged in the design and development of avionic systems and equipment in the avionic and aerospace industries Students and post graduate students taking avionics and aeronautical engineering courses Staff in the armed services and civil airlines engaged in the support or operation of aircraft who wish to acquire a deeper understanding of the design and implementation of avionic systems and equipment

Modular Low-Power, High-Speed CMOS Analog-to-Digital Converter of Embedded Systems Keh-La Lin, Armin Kemna, Bedrich J. Hosticka, 2006-01-14 One of the main trends of microelectronics is toward design for integrated systems i e system on a chip SoC or system on silicon SoS Due to this development design techniques for mixed signal circuits become more important than before Among other devices analog to digital and digital to analog converters are the two bridges between the analog and the digital worlds Besides low power design technique is one of the main issues for embedded systems especially for hand held applications Modular Low Power High Speed CMOS Analog to Digital Converter for Embedded Systems aims at design techniques for low power high speed analog to digital converter processed by the standard CMOS technology Additionally this book covers physical integration issues of A/D converter integrated in SoC i e substrate crosstalk and reference voltage network design

Circuit Techniques for Low-Voltage and High-Speed A/D Converters Mikko E. Waltari, Kari A.I. Halonen, 2005-12-30 For four decades the evolution of integrated circuits has followed Moore's law according to which the number of transistors per square millimeter of silicon doubles every 18 months At the same time transistors have become faster making possible ever increasing clock rates in digital circuits This trend seems set to continue for at least another decade without slowing down Thus in the near future the processing power of digital circuits will continue to increase at an accelerating pace For analog circuits the evolution of technology is not as beneficial Thus there is a trend to move signal processing functions from the analog domain to the digital one which besides allowing for a higher level of accuracy provides savings in power consumption and silicon area increases robustness speeds up the design process brings flexibility and programmability and increases the possibilities for design reuse In many applications the input and output signals of the system are inherently analog preventing all digital realizations at the very least a conversion between analog and digital is needed at the interfaces Typically moving the analog/digital boundary closer to the outside world increases the bit rate across it In telecommunications systems the trend to boost

bit rates is based on playing wider bandwidths and a higher signal to noise ratio. At the same time, radio architectures in many applications are evolving toward software defined radio, one of the main characteristics of which is the shifting of the analog/digital boundary closer to the antenna.

Architectures for RF Frequency Synthesizers Cicero S. Vaucher, 2006-04-18

This text describes a conceptual framework for analyzing the performance of PLL frequency synthesizers and presents optimization procedures for the different performance aspects. It contains basic information and in-depth knowledge widely illustrated with practical design examples used in industrial products.

CMOS Current Amplifiers Kimmo Koli, Kari A.I. Halonen, 2006-04-18

CMOS Current Amplifiers: Speed versus Nonlinearity is intended as a current amplifier cookbook containing an extensive review of different current amplifier topologies realisable with modern CMOS integration technologies. The seldom-discussed issue of high frequency distortion performance is derived for all reviewed amplifier topologies using as simple and intuitive mathematical methods as possible. The topologies discussed are also useful as building blocks for high performance voltage mode amplifiers. So the reader can apply the discussed techniques to both voltage and current mode analogue integrated circuit design. This book contains application examples with experimental results in three different fields: instrumentation amplifiers, continuous time analogue filters, and logarithmic amplifiers.

The Piezjunction Effect in Silicon Integrated Circuits and Sensors Fabiano Fruett, Gerard C.M. Meijer, 2006-04-18

Mechanical stress affects the magnitude of base-emitter voltages of forward-biased bipolar transistors. This phenomenon is called the piezjunction effect. The piezjunction effect is the main cause of inaccuracy and drift in integrated temperature sensors and bandgap voltage references. The aim of *The Piezjunction Effect in Silicon Integrated Circuits and Sensors* is twofold: Firstly, to describe techniques that can reduce the mechanical stress-induced inaccuracy and long-term instability. Secondly, to show that the piezjunction effect can be applied for new types of mechanical sensor structures. During IC fabrication and packaging, thermo-mechanical stress is induced when the packaged chips cool down to the temperature of application. The piezjunction effect is caused by a stress-induced change in the conductivity of the minority charge carriers, while the piezoresistive effect is caused by a similar effect for the majority charge carriers. To characterise the anisotropic piezjunction effect, the authors performed systematic investigations over wide ranges of mechanical stress and temperature. The experiments have been performed for various crystal and stress orientations. The experimental results have been used to extract the first and second order piezjunction FOPJ and SOPJ coefficients for bipolar transistors. It is shown how the knowledge of the piezjunction and piezoresistive coefficients can be used to minimize the undesirable mechanical stress effects on the electrical characteristics of transistors and resistors respectively. Devices with lower mechanical stress sensitivity can be found by comparing their piezo-coefficients. The layout of the device can also be optimized to reduce the mechanical stress sensitivity. As a next step, it is shown how the knowledge of the piezo effects on device level can be used to predict and to reduce their negative influence on circuit level. This is demonstrated for a number of important basic circuits including

translinear circuits temperature transducers and bandgap references Finally it is shown how the piezjunction effect can be used to fabricate stress sensing elements It appears that in comparison with resistive stress sensing elements the piezjunction sensors have the advantage of a smaller size and very low power dissipation

Direct Conversion Receivers in Wide-Band Systems Aarno Pärssinen, 2006-04-18 This book is based on my doctoral thesis at the Helsinki University of Technology Several different projects during five years guided me from the basics of the RF IC design to the implementations of highly integrated radio receiver chips Sharing time and effort between IC and system issues is not always straightforward I have been lucky to follow both topics and share experiences with diligent and enthusiastic people having different specialities As a result this book will cover a wide range of different topics needed in the design of highly integrated radio receivers Experiences from the first receiver prototypes for the third generation cellular systems form the basis of this book Most of the issues are directly related to the early proposals of European and Japanese standardization organizations For example the chip rate was originally set to 4 096 Mcps in a wide band CDMA channel I have kept that number in the book in most of the examples although it has been later changed to 3 84 Mcps I hope that the readers will accept that and the possible other incompatibilities to the latest specifications At least in the research phase the changes even in the most essential requirements are definitely not a rare incident and IC designers should be able to react and modify their designs as soon as they can

Data Converters for Wireless Standards Chunlei Shi, Ismail Mohamed Mostafa, 2006-04-18 This text presents the design of data converters for emerging standards and introduces the underlying circuit design principles It is an excellent reference for IC and mixed signal designers design managers and project leaders in industry particularly those in the wireless semiconductor industry

Direct Digital Synthesizers Jouko Vankka, Kari A.I. Halonen, 2013-04-17 A major advantage of a direct digital synthesizer DDS is that its output frequency phase and amplitude can be precisely and rapidly manipulated under digital processor control Other inherent DDS attributes include the ability to tune with extremely fine frequency and phase resolution and to rapidly hop between frequencies These combined characteristics have made the technology popular in military radar and communications systems In fact DDS technology was previously applied almost exclusively to high end and military applications it was costly power hungry difficult to implement and required a discrete high speed D A converter Due to improved integrated circuit IC technologies they now present a viable alternative to analog based phase locked loop PLL technology for generating agile analog output frequency in consumer synthesizer applications It is easy to include different modulation capabilities in the DDS by using digital signal processing DSP methods because the signal is in digital form By programming the DDS adaptive channel bandwidths modulation formats frequency hopping and data rates are easily achieved The flexibility of the DDS makes it ideal for signal generator for software radio The digital circuits used to implement signal processing functions do not suffer the effects of thermal drift aging and component variations associated with their analog counterparts The implementation of digital functional blocks makes it possible to

achieve a high degree of system integration Recent advances in IC fabrication technology particularly CMOS coupled with advanced DSP algorithms and architectures are providing possible single chip DDS solutions to complex communication and signal processing subsystems as modulators demodulators local oscillators programmable clock generators and chirp generators The DDS addresses a variety of applications including cable modems measurement equipments arbitrary waveform generators cellular base stations and wireless local loop base stations Direct Digital Synthesizers was written to find possible applications for radio communication systems It will have appeal for wireless and wireline communication engineers teachers and students

Continuous-Time Sigma-Delta Modulation for A/D Conversion in Radio

Receivers Lucien Breems,Johan Huijsing,2006-04-18 This text describes the design and theory of continuous time sigma delta modulators for analogue to digital conversion in radio receivers The book s main focus is on dynamic range linearity and power efficiency aspects of sigma delta modulators which are very important requirements for use in battery operated receivers

Automated Calibration of Modulated Frequency Synthesizers Dan McMahon,2006-04-18 In recent years there has been considerable interest in highly integrated low power portable wireless devices This monograph focuses on the problem of low power GFSK GMSK modulation and presents an architectural approach for improved performance Including several valuable tools for the practicing engineer

Switched-Capacitor Techniques for High-Accuracy Filter and ADC Design Patrick J. Quinn,Arthur H.M. van Roermund,2007-07-20 This book proposes alternative switched capacitor techniques which allow the achievement of higher intrinsic analogue functional accuracy than previously possible in such application areas as analogue filter and ADC design The validity of the concepts developed and analyzed in Switched Capacitor Techniques for High Accuracy Filter and ADC Design has been demonstrated in practice with the design of CMOS SC bandpass filters and algorithmic ADC stages

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Table of Contents Systematic Design For Optimisation Of Pipelined Adcs

1. Understanding the eBook Systematic Design For Optimisation Of Pipelined Adcs
 - The Rise of Digital Reading Systematic Design For Optimisation Of Pipelined Adcs
 - Advantages of eBooks Over Traditional Books
2. Identifying Systematic Design For Optimisation Of Pipelined Adcs
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Systematic Design For Optimisation Of Pipelined Adcs
 - User-Friendly Interface
4. Exploring eBook Recommendations from Systematic Design For Optimisation Of Pipelined Adcs
 - Personalized Recommendations
 - Systematic Design For Optimisation Of Pipelined Adcs User Reviews and Ratings
 - Systematic Design For Optimisation Of Pipelined Adcs and Bestseller Lists

5. Accessing Systematic Design For Optimisation Of Pipelined Adcs Free and Paid eBooks
 - Systematic Design For Optimisation Of Pipelined Adcs Public Domain eBooks
 - Systematic Design For Optimisation Of Pipelined Adcs eBook Subscription Services
 - Systematic Design For Optimisation Of Pipelined Adcs Budget-Friendly Options
6. Navigating Systematic Design For Optimisation Of Pipelined Adcs eBook Formats
 - ePub, PDF, MOBI, and More
 - Systematic Design For Optimisation Of Pipelined Adcs Compatibility with Devices
 - Systematic Design For Optimisation Of Pipelined Adcs Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Systematic Design For Optimisation Of Pipelined Adcs
 - Highlighting and Note-Taking Systematic Design For Optimisation Of Pipelined Adcs
 - Interactive Elements Systematic Design For Optimisation Of Pipelined Adcs
8. Staying Engaged with Systematic Design For Optimisation Of Pipelined Adcs
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Systematic Design For Optimisation Of Pipelined Adcs
9. Balancing eBooks and Physical Books Systematic Design For Optimisation Of Pipelined Adcs
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Systematic Design For Optimisation Of Pipelined Adcs
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Systematic Design For Optimisation Of Pipelined Adcs
 - Setting Reading Goals Systematic Design For Optimisation Of Pipelined Adcs
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Systematic Design For Optimisation Of Pipelined Adcs
 - Fact-Checking eBook Content of Systematic Design For Optimisation Of Pipelined Adcs
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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