2017 MIXDES – 24th International Conference Mixed Design of Integrated Circuits and Systems

Bydgoszcz, Poland 22-24 June 2017



IEEE Catalog Number: ISBN: CFP17MIX-POD 978-1-5090-6486-1 Copyright © 2017, Department of Microelectronics & Computer Science, Lodz University of Technology, Poland All Rights Reserved

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number: ISBN (Print-On-Demand): ISBN (Online): CFP17MIX-POD 978-1-5090-6486-1 978-83-63578-12-1

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



Table of Contents

I

	Preface
	Table of Contents 7
I	General Invited Papers
	Emerging Sigma-Delta Modulation Techniques for an Efficient Digitization in the Internet of Things
	High-Performance Silicon Photonics Platform for Low-Power Photonic Integrated Circuits 17 T. Mogami (PETRA, Japan), T. Horikawa (PETRA and AIST, Japan), K. Kinoshita (PETRA, Japan)
	Introduction of Analog Front End IC Used in Sensing System 19 Y. Shimeno (New Japan Radio Co., Ltd., Japan)
	The Future of CMOS: More Moore or The Next Big Thing? 21 W. Kuźmicz (Warsaw Univ. of Techn., Poland)
S 1	New Trend of Analog Systems
	Integrated CMOS ADC - Tutorial Review on Recent Hybrid SAR-ADC Architectures (invited paper)
	Sensor/RF Digitization for IoT-Applications Using All-Digital-Very-Scalable-ADC TAD (invited paper)
	SI/PI/EMI Simulation Techniques and Application to Automotive Electronic Design Issues (invited paper)
	A 2nd-order ΔΣAD Modulator Using Ring Amplifier and SAR Quantizer with Simplified Operation Mode
	A Delta-Sigma DAC with Feedforward Jitter-Shaper Reducing Jitter Noise
	A Design Method of Low Frequency Universal Filter Employing MOCCIIs
	A High Precision Vernier Type Delta-Sigma Time to Digital Converter
	A Simple Current Reference with Low Sensitivity to Supply Voltage and Temperature
	An Application for Tree Structure NSDEM to a Directivity Speaker with Amplitude Controlling a Digitally Direct Driven Speaker
	Applying Negative Feedback to Improve Linearity and Input Property of Analog CMOS Transresistor
	Comparator Design for Linearized Statistical Flash A-to-D Converter
	Experimental Study of the Oscillation Mode of the Coupled Oscillator ORIGAMI for TDC
	Improvement Technique of Tuning Range for Local-Feedback MOS Transconductor 95 T. Ohbuchi, F. Matsumoto (National Defense Academy, Japan)

_ow-Distortion Low-Power MOSFET-C Filter Design Method 1	01
S. Takagi, H. Sato (Tokyo Inst. of Techn., Japan)	
Non-binary Cyclic and Binary SAR Hybrid ADC	05
K. Inoue, T. Matsuura, A. Hyogo (Tokyo Univ. of Science, Japan), H. San (Tokyo City Univ., Japan)	
Dperational Amplifier Based LC Resonant Circuit for Adiabatic Logic	110
Y. Takahashi, T. Sekine, M. Han (Gifu Univ., Japan)	
Self-calibrated Analog-Front-End Circuitry for Ultra Low Power Strain Sensors	14
D. Kuramoto, T. Hamasaki (Hiroshima Inst. of Techn., Japan)	

S2 Compact Modeling for Characterization and Design of CMOS ICs

A Test Structure for Characteriation of the Shallow Piezoresistor-based Strain Sensors	
Analytical Modeling of RDF Effects on the Threshold Voltage in Short-Channel Double-Gate MOSFETs	
Electrical Characterization of Different Types of Transistors Fabricated in VeSTIC Process 132 G. Głuszko, D. Tomaszewski, K. Domański (Institute of Electron Techn., Poland)	
Improvements in Qucs-S Equation-Defined Modelling of Semiconductor Devices and IC's 137 M. Brinson (London Metropolitan Univ., UK), V. Kuznetsov (Bauman Moscow Tech. Univ., Russia)	
Non-Iterative NEGF Based Model for Band-to-Band Tunneling Current in DG TFETs 143 F. Hosenfeld, F. Horst, A. Kloes (Tech. Hochschule Mittelhessen, Germany), B. Iniguez, F. Lime (Univ. Rovira i Virgili, Spain)	
Simulation Framework for Barrier Lowering in Schottky Barrier MOSFETs	
Variability-Aware Table-Based DC Model of a Dual-Gate Transistor	
xTCA for Instrumentation	
A C++ Shared-Memory Ring-Buffer Framework for Large-Scale Data Acquisition Systems	

Development of Complex Systems for High-Energy Physics	167
Human Machine Interface for High Energy Physics Experiments	173
Universal Module Management Controller for MicroTCA.4 Systems	178

1 Design of Integrated Circuits and Microsystems

S3

A Bidirectional Front-end with Bandwidth Control for Actuation and Read-out of MEMS Resonating Sensors	185
L. Marchetti, Y. Berg, M. Azadmehr (Univ. College of Southeast Norway, Norway)	
A Highly Linear 4-bit DAC with 1GHz Sampling Rate Implemented in 28nm FD-SOI Process	189
A Low Energy Pulse Interval Modulation for Implantable Devices	196

A Method to Manage Unknown Values Generation and Propagation During Gate Level Simulations of Multi-Clock Digital Circuits 200 A. Łuczyk (Warsaw Univ. of Techn., Poland)
A Novel APS Pixel Level Rearrangement to Increase the Fill Factor and SNR in 0.35µm CMOS Technology
Algorithms for Elimination of Charge Sharing Effects in Single Photon Counting Pixel Detectors 211 P. Otfinowski, A. Krzyzanowska (AGH Univ. of Science and Techn., Poland) 211
An Embedded Charge Pump for a Zener-Based Voltage Reference Compensated Using a ΔV_BE Stack
An Extendable Global Clock High-Speed Binary Counter Compatible with the FPGA CLBs
Application of the Maximum Weighted Matching to Quantum Cost Reduction in Reversible Circuits 224 J. Jegier (Orange Labs, Poland), P. Kerntopf (Univ. of Lodz, Poland) 24
Automated Diagnosis of HV/LV and Floating Gate Faults in VLSI Design 229 Q. Zhu (International Technological Univ., USA)
Biasing Potentials Monitoring Circuit for Multichannel Radiation Imaging ASIC In-system Diagnostics
Design of 4 Gbps SLVS-type Transmitter in 55 nm CMOS 240 L.A. Kadlubowski, P. Kmon (AGH Univ. of Science and Techn., Poland)
Design of Memory Subsystem for Wide Input Data Range in the SALT ASIC 245 K. Świentek, M. Banachowicz (AGH Univ. of Science and Techn., Poland)
Designing HFPGA-based Mealy FSMs with Transformation of Output Functions
Designing HFPGA-based FSMs with Counters
EIA/TIA-485 Transceiver in Standard 130 nm CMOS Technology
Exploiting Reversible Logic Design for Implementing Adiabatic Circuits 264 A. Rauchenecker, T. Ostermann, R. Wille (Johannes Kepler Univ., Austria)
FPGA Implementation of the Multiplication Operation in the Multiple-Precision Arithmetic 271 K. Rudnicki (Brightelligence Inc., UK), T. Stefanski (Gdansk Univ. of Techn., Poland) 271
Hardware Implementation of 3D Pipelined Laplace Filter Based on Rotation Structures 276 P. Poczekajło, K. Wawryn (Koszalin Univ. of Techn., Poland) 276
Low Frequency CMOS Two-Integrator Oscillator for IoT Applications 281 E. Mendes, J.P. Oliveira, L. Oliveira (Univ. Nova de Lisboa, Portugal) 281
Microstrip and Gas Electron Multiplier Readout ASIC for Physics Experiment at FAIR 285 K. Kasiński, W. Zubrzycka, R. Szczygieł (AGH Univ. of Science and Techn., Poland)
Multichannel Integrated Lock-in Amplifier for Low Noise Measurements 290 C. Kołaciński, D. Obrębski (Institute of Electron Techn., Poland)
On the Bandpass/Lowpass Microwave/RF Filter 296 M. Zaradny (Wrocław Univ. of Science and Techn., Poland) 296
Optimization of RF Low Noise Amplifier Design Using Analytical Model and Genetic Computation
Performance Estimation of Lattice Boltzmann Method Implementation in ARUZ

	neter Research of Higher Order Sigma-Delta Modulators Using Dynamically Reprogrammable FPAA
-	r Tunable Simple Band-Pass Filter: Methods for Tunability Range Extension
	Integrated Circuit Operating with CdTe Pixel Detector
•	n Technique Based on On-Chip Resistor
Thermal Issues	n Microelectronics
-	ent in Aspect of Throughput Increase
	oprocessor Cooling System Based on Ambient Circumstanes
	el of Planar Transformers
	of Compact Thermal Models Generated from Measured Thermal Responses and Detailed Thermal Models
Investigation of the Influ P. Górecki (Gdynia Mar	uence of Thermal Phenomena on Characteristics of IGBTs Contained in Power Modules
	rocessor Throughput Increase with New Control System
-	of Weather Conditions on Properties of the Photovoltaic Installation
	ge Topography
G. De Mey (Univ. of Gh	f Transient Thermal Problems in Microelectronics
	nomenon in ICs Cooled by Integrated Microchannels
Analysis and Mo	delling of ICs and Microsystems
	Continuous-time Common-Mode Feedback Circuit
	tion by SOI Sensors
	Inductor Modeling in Radio Frequency Integrated Circuits

	On Power ESD Test of Integrated Circuits
	Resistorless Universal Biquad Filter Based on Digitally Programmable Current Follower Transconductance Amplifier
	Simulations and Analysis of Microgyroscope Response in Drive and Sense Directions
	SIMULINK and COMSOL Software Application for Modeling and Simulation MEMS Accelerometer
	Thermal and Power Delivery Considerations of the 65k Pixel 3-D Integrated Radiation Imaging Module with Through-Silicon Vias
4	Microelectronics Technology and Packaging
	Analysis of Thermal and Electrical Properties of Heating Microsystems Based on TCO Layers
	Elements of Elastic Electronics Created on Textile Substrate
5	Testing and Reliability
	Automated Software-Based Self-Test Generation for Microprocessors 453 A. Jasnetski, R. Ubar, A. Tsertov (Tallinn Univ. of Techn., Estonia)
	Durability and Reliability Enhancement of Selected Electronic Components Achieved by Laser Technologies
	Prototyping of WTA ANNs Using FPAA Devices
	Shannon Information Entropy as Complexity Metric of Source Code 468 M. Cholewa (Univ. of Silesia, Poland)
6	Power Electronics
	Diagrams for Energy Management in Renewable Energy Systems
	Digital Control Buck Converter - Reducing the Impact of Load Change on the Output Voltage
	Review of Commercial SiC MOSFET Models: Topologies and Equations
	Review of Commercial SiC MOSFET Models: Validity and Accuracy
	Undesirable Sub-harmonic Currents in the Coil of Buck Converter Prototype - Project Bumblebee
7	Signal Processing
	A Serial Distance Calculation Circuit for the Application in Artificial Neural Networks and Pattern Recognition
	Camera Callibration and Object Size/Distance Calculation Application

J. Warczarek, P. Śniatała (Poznan Univ. of Techn., Poland)

Correlational and Regressive Analysis of the Relationship between Tongue and Lips Motion - An EMA and Video Study of Selected Polish Speech Sounds
R. Wielgat, Ł. Mik (State Higher Vocational School in Tarnow, Poland), A. Lorenc (Department of Speech Therapy and Applied Linguistics, Maria Curie-Skłodowska University; Department of Speech and Language Therapy and Voice Production, Warsaw University, Poland)
Direct-Coupled-Resonators Bandpass Filters with Arbitral End-Coupled-Series-Immittances
Hardware Implementation of the Particle Swarm Optimization Algorithm
New Network Structures of Reconfigurable Fractional-order PID Regulators with DVCC 527 J. Petrzela (Brno Univ. of Techn., Czech Republic)
OWA Aggregation Operator in Robust Filtering 532 T. Pander (Silesian Univ. of Techn., Poland), J. Wróbel (ITAM Zabrze, Poland)
Semi-analytical Recursive Algorithms of Convolution Calculations for Digitally Controlled Buck Converter Design
Statistical Analysis of Periodically Non-stationary Oscillations for Unknown Period
Embedded Systems
CloudBus Protocol Hardware Multi-Converter Gateway for Distributed Embedded Systems
Dedicated AVR Bootloader for Performance Improvement of Prototyping Process 553 M. Lewandowski, T. Orczyk, P. Porwik (Univ. of Silesia, Poland)
Development of the Sensor Network for Building Technologies
Instructionless General Purpose Coarse-Grained Reconfigurable Processor Performance in Encryption
Medical Applications
Atrial Fibrillation Episodes Detection Based on Classification of Heart Rate Derived Features 571 N. Henzel, J. Wróbel, K. Horoba (ITAM Zabrze, Poland)
Bioimpedance Spectroscopy Monitoring-Designing Challenges and Description of the Acquired Results
Comparison of Algorithms for Detection and Real-Time Tracking of Living Microorganisms in Lab-on-a-Chip Devices
Control and Signal Processing Software Embedded in Smart Wristband Monitor of Silent Atrial Fibrillation
Distributed-Arithmetic-Based DWT Processor for Neural Recording Systems
Hardware Design Issues and Functional Requirements for Smart Wristband Monitor of Silent Atrial Fibrillation
Principal Component Analysis of Accelerations in Human Dynamic Movements: A Sample Set Length Effect Study
Index of Authors