

2020 European Conference on Circuit Theory and Design (ECCTD 2020)

**Sofia, Bulgaria
7 – 10 September 2020**



**IEEE Catalog Number: CFP20ECC-POD
ISBN: 978-1-7281-7184-5**

**Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. 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:	CFP20ECC-POD
ISBN (Print-On-Demand):	978-1-7281-7184-5
ISBN (Online):	978-1-7281-7183-8
ISSN:	2472-467X

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

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

GENERAL CHAIRS MESSAGE	1
KEYNOTE SPEAKERS	2
SPECIAL SESSION 1 (SS1): PHYSICALLY UNCLONABLE FUNCTIONS.....	3
INTRODUCTION TO PHYSICALLY UNCLONABLE FUCTIONS: PROPERTIES AND APPLICATIONS.....	4
<i>M. Garcia-Bosque, G. Díez-Señorans, C. Sánchez-Azqueta, S. Celma</i>	
SPATIAL CONTEXT TREE WEIGHTING FOR PHYSICAL UNCLONABLE FUNCTIONS	8
<i>Michael Pehl, Tobias Tretschok, Daniel Becker, Vincent Immler</i>	
ON THE INTEGRATION OF PHYSICALLY UNCLONABLE FUNCTIONS INTO ARM TRUSTZONE SECURITY TECHNOLOGY	12
<i>Callum Aitchison, Roman Buckle, Alvin Ch'ng, Christian Clarke, Jacob Malley, Basel Halak</i>	
A STUDY OF THE SPATIAL AUTO-CORRELATION OF MEMORY-BASED PHYSICAL UNCLONABLE FUNCTIONS.....	16
<i>Tolga Arul, Nikolaos Athanasios Anagnostopoulos, Sergej Reißig, Stefan Katzenbeisser</i>	
THE BIG PICTURE OF DELAY-PUF DEPENDABILITY	20
<i>Alexander Schaub, Jean-Luc Danger, Olivier Rioul, Sylvain Guilley</i>	
A NEW APPROACH TO ANALYSIS THE SECURITY OF COMPENSATED MEASURING PUFs	24
<i>G. Díez-Señorans, M. Garcia-Bosque, C. Sánchez-Azqueta, S. Celma</i>	
CALIBRATION OF RING OSCILLATOR PUF AND TRNG.....	29
<i>Cristina Martínez-Gómez, Iluminada Baturone</i>	
DESIGN OF AREA-EFFICIENT PHYSICAL UNCLONABLE FUNCTIONS DERIVED FROM CNNs: TRADE-OFFS AND OPTIMIZATION	33
<i>T. Addabbo, A. Fort, R. Moretti, M. Mugnaini, H. Takaloo, V. Vignoli</i>	
PHYSICAL SECURITY OF RING-BASED PUF.....	37
<i>L. Bossuet</i>	
HARDWARE-INTRINSIC SECURITY WITH PRINTED ELECTRONICS FOR IDENTIFICATION OF IOE DEVICES.....	42
<i>Lukas Zimmermann, Alexander Scholz, Mehdi B. Tahoori, Axel Sikora, Jasmin Aghassi-Hagmann</i>	
SPECIAL SESSION 2 (SS2): SENSING AND UNCONVENTIONAL MEM-PROCESSING WITH MULTI-FUNCTIONAL MEMRISTORS	46
INPUT DESIGN FOR CONTROLLING DYNAMICS IN A SECOND-ORDER MEMRISTIVE CIRCUIT.....	49
<i>Mauro Di Marco, Mauro Forti, Giacomo Innocenti, Alberto Tesi</i>	

BREAKING THE CONVERSION WALL IN MIXED-SIGNAL SYSTEMS USING NEUROMORPHIC DATA CONVERTERS	53
<i>Loai Danial, Shahar Kvatinsky</i>	
A COMPACT MODEL FOR THE ELECTROFORMING PROCESS OF MEMRISTIVE DEVICES	57
<i>Camilla La Torre, Andreas Kindsmüller, Seokki Son, Rainer Waser, Vikas Rana, Stephan Menzel</i>	
TEMPLATE OPTIMIZATION IN CELLULAR NEURAL NETWORKS USING GRADIENT BASED APPROACHES	61
<i>András Fülöp, András Horváth</i>	
EFFICIENT IMPLEMENTATION OF MEMRISTOR CELLULAR NONLINEAR NETWORKS USING STOCHASTIC COMPUTING.....	65
<i>Oscar Camps, Stavros G. Stavrinides, Rodrigo Picos</i>	
IMPLEMENTATION OF LOGICAL AND MEMORY FUNCTIONS WITH MEMRISTOR CELLULAR NONLINEAR NETWORKS	69
<i>A. Ascoli, I. Messaris, A.S. Demirkol, R. Tetzlaff, L. Chua, D. Biolek, V. Biolková, Z. Kolka</i>	
IMPLEMENTATION AND OPTIMIZATION OF CHEMICAL LOGIC GATES USING MEMRISTIVE CELLULAR AUTOMATA	77
<i>Iosif-Angelos Fyrigos, Vasileios Ntinias, Michail-Antisthenis Tsompanas, Stavros Kitsios, Georgios Ch. Sirakoulis, Dimitris Tsoukalas, Andrew Adamatzky</i>	
MEMRISTOR BASED OSCILLATORS WITH CONTROLLED THRESHOLD PARAMETERS.....	83
<i>Vladimir V. Rakitin, Sergey G. Rusakov</i>	
DIRECT STATE TRANSFER IN MLC BASED MEMRISTIVE RERAM DEVICES FOR TERNARY COMPUTING	87
<i>Dietmar Fey, John Reuben</i>	
NEUROMORPHIC CIRCUITS ON SEGMENTED CROSSBAR ARCHITECTURES WITH ENHANCED PROPERTIES.....	92
<i>Vasileios Ntinias, Panagiotis Karakolis, Georgios Ch. Sirakoulis, Panagiotis Dimitrakis</i>	
ON THE DEVELOPMENT OF MCU-BASED AD HOC HW INTERFACE CIRCUITRY FOR MEMRISTOR CHARACTERIZATION	98
<i>Robinson De La Fuente, Ioannis Vourkas, Marcelo Perez</i>	
MICROFLUIDIC SENSORS BASED ON MEMRISTIVE CIRCUITS SYNCHRONIZATION	103
<i>Maide Bucolo, Arturo Buscarino, Luigi Fortuna, Salvina Gagliano, Giovanna Stella</i>	
EVIDENCE OF NANOPARTICLE MIGRATION IN POLYMERIC HYBRID MEMRISTOR DEVICES	107
<i>Ayoub H. Jaafar, Alex Gee, Abdullah O. Hamza, Charlotte J. Eling, Jean-Sebastien G. Bouillard, Ali M. Adawi, Neil T. Kemp</i>	
DYNAMICS OF A NEW HYSTERESIS MEMRISTOR CNN	111
<i>Angela Slavova</i>	
A NEW CNN OCCLUSION MASKING METHOD FOR IRT IMAGING IN NEUROSURGERY	115
<i>Yahya Moshaei-Nezhad, Juliane Müller, Christian Schnabel, Matthias Kirsch, Ronald Tetzlaff</i>	

STABILITY AND TRANSIENT DYNAMICS OF PLLS IN THEORY AND EXPERIMENTS	119
<i>Rabia Fatima Riaz, Dimitrios Prousalis, Christian Hoyer, Jens Wagner, Frank Ellinger, Frank Jülicher, Lucas Wetzel</i>	
INTEGER CONVOLUTIONAL NEURAL NETWORKS WITH BOOLEAN ACTIVATIONS: THE BOOLHASH ALGORITHM.....	123
<i>Grigor Gatchev, Valentin S. Mollov</i>	
MULTYLAYER PERCEPTRON REPRESENTATION BY INDEX MATRICES WITH ELEMENTS IN A FIXED INTERVAL.....	127
<i>Krassimir Atanasov, Sotir Sotirov</i>	
EQUIVALENT TRANSMISSION LINES FOR QUANTUM PARTICLES IN SECTIONALLY CONSTANT POTENTIALS.....	130
<i>Pier Paolo Civalleri, Fernando Corinto</i>	
A NOVEL ANALYSIS OF THE BEAM SQUINTING IN WIDEBAND PHASED ARRAY DIGITAL I/Q TRANSMITTERS	134
<i>Veselin Manev, Marios Neofytou, Georgi Radulov, Kostas Doris</i>	
IMPROVING ALIASING REJECTION BY INSERTING ADDITIONAL ZEROS INTO FOLDING BANDS USING SIMPLE FILTERS	138
<i>Gordana Jovanovic Dolecek, Lara Dolecek</i>	
IMPROVING POF QUALITY IN MULTI OBJECTIVE OPTIMIZATION OF ANALOG ICS VIA DEEP LEARNING.....	142
<i>Tuğberk Oğulcan Çakıcı, Gamze İslamoğlu, Şeyda Nur Güzelhan, Engin Afacan, Günhan Dündar</i>	
A GLOBALLY-OPTIMIZED CO-DESIGN APPROACH FOR HETEROGENEOUS SYSTEMS USING CONVEX OPTIMIZATION.....	146
<i>Tilman Horst, Robert Fischbach, Jens Lienig</i>	
A STARTUP CIRCUIT FOR EVEN-STAGE DIFFERENTIAL RING OSCILLATORS	152
<i>L. Benvenuti, P. Bruschi, L. Fanucci, A. Maccioni, G. Pasetti, F. Tinfena</i>	
FAST LEAK LOCALIZATION BASED ON ACOUSTIC SIGNAL ATTENUATION FOR PIPELINES IN HIGH-NOISE ENVIRONMENT	156
<i>Georgios-Panagiotis Kousiopoulos, Spyridon Nikolaidis</i>	
SYNCHRONISATION IN NOISY PLL NETWORKS: TIME DOMAIN MODEL AND ITS ANALYSIS	160
<i>Eugene Koskin, Maksim Balakin, Nikita Ryskin, Dimitri Galayko, Elena Blokhina</i>	
FPGA VALIDATION OF EVENT-DRIVEN ADPLL.....	164
<i>Eugene Koskin, Pierre Bisiaux, Dimitri Galayko, Elena Blokhina</i>	
ON THE PERFORMANCE IMPROVEMENT OF OTA IN SUB-THRESHOLD REGION WITH DUAL SUPPLY	168
<i>Ersin Alaybeyoglu, Hakan Kuntman</i>	
A FLIPPING ACTIVE-DIODE RECTIFIER FOR PIEZOELECTRIC-VIBRATION ENERGY- HARVESTING	172
<i>Wan-Ling Wu, Ching-Yuan Yang, Dung-An Wang</i>	

IMPLEMENTATION OF FRACTIONAL-ORDER MODEL OF NICKEL-CADMIUM CELL USING CURRENT FEEDBACK OPERATIONAL AMPLIFIERS	176
<i>Vassilis Alimisis, Marios Gourdouparis, Christos Dimas, Paul P. Sotiriadis</i>	
SPICE AND MATLAB SIMULATION AND EVALUATION OF ELECTRICAL IMPEDANCE TOMOGRAPHY READOUT CHAIN USING PHANTOM EQUIVALENTS	180
<i>Christos Dimas, Vassilis Alimisis, Paul P. Sotiriadis</i>	
A PULSE WIDTH-CONTROLLED CMOS LASER DIODE PULSER AND A TIME-GATED TIME-RESOLVED SPAD ARRAY TRANSCIEVER CHIP FOR DIFFUSE OPTICS	184
<i>Marko Pakaslahti, Jan Nissinen, Ilkka Nissinen</i>	
A 0.037MM ² 1GSPS 12B SELF-CALIBRATED 40NM CMOS DAC CELL WITH SFDR>60DB UP TO 200MHZ AND IM3 < -60DB UP TO 350MHZ	188
<i>Georgi Radulov, Patrick Quinn</i>	
SECURE SCAN DESIGN WITH A NOVEL METHODOLOGY OF SCAN CAMOUFLAGING	192
<i>Srisubha Kalanadhabhatta, Kiran Kumar Anumandla, Saqib Khursheed, Amit Acharyya</i>	
DESIGN OF LOW-TEMPERATURE AND RADIATION-HARDENED JFET DIRECT COUPLED OP-AMPS WITHOUT CURRENT MIRRORS	196
<i>Anna Bugakova, Nikolay Prokopenko, Alexey Titov</i>	
INSTRUCTION EXTENSION OF AN OPEN SOURCE RV32IMC CORE FOR NTRU CRYPTOSYSTEM	200
<i>Elif Nur İşman, Canberk Topal, Latif Akçay, Berna Örs</i>	
NOVEL BASEBAND ANALOG BEAMFORMING THROUGH RESISTIVE DACS AND SIGMA DELTA MODULATORS	205
<i>S. Ringeling, L. Steinebach, Q. Liu, C. Zhang, S. Bajoria, M. Bolatkale, L. Breems, G. Radulov</i>	
CLOSED-FORM DESIGN OF 2D FILTERS WITH ELLIPTICAL AND CIRCULAR FREQUENCY RESPONSE	209
<i>Radu Matei</i>	
A HIGH SPEED AND LOW COMPLEXITY ARCHITECTURE DESIGN METHODOLOGY FOR SQUARE ROOT UNSCENTED KALMAN FILTER BASED SLAM	213
<i>Rashi Dutt, Amit Acharyya</i>	
A LOW-POWER WIDE SUPPLY RANGE DELAY-LINE BASED IC FOR AMPEROMETRIC MEASUREMENT.....	217
<i>Amlan Nag, Ravinder Dahiya, Srinjoy Mitra</i>	
A SIMULATION TOOL FOR ANALYSIS OF OSCILLATOR ENSEMBLES DEFINED BY KURAMOTO MODEL.....	221
<i>Mark M. Gourary, Sergey G. Rusakov</i>	
TIME-DIVISION CHOPPER AMPLIFIER SUITABLE FOR ACQUISITION OF PLURAL BIOLOGICAL SIGNALS.....	225
<i>Takahide Ssto, Shintaro Motoki, Satomi Ogawa</i>	
DUAL-BAND SINGLE-LAYERED MODIFIED E-SHAPED PATCH ANTENNA FOR RF ENERGY HARVESTING SYSTEMS.....	229
<i>Achilles D. Boursianis, Maria S. Papadopoulou, Spyridon Nikolaidis, Sotirios K. Goudos</i>	

A NEW APPROACH TO THE DESIGN OF CMOS INDUCTORLESS COMMON-GATE LOW- NOISE AMPLIFIERS	233
<i>Antonio D. Martinez-Perez, Pedro A. Martinez-Martinez, Guillermo Royo, Francisco Aznar, Santiago Celma</i>	
DESIGN OF A 1.5 GHZ LOW JITTER DCO RING IN 28 NM CMOS PROCESS	237
<i>Pierre Bisiaux, Elena Blokhina, Eugene Koskin, Teerachot Siriburanon, Dimitri Galayko</i>	
AN OVERVIEW OF AUTOMATIC ANTENNA IMPEDANCE MATCHING FOR MOBILE COMMUNICATIONS	242
<i>David Lauder, Yichuang Sun</i>	
DESIGN CONSIDERATIONS OF ANTENNAS AND ADAPTIVE IMPEDANCE MATCHING NETWORKS FOR RF ENERGY HARVESTING.....	246
<i>David Lauder, Yichuang Sun</i>	
WEDGE FILTERS DESIGNED FROM 1D DIGITAL PROTOTYPES.....	250
<i>Radu Matei</i>	
SYNERGETIC ALGORITHM FOR POWER-DOWN SYNTHESIS.....	254
<i>Maximilian Neuner, Helmut Graeb</i>	

Author Index