

TABLE OF CONTENTS

ABOUT ISCAS 2017	IV
ABOUT THE IEEE CIRCUITS AND SYSTEMS SOCIETY.....	V
WELCOME MESSAGE - GENERAL CHAIRS	VI
WELCOME MESSAGE - TECHNICAL PROGRAM CHAIRS	VIII
CONFERENCE COMMITTEE	IX
CONFERENCE SUPPORT & SPONSORS	XI
KEYNOTE SPEAKERS.....	XV
PIONEERS OF CAS SESSIONS	XVIII
FUTURECAS PANEL.....	XIX
CASS TRANSACTIONS PAPERS	XX
LIVE DEMONSTRATIONS.....	XX
IOVT PANEL.....	XXI
PITCH YOUR STARTUP	XXII
CASS STUDENT DESIGN COMPETITION	XXII
LATE BREAKING NEWS.....	XXII
POSTER SESSIONS	XXIII
SOCIAL PROGRAM.....	XXIV
IBUKA AWARD	XXVII
2017 CIRCUITS AND SYSTEMS SOCIETY AWARD RECIPIENTS	XXVIII
ABOUT BALTIMORE AND THE VENUE	XXXVI
TUTORIALS – SUNDAY, MAY 28 TH	XXXVII
ISCAS 2018	XL
TECHNICAL SESSIONS - MONDAY, MAY 29 TH	XLI
CASS STUDENT DESIGN COMPETITION – MONDAY, MAY 29 TH	LXII
LIVE DEMONSTRATIONS – MONDAY, MAY 29 TH	LXIII
POSTER SESSION – MONDAY, MAY 29 TH	LXV
TECHNICAL SESSIONS – TUESDAY, MAY 30 TH	LXXVI
LIVE DEMONSTRATIONS – TUESDAY, MAY 30 TH	XCVII
POSTER SESSION – TUESDAY, MAY 30 TH	XCIX
PIONEERS OF CAS – TUESDAY, MAY 30 TH	CXI
TECHNICAL SESSIONS – WEDNESDAY, MAY 31 ST	CXII

CMOS-bio Interfaces: Recent Trends & Future Perspectives

Time: Monday, May 29 (8:00-9:30)

Room: Dover A

Chair(s): Jens Anders - Universität Ulm; Donhee Ham - Harvard University

CMOS-Nano-Bio Interface Array for Cardiac and Neuro Technology 1

Jeffrey Abbott, Tianyang Ye, Ling Qin, Marsela Jorgolli, Rona Gertner, Donhee Ham, Hongkun Park
Harvard University, United States

CMOS Bioelectronics: Emerging Application in Molecular Diagnostics, Microbiology, and Neuroscience
..... NA

Kenneth Shepard
Columbia University, United States

Towards CMOS-Based in-Vivo NMR Spectroscopy and Microscopy 2

Jonas Handwerker{2}, Marlon Pérez-Rodas{1}, Maurits Ortmanns{2}, Klaus Scheffler{1}, Jens Anders{2}
{1}Max Planck Institute for Biological Cybernetics, Germany; {2}Universität Ulm, Germany

Wide-Range Optical CMOS-Based Diagnostics..... 6

Mohammed Al-Rawhani, Boon Chong Cheah, Christos Giagkoulouits, Abdu Shakoor, Bence Nagy, James Beeley,
David Cumming
University of Glasgow, United Kingdom

**INVITED: Technology Trends and Commercialization of High-Density Microelectrode Arrays for Advanced
in-Vitro Electrophysiology** 10

Urs Frey{2}, Marie E. Obien{2}, Jan Müller{2}, Andreas Hierlemann{1}
{1}Eidgenössische Technische Hochschule Zürich, Switzerland; {2}MaxWell Biosystems AG / Eidgenössische
Technische Hochschule Zürich, Switzerland

Neuromorphic & Learning Circuits & Systems

Time: Monday, May 29 (8:00-9:30)

Room: Grand Ballroom I

Chair(s): Scott Koziol - Baylor University; Shih-Chii Liu - Swiss Federal Institute of Technology in Zurich

Oscillation-Based Slime Mould Electronic Circuit Model for Maze-Solving Computations 11

Vasileios Ntinias{1}, Georgios Ch. Sirakoulis{1}, Ioannis Vourkas{1}, Andrew Adamatzky{2}
{1}Democritus University of Thrace, Greece; {2}University of the West of England, United Kingdom

Randomized Unregulated Step Descent for Limited Precision Synaptic Elements 12

Lorenz Müller, Manu Nair, Giacomo Indiveri
Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland

Ultra-Low-Energy Mixed-Signal IC Implementing Encoded Neural Networks..... 13
Benoit Larras{2}, Cyril Lahuec{1}, Fabrice Seguin{1}, Matthieu Arzel{1}
{1}TELECOM Bretagne, France; {2}Université Lille 1 / Université de Valenciennes, France

A Fully-Synthesized 20-Gate Digital Spike-Based Synapse with Embedded Online Learning 17
Charlotte Frenkel{2}, Giacomo Indiveri{1}, Jean-Didier Legat{2}, David Bol{2}
{1}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland; {2}Université Catholique de Louvain, Belgium

Learning in Silicon Beyond STDP: a Neuromorphic Implementation of Multi-Factor Synaptic Plasticity with Calcium-Based Dynamics..... 21
Frank Maldonado Huayaney, Stephen Nease, Elisabetta Chicca
Universität Bielefeld, Germany

Computing with Memory Devices

Time: Monday, May 29 (8:00-9:30)

Room: Grand Ballroom II

Chair(s): Pierre-Emmanuel Gaillardon - University of Utah; Daniele Ielmini - Politecnico di Milano

Circuit Designs of High-Performance and Low-Power RRAM-Based Multiplexers Based on 4T(1R1R) Programming Structure..... 22
Xifan Tang{1}, Giovanni De Micheli{1}, Edouard Giacomini{2}, Pierre-Emmanuel Gaillardon{2}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}University of Utah, United States

Neuromorphic Devices and Architectures for Next-Generation Cognitive Computing 23
Geoffrey W. Burr{1}, Pritish Narayanan{1}, Robert M. Shelby{1}, Stefano Ambrogio{1}, Hsin-yu Tsai{1}, Scott L. Lewis{2}, Kohji Hosokawa{3}
{1}IBM Research, United States; {2}IBM T. J. Watson Research Center, United States; {3}IBM Tokyo Research Laboratory, Japan

RM3 Based Logic Synthesis..... 27
Mathias Soeken{1}, Pierre-Emmanuel Gaillardon{2}, Giovanni De Micheli{1}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}University of Utah, United States

Local Memory and Logic Arrangement for Ultra-Low Power Array Processors..... 31
Ari Paasio
University of Turku, Finland

Pitch Your Startup

Time: Monday, May 29 (8:00-9:30)

Room: Grand Ballroom III

Chair(s): Geoff Barrows - Centeye; Gabriele Manganaro – Analog Devices

***Participants TBD**

Interface Circuits

Time: Monday, May 29 (8:00-9:30)

Room: Grand Ballroom IV

Chair(s): Shahriar Mirabbasi - University of British Columbia; Degang Chen - Iowa State University

A Novel 3-Tap Adaptive Feed Forward Equalizer for High Speed Wireline Receivers..... 35
Raga Lasya Munagala, Vijay U K
Intel Technology India Pvt Ltd., India

A 40 Gb/s 74.9 mW PAM4 Receiver with Novel Clock and Data Recovery 39
Liangxiao Tang, Weixin Gai, Linqi Shi, Xiao Xiang
Peking University, China

Current Mode 1.2-Gbps SLVS Transceiver for Readout Front-End ASIC 43
Hugo Hernandez, Dionisio Carvalho, Bruno Sanches, Lucas C. Severo, Wilhelms Van Noije
Universidade de São Paulo, Brazil

A 10-Bit Linearity Current-Controlled Ring Oscillator with Rolling Regulation for Smart Sensing..... 47
Michele Dei^{1}, Jordi Sacristán^{1}, Eloi Marigó^{2}, Mohanraj Soundara^{2}, Lluís Terés^{1}, Francisco Serra-
Graells^{1}
^{1}Consejo Superior de Investigaciones Científicas, Spain; ^{2}Silterra Malaysia Sdn. Bhd., Malaysia

A Low-Noise Fully-Differential Open-Loop Interface for High-G Capacitive Micro-Accelerometers with 112.2 dB Dynamic Range 51
Meng Zhao, Zhongjian Chen, Zhaofeng Huang, Guangyi Chen, Wengao Lu, Yacong Zhang
Peking University, China

Video: Recording, Streaming, Synopsis, Evaluation & 3D

Time: Monday, May 29 (8:00-9:30)

Room: Grand Ballroom VII

Chair(s): Chris Lee - National Cheng Kung University

A Low-Power Video Recording System with Multiple Operation Modes for H.264 and Light-Weight Compression 55
Hyun Kim^{2}, Hyuk-Jae Lee^{2}, Chae Eun Rhee^{1}
^{1}Inha University, Korea, South; ^{2}Seoul National University, Korea, South

Peer-Assisted Video Streaming with RTMFP Flash Player: a Measurement Study on PPTV..... 56
Shan Zhou, Qiang Wang, Junqiang Ge, Ye Tian
University of Science and Technology of China, China

Multicamera Joint Video Synopsis 58
Jianqing Zhu^{1}, Shengcai Liao^{2}, Stan Z. Li^{2}
^{1}Huaqiao University, China; ^{2}Institute of Automation, Chinese Academy of Sciences , China

On Evaluating Perceptual Quality of Online User-Generated Videos 58
Soobeom Jang, Jong-Seok Lee
Yonsei University, Korea, South

Internet of Video Things: Enabling Technologies

Time: Monday, May 29 (8:00-9:30)

Room: Grand Ballroom VIII

Chair(s): Eduard Alarcon - Universitat Politècnica de Catalunya; Yen-Kuang Chen - Intel Corporation

INVITED: 3D Machine Vision in IoT for Factory and Building Automation 59
Wai Lee
Texas Instruments Inc., United States

A 0.42V High Bandwidth Synthesizable Parallel Access Smart Memory Fabric for Computer Vision 60
Prashant Dubey, Kritika Aditya, Ankur Srivastava, Amit Khanuja, Jamil Kawa, Thu Nguyen
SYNOPSISYS India Pvt. Ltd., India; SYNOPSISYS India Pvt. Ltd., United States

A Color Frame Reproduction Technique for IoT-Based Video Surveillance Application 64
Rashedul Hasan, Shahed K. Mohammed, Alimul Haque Khan, Khan A. Wahid
University of Saskatchewan, Canada

- Object-Based on-Line Video Summarization for Internet of Video Things..... 68**
Shih-Ting Lin{2}, Yuan-Hsin Liao{2}, Yu Tsao{1}, Shao-Yi Chien{2}
{1}Academia Sinica, Taiwan; {2}National Taiwan University, Taiwan
- A 142MOPS/mW Integrated Programmable Array Accelerator for Smart Visual Processing..... 72**
Satyajit Das{1}, Davide Rossi{1}, Kevin Martin{2}, Philippe Coussy{2}, Luca Benini{1}
{1}Università di Bologna, Italy; {2}Université Bretagne Sud, France

Biometrics & Biomedical Signal/Image Processing Circuits & Systems: I

Time: Monday, May 29 (8:00-9:30)

Room: Grand Ballroom IX

Chair(s): Zhiping Lin - Nanyang Technological University; Danilo Demarchi - Politecnico di Torino

- Architecture for Complex Network Measures of Brain Connectivity 76**
Chandrajit Pal{4}, Dwaipayan Biswas{1}, Koushik Maharatna{3}, Amlan Chakrabarti{2}
{1}IMEC, Belgium; {2}University of Calcutta, India; {3}University of Southampton, United Kingdom; {4}University of Southampton / University of Calcutta, United Kingdom
- Non-Invasive Blood Pressure Estimation Using Phonocardiogram 80**
Amirhossein Esmaili Dastjerdi, Mohammad Kachuee, Mahdi Shabany
Sharif University of Technology, Iran
- Towards an on-Chip Signal Processing Solution for the Online Calibration of SS-OCT Systems 84**
Oscar Barajas, Amir Tofighi Zavareh, Sebastian Hoyos
Texas A&M University, United States
- Automatic Endosomal Structure Detection and Localization in Fluorescence Microscopic Images..... 88**
Dongyun Lin{1}, Zhiping Lin{1}, Ramraj Velmurugan{2}, Raimund Ober{2}
{1}Nanyang Technological University, Singapore; {2}Texas A&M University, United States
- LLC Encoded Bow Features and Softmax Regression for Microscopic Image Classification..... 92**
Dongyun Lin{3}, Zhiping Lin{3}, Lei Sun{1}, Kar-Ann Toh{4}, Jiuwen Cao{2}
{1}Beijing Institute of Technology, China; {2}Hangzhou Dianzi University, China; {3}Nanyang Technological University, Singapore; {4}Yonsei University, Korea, South

ADC Circuit Techniques

Time: Monday, May 29 (8:00-9:30)

Room: Grand Ballroom X

Chair(s): Jose Silva-Martinez - Texas A&M University; George Yuan - Hong Kong University of Science and Technology

- A 200MS/s, 11 Bit SAR-Assisted Pipeline ADC with Bias-Enhanced Ring Amplifier 96**
Yongzhen Chen, Jingjing Wang, Hang Hu, Fan Ye, Junyan Ren
Fudan University, China
- A 10-b Statistical ADC Employing Pipelining and Sub-Ranging in 32nm CMOS..... 100**
Sen Tao{1}, Naveen Verma{1}, Ryan M. Corey{2}, Andrew C. Singer{2}
{1}Princeton University, United States; {2}University of Illinois at Urbana-Champaign, United States

Analog Bandwidth Mismatch Compensation for Time-Interleaved 104
Alexandre Mas{2}, Eric Andre{2}, Caroline Lelandais-Perrault{1}, Filipe Vinci Dos Santos{1}, Philippe Benabes{1}
{1}CentraleSupélec, France; {2}STMicroelectronics, France

Sampling Time Calibration Method for Multi-Channel Interleaved ADCs 108
Adrian Leuciuc
Cadence Design Systems, United States

A Power Minimized 74 fJ/Conversion-Step 88.6 dB SNR Incremental $\Sigma\Delta$ ADC with an Asynchronous SAR Quantizer 112
Saqib Mohamad{2}, Wu Chao{2}, Jie Yuan{2}, Amine Bermak{1}
{1}Hamad Bin Khalifa University / Hong Kong University of Science and Technology, Qatar; {2}Hong Kong University of Science and Technology, Hong Kong

Wireless Communication Receivers for 5G

Time: Monday, May 29 (8:00-9:30)

Room: Laurel AB

Chair(s): Christoph Studer - Rice University; Miroslav Velev - Aries Design Automation

A Wideband Blocker-Resilient Direct $\Delta\Sigma$ Receiver with Selective Input-Impedance Matching 116
Faizan Ul Haq{1}, Mikko Englund{1}, Kari Stadius{1}, Marko Kosunen{1}, Jussi Ryyänen{1}, Kimmo Koli{2}, Kim B Östman{3}
{1}Aalto University, Finland; {2}Huawei Technologies Oy Co. Ltd, Finland; {3}Nordic Semiconductor, Finland

An 1.1 V 0.1-1.6 GHz Tunable-Bandwidth Elliptic Filter with 6 dB Linearity Improvement by Precise Zero Location Control in 40 nm CMOS Technology for 5G Applications 120
Ching-Da Wu{2}, Jian-Yu Hsieh{1}, Chun-Han Wu{2}, Yang-Sheng Cheng{2}, Chun-Chang Wu{2}, Shey-Shi Lu{2}
{1}National Ilan University, Taiwan; {2}National Taiwan University, Taiwan

Near-Field Dual-Use Antenna for Magnetic-Field Based Communication and Electrical-Field Based Distance Sensing in mm³-Class Sensor Node 124
Ryo Shirai{2}, Jin Kono{2}, Tetsuya Hirose{1}, Masanori Hashimoto{2}
{1}Kobe University, Japan; {2}Osaka University, Japan

FPGA Design of Low-Complexity Joint Channel Estimation and Data Detection for Large SIMO Wireless Systems 128
Oscar Castañeda{1}, Tom Goldstein{2}, Christoph Studer{1}
{1}Cornell University, United States; {2}University of Maryland, College Park, United States

A Low-Noise Cartesian Error Feedback Architecture 132
Jinbo Li, Qun Jane Gu
University of California, Davis, United States

Many-Core Systems

Time: Monday, May 29 (8:00-9:30)

Room: Laurel CD

Chair(s): Vasily Moshnyaga - Fukuoka University; Danella Zhao - University of Louisiana at Lafayette

Dark Silicon-Power-Thermal Aware Runtime Mapping and Configuration in Heterogeneous Many-Core NoC 136
Md Farhadur Reza{2}, Dan Zhao{1}, Magdy Bayoumi{2}
{1}Old Dominion University, United States; {2}University of Louisiana at Lafayette, United States

TECHNICAL SESSIONS – MONDAY, MAY 29TH

<i>Application Resource Management for Exploitation of Non-Volatile Memory in Many-Core Systems</i>	140
Setareh Behroozi, Iraklis Anagnostopoulos Southern Illinois University Carbondale, United States	
<i>Activation of Secure Zones in Many-Core Systems with Dynamic Rerouting</i>	144
Luciano Caimi, Vinicius Fochi, Eduardo Wachter, Daniel Munhoz, Fernando Moraes Pontificia Universidade Católica do Rio Grande do Sul, Brazil	
<i>Demystifying the Cost of Task Migration in Distributed Memory Many-Core Systems</i>	148
Marcelo Ruaro, Fernando Moraes Pontificia Universidade Católica do Rio Grande do Sul, Brazil	
<i>A Low Latency Feature Extraction Accelerator with Reduced Internal Memory</i>	152
Rongdi Sun, Peilin Liu, Jun Wang, Zunquan Zhou Shanghai Jiao Tong University, China	

Advanced Video Coding & Standardization

Time: Monday, May 29 (8:00-9:30)

Room: Kent AB

Chair(s): Wen-Hsiao Peng - National Chiao Tung University; Tokunbo Ogunfunmi - Santa Clara University

<i>A Cam Enabled Fast Video Motion Estimation Based on Locality Sensitive Signatures</i>	156
Pavel Arnaudov, Dr. Tokunbo Ogunfunmi Santa Clara University, United States	
<i>Fast Intra Coding Unit Size Decision for HEVC with GPU Based Keypoint Detection</i>	160
Falei Luo{3}, Shanshe Wang{4}, Siwei Ma{4}, Nan Zhang{2}, Yun Zhou{1}, Wen Gao{4} {1}Academy of Broadcasting Science, China; {2}Capital Medical University, China; {3}Institute of Computing Technology, Chinese Academy of Sciences, China; {4}Peking University, China	
<i>Depth-Projected Determination for Adaptive Search Range in Motion Estimation for HEVC</i>	164
Tsz-Kwan Lee, Yui-Lam Chan, Wan-Chi Siu Hong Kong Polytechnic University, Hong Kong	
<i>Measurement-Domain Intra Prediction Framework for Compressively Sensed Images</i>	168
Jianbin Zhou, Dajiang Zhou, Li Guo, Yoshimura Takeshi, Satoshi Goto Waseda University, Japan	
<i>A Low-Cost Approximate 32-Point Transform Architecture</i>	172
Heming Sun{3}, Zhengxue Cheng{1}, Amir Masoud Gharehbaghi{2}, Shinji Kimura{3}, Masahiro Fujita{2} {1}Shanghai Jiao Tong University, China; {2}University of Tokyo, Japan; {3}Waseda University, Japan	

Mini-Tutorial

Time: Monday, May 29 (8:00-9:30)

Room: Essex AB

Memristor-CMOS hybrid circuits and systems for brain-inspired computing

Kyeong-Sik Min{1}, Fernando Corinto{2}

Kookmin Univ., Seoul, Korea{1}; Politecnico di Torino, Turin, Italy{2}

Welcome Session and Keynote

Time: Monday, May 29 (9:30-11:00)

Room: Grand Ballroom V-VI

Opening Remarks and Welcome from the Conference Co-Chairs

Pamela Abshire, University of Maryland, College Park, MD, USA

Ralph Etienne-Cummings, Johns Hopkins University, Baltimore, MD, USA

The BRAIN Initiative: Building, Strengthening, and Sustaining

Miyoung Chun, Executive VP of Science Programs, The Kavli Foundation

Wearable Sensing Systems

Time: Monday, May 29 (11:30-13:00)

Room: Dover A

Chair(s): Ravinder Dahiya - University of Glasgow; Hadi Heidari - University of Glasgow

Electronic Skin and Electrocutaneous Stimulation to Restore the Sense of Touch in Hand Prosthetics

..... 176

Lucia Seminara^{3}, Marta Franceschi^{3}, Luigi Pinna^{3}, Ali Ibrahim^{3}, Maurizio Valle^{3}, Strahinja Dosen^{1}, Dario Farina^{2}

^{1}Georg-August-Universität Göttingen, Germany; ^{2}Imperial College London, United Kingdom; ^{3}Università di Genova, Italy

High Resolution and Linearity Enhanced SAR ADC for Wearable Sensing Systems..... 180

Hua Fan^{3}, Hadi Heidari^{4}, Franco Maloberti^{2}, Dagang Li^{1}, Daqian Hu^{1}, Yuanjun Cen^{1}

^{1}Chengdu Sino Microelectronics Technology Co.,Ltd, China; ^{2}Università degli Studi di Pavia, Italy; ^{3}University of Electronic Science and Technology of China, China; ^{4}University of Glasgow, United Kingdom

A Low-Power Low-Noise CMOS Voltage Reference with Improved PSR for Wearable Sensor Systems

..... 184

Pınar Başak Başıyurt^{2}, Edoardo Bonizzoni^{3}, Franco Maloberti^{3}, Devrim Yılmaz Aksin^{1}

^{1}Analog Devices Inc., Turkey; ^{2}Istanbul Technical University, Turkey; ^{3}Università degli Studi di Pavia, Italy

Information-Processing-Driven Interfaces in Hybrid Large-Area Electronics Systems..... 188

Tiffany Moy, Warren Rieutort-Louis, Liechao Huang, Sigurd Wagner, James Sturm, Naveen Verma

Princeton University, United States

A 310 nW 14.2-Bit Iterative-Incremental ADC for Wearable Sensing Systems..... 192

Tan-Tan Zhang^{2}, Man-Kay Law^{2}, Bo Wang^{1}, Pui-In Mak^{2}, Mang-I Vai^{2}, Rui Paulo Martins^{2}

^{1}Hamad Bin Khalifa University / Hong Kong University of Science and Technology, Qatar; ^{2}University of Macau, Macau

50 years of Circuits, Systems & Signals: A Session in Honor of Prof. Sanjit K. Mitra (Part I)

Time: Monday, May 29 (11:30-13:00)

Room: Dover BC

Chair(s): PP Vaidyanathan - California Institute of Technology; Yao Wang - New York University

A Historical Overview of Dr. Sanjit Mitra's Academic, Research and Professional Activities..... 196

William Jenkins^{1}, Michael Soderstrand^{2}

^{1}Pennsylvania State University, United States; ^{2}University of California, Davis, United States

Filtering and Enhancement of Color Images in the Block DCT Domain..... 200

Jayanta Mukhopadhyay

Indian Institute of Technology Kharagpur, India

TECHNICAL SESSIONS – MONDAY, MAY 29TH

- On Secure Communications Without Eavesdropper Channel State*..... 204**
Phillip Regalia
National Science Foundation / Catholic University of America, United States
- INVITED: Photonic Allpass Filter: a Versatile Building Block for All-Optical Signal Processing* 208**
Yujia Wang, Truong Nguyen
University of California, San Diego, United States

Deep Learning Systems

Time: Monday, May 29 (11:30-13:00)

Room: Grand Ballroom I

Chair(s): Jinhu Lu - Chinese Academy of Sciences; Wei Xing Zheng - Western Sydney University

INVITED: Unsupervised Learning Using Adversarial Networks

- Soumith Chintala..... NA
Facebook, United States

- Pipelined Parallel Contrastive Divergence for Continuous Generative Model Learning* 212**
Bruno Umbria Pedroni, Sadique Sheik, Gert Cauwenberghs
University of California, San Diego, United States

- DFGNet: Mapping Dataflow Graph Onto CGRA by a Deep Learning Approach* 216**
Shouyi Yin, Dajiang Liu, Lifeng Sun, Leibo Liu, Shaojun Wei
Tsinghua University, China

- Optimizing Deep Neural Network Structure for Face Recognition* 220**
Fanruo Meng, Chang Shu, Hongsheng Liu
University of Electronic Science and Technology of China, China

- Evaluation of Neural Network Architectures for Embedded Systems* 224**
Alfredo Canziani^{1}, Eugenio Culurciello^{1}, Adam Paszke^{2}
^{1}Purdue University, United States; ^{2}University of Warsaw, Poland

Brain Circuits & Systems

Time: Monday, May 29 (11:30-13:00)

Room: Grand Ballroom II

Chair(s): Wouter Serdijn - Delft University of Technology; Andreas Demosthenous - University College London

- High Density, High Radiance μ LED Matrix for Optogenetic Retinal Prostheses and Planar Neural Stimulation*..... 228**
Ahmed Soltan^{3}, Brian McGovern^{1}, Emmanuel Drakakis^{1}, Mark Neil^{1}, Mahbub Akhter^{2}, Jun Su Lee^{2}, Patrick Degenaar^{3}
^{1}Imperial College London, United Kingdom; ^{2}Tyndall National Institute, Ireland; ^{3}University of Newcastle, United Kingdom

- A Precision Pseudo Resistor Bias Scheme for the Design of Very Large Time Constant Filters* 229**
Roberto Puddu, Caterina Carboni, Lorenzo Bisoni, Gianluca Barabino, Danilo Pani, Luigi Raffo, Massimo Barbaro
Università degli Studi di Cagliari, Italy

- A High Input Impedance Low Noise Integrated Front-End Amplifier for Neural Monitoring* 230**
Zhijun Zhou, Paul Warr
University of Bristol, United Kingdom

- An Integrated Passive Phase-Shift Keying Modulator for Biomedical Implants with Power Telemetry Over a Single Inductive Link* 231**
Dai Jiang, Dominik Cirmirakis, Matthew Schormans, Andreas Demosthenous, Timothy Perkins, Nick Donaldson
University College London, United Kingdom

Memristive Model for Synaptic Circuits 232
Yang Zhang^{1}, Xiaoping Wang^{1}, Yi Li^{1}, Eby G. Friedman^{2}
{1}Huazhong University of Science and Technology, China; {2}University of Rochester, United States

Oscillators, Phase-locked Loops & Others I

Time: Monday, May 29 (11:30-13:00)

Room: Grand Ballroom III

Chair(s): Jorge Fernandes - Instituto de Engenharia de Sistemas e Computadores-ID; Shahriar Mirabbasi - University of British Columbia

INVITED: a ± 10 ppm -40 to 125°C BAW-Based Frequency Reference System for Crystal-Less Wireless Sensor Nodes 233
Danielle Griffith, Per Torstein Røine, Torjus Kallerud, Brian Goodlin, Zachary Hughes, Ernest Yen
Texas Instruments Inc., Norway; Texas Instruments Inc., United States

On the Mechanisms Governing Spurious Tone Injection in Fractional PLLs 237
Federico Bizzarri^{1}, Angelo Brambilla^{1}, Sergio Callegari^{2}
{1}Politecnico di Milano, Italy; {2}Università di Bologna, Italy

A Wide Tuning-Range ADPLL for mW-Socs with Dithering-Enhanced Accuracy in 65 nm CMOS 238
David Bellasi, Philipp Schönle, Qiuting Huang, Luca Benini
Eidgenössische Technische Hochschule Zürich, Switzerland

A Novel Segmentation Scheme for DTC-Based $\Delta\Sigma$ Fractional-N PLL 242
Tuan Minh Vo, Carlo Samori, Andrea Leonardo Lacaita, Salvatore Levantino
Politecnico di Milano, Italy

0.5 kHz – 32 MHz Digital Fractional-N Frequency Synthesizer with Burst-Frequency Switch 246
Seung-Hun Shin, Pil-Ho Lee, Jin-Woo Park, Yu-Jeong Hwang, Young-Chan Jang
Kumoh National Institute of Technology, Korea, South

Temperature Compensated Circuits

Time: Monday, May 29 (11:30-13:00)

Room: Grand Ballroom IV

Chair(s): Degang Chen - Iowa State University; Shahriar Mirabbasi - University of British Columbia

A 0.9V-VDD Sub-nW Resistor-Less Duty-Cycled CMOS Voltage Reference in 65nm for IoT 250
Maoqiang Liu, Arthur H. M. van Roermund, Pieter Harpe
Eindhoven University of Technology, Netherlands

A 2.1-ppm/°C Current-Mode CMOS Bandgap Reference with Piecewise Curvature Compensation 254
Ruocheng Wang, Wengao Lu, Yuze Niu, Zhaokai Liu, Meng Zhao, Yacong Zhang, Zhongjian Chen
Peking University, China

TECHNICAL SESSIONS – MONDAY, MAY 29TH

A Sub-1 V, Nanopower, ZTC Based Zero-VT Temperature-Compensated Current Reference 258
David Cordova{1}, Arthur C. de Oliveira{2}, Pedro Toledo{2}, Hamilton Klimach{2}, Sergio Bampi{2}, Eric Fabris{2}
{1}IMS Bordeaux, Peru; {2}Universidade Federal do Rio Grande do Sul, Brazil

Temperature Compensation of Floating-Gate Transistors in Field-Programmable Analog Arrays..... 262
Alexander Dilello{2}, Steven Andryczik{2}, Brandon Kelly{2}, Brandon Rumberg{1}, David Graham{2}
{1}Aspinity Inc., United States; {2}West Virginia University, United States

A 9-nW on-Chip Constant Subthreshold CMOS Transconductance Bias with Fine-Tuning 266
Uldric Antao, John Choma, Theodore Berger
University of Southern California, United States

Computational Image Sensors

Time: Monday, May 29 (11:30-13:00)

Room: Grand Ballroom VII

Chair(s): Joseph Lin - Massachusetts Institute of Technology; Charbel Rizk - Johns Hopkins University

Reducing Electrical Power Dissipation in Computational Imaging Systems Through Special-Purpose Optics 270

David Stork, Thomas Vogelsang, James Tringali, Patrick R. Gill, Mark Kellam, Evan Erickson
Rambus Inc., United States

Neuromorphic Readout Integrated Circuits and Related Spike-Based Image Processing..... 274
Dean Scribner, Thomas Petty, Peter Mui
Northrop Grumman Corporation, United States

Characterization of RTN Noise in the Analog Front-End of Digital Pixel Imagers 278
Charbel Rizk{2}, Francisco Tejada{1}, John Hughes{2}, David Barbehenn{2}, Philippe Pouliquen{2}, Andreas G. Andreou{2}
{1}Imogin LLC, United States; {2}Johns Hopkins University, United States

Block-Matching Optical Flow for Dynamic Vision Sensors: Algorithm and FPGA Implementation 282

Min Liu, Tobi Delbruck
Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland

Spatiotemporal Compressed Sampling for Video Compression..... NA
Jie Zhang, Tao Xiong, Sang Peter Chin, Trac Tran, Ralph Etienne-Cummings
Johns Hopkins University, United States

Internet of Video Things: System Architecture, Framework, & ApplicationTime: Monday, May 29 (11:30-13:00)

Room: Grand Ballroom VIII

Chair(s): Yen-Kuang Chen - Intel Corporation; Eduard Alarcon - Universitat Politècnica de Catalunya

INVITED: Improving Driver Safety Using Deep Learning on Embedded Devices NA
David Julian
NetraDyne, United States

Internet of Video Things in 2030: a World with Many Cameras 286
Anup Mohan{1}, Kent Gauen{1}, Yung-Hsiang Lu{1}, Wei Wayne Li{2}, Xuemin Chen{2}
{1}Purdue University, United States; {2}Texas Southern University, United State

A Framework for Visual Fog Computing 290
Shao-Wen Yang{2}, Omesh Tickoo{2}, Yen-Kuang Chen{1}
{1}Intel Corporation, United States; {2}Intel Research Labs, United States

A Multi-Agent Based System for Run-Time Distributed Resource Management..... 294
Ioannis Galanis, Daniel Olsen, Iraklis Anagnostopoulos
Southern Illinois University Carbondale, United States

Distributed Video Codec with Spatiotemporal Side Information 298
Yueh-Ying Lee^{3}, Pin-Hung Kuo^{3}, Chia-Han Lee^{2}, Yen-Kuang Chen^{1}, Shao-Yi Chien^{3}
{1}Intel Corporation, United States; {2}National Chiao Tung University, Taiwan; {3}National Taiwan University, Taiwan

Biometrics & Biomedical Signal/Image Processing Circuits & Systems: II**Time:** Monday, May 29 (11:30-13:00)**Room:** Grand Ballroom IX**Chair(s):** Gianluca Setti - Università degli Studi di Ferrara; Danilo Demarchi - Politecnico di Torino

LightProbe: a 64-Channel Programmable Ultrasound Transducer Head with an Integrated Front-End and a 26.4 Gb/s Optical Link 302
Pascal Alexander Hager^{1}, Christoph Risser^{2}, Peter-Karl Weber^{2}, Luca Benini^{1}
{1}Eidgenössische Technische Hochschule Zürich, Switzerland; {2}Fraunhofer Institute for Biomedical Engineering, Germany

A Microstimulator with Parameter Adjustment for Bladder Dysfunction 306
Yu-Jin Lin, Shuenn-Yuh Lee
National Cheng Kung University, Taiwan

On the Use of Compressive Sensing (CS) for Brain Dopamine Recording with Fast-Scan Cyclic Voltammetry (FSCV) 310
Hossein Zamani^{1}, Hamid Bahrami^{3}, Paul Garris^{2}, Pedram Mohseni^{1}
{1}Case Western Reserve University, United States; {2}Illinois State University, United States; {3}University of Akron, United States

Tensor-Based Fusion of EEG and FMRI to Understand Neurological Changes in Schizophrenia 314
Evrin Acar^{1}, Yuri Levin-Schwartz^{2}, Vince D. Calhoun^{3}, Tulay Adalı^{2}
{1}University of Copenhagen, Denmark; {2}University of Maryland, Baltimore County, United States; {3}University of New Mexico, United States

A Power-Area-Efficient Impedance Sensor Design for 10 × 10 Microelectrode Array Sensing 318
Xinyuan Ge, Tsz Ngai Lin, Jie Yuan
Hong Kong University of Science and Technology, Hong Kong

SAR ADCs**Time:** Monday, May 29 (11:30-13:00)**Room:** Grand Ballroom X**Chair(s):** Mohamad Sawan - Polytechnique Montréal; Jose Silva-Martinez - Texas A&M University

High-Resolution SAR ADC with Enhanced Linearity 322
Hua Fan^{2}, Franco Maloberti^{1}
{1}Università degli Studi di Pavia, Italy; {2}University of Electronic Science and Technology of China, China

Seven-Bit 700-MS/s Four-Way Time-Interleaved SAR ADC with Partial Vcm-Based Switching 324
Dezhi Xing^{2}, Yan Zhu^{2}, Chi-Hang Chan^{2}, Sai-Weng Sin^{2}, Seng-Pan U^{2}, Rui Paulo Martins^{2}, Fan Ye^{1}, Junyan Ren^{1}
{1}Fudan University, China; {2}University of Macau, China; {2}University of Macau, Portugal

TECHNICAL SESSIONS – MONDAY, MAY 29TH

A 12-Bit 40-MS/s Calibration-Free SAR ADC..... 324
Chung-Wei Hsu, Li-Jen Chang, Chun-Po Huang, Soon-Jyh Chang
National Cheng Kung University, Taiwan

A Calibration-Free 13-Bit 0.9 V Differential SAR-ADC with Hybrid DAC and Dithering..... 328
Quentin Sauv {1}, Damien Favre{3}, Gabriel Morin-Laporte{3}, Mohammad Taherzadeh-Sani{2}, Nicolas Constantin{1}, Fr d ric Nabki{1}
{1} cole de Technologie Sup rieure, Canada; {2}Ferdowsi University of Mashhad, Iran; {3}Universit  du Qu bec   Montr al, Canada

A Low-Complexity Correlation-Based Time Skew Estimation Technique for Time-Interleaved SAR ADCs 332
Armia Salib, Barry Cardiff, Mark Flanagan
University College Dublin, Ireland

MIMO Systems

Time: Monday, May 29 (11:30-13:00)

Room: Laurel AB

Chair(s): Christoph Studer - Rice University; Lan-Da Van - National Chiao Tung University

Power-Aware Space-Time-Trellis-Coded MIMO Detector with SNR Estimation and State-Purging 336
Kai-Ting Shr, Chieh-Yu Chen, Jin-Wei Jhang, Yuan-Hao Huang
National Tsing Hua University, Taiwan

ADMM-Based Infinity Norm Detection for Large MU-MIMO: Algorithm and VLSI Architecture 340
Shahriar Shahabuddin{2}, Markku Juntti{2}, Christoph Studer{1}
{1}Cornell University, United States; {2}University of Oulu, Finland

A Cholesky Decomposition Based Massive MIMO Uplink Detector with Adaptive Interpolation 344
Rakesh Gangarajiah, Hemanth Prabhu, Ove Edfors, Liang Liu
Lund University, Sweden

Design of an SVD Engine for 8x8 MIMO Precoding Systems 348
Chun-Hun Wu, Chin-Yi Liu, Pei-Yun Tsai
National Central University, Taiwan

Algorithm and Architecture for Joint Detection and Decoding for MIMO with LDPC Codes 352
Shushen Jing{2}, Junmei Yang{2}, Zhongfeng Wang{1}, Xiaohu You{2}, Chuan Zhang{2}
{1}Nanjing University, China; {2}Southeast University, China

Emerging & Reconfigurable Architectures

Time: Monday, May 29 (11:30-13:00)

Room: Laurel CD

Chair(s): Xinmiao Zhang - Case Western University; Keshab K. Parhi - University of Minnesota at Minneapolis

FPGA Implementation and Comparison of AES-GCM and Deoxys Authenticated Encryption Schemes 356
Sandhya Koteswara{2}, Amitabh Das{1}, Keshab K. Parhi{2}
{1}Intel Corporation, United States; {2}University of Minnesota Twin Cities, United States

Robust 7-nm SRAM Design on a Predictive PDK..... 360
Vinay Vashishtha, Manoj Vangala, Parv Sharma, Lawrence Clark
Arizona State University, United States

- A Fast FPGA-Based Deep Convolutional Neural Network Using Pseudo Parallel Memories* 364**
Muluken Hailesellase, Syed Rafay Hasan
Tennessee Technological University, United States
- Fast Cycle-Accurate Compile Based Simulator for Reconfigurable Processor*..... 368**
Narasinga Rao Miniskar{2}, Raj Narayana Gadde{2}, Young-Chul Rams Cho{1}, Sukjin Kim{1}
{1}Samsung Electronics, Korea, South; {2}Samsung R&D Institute India, Bangalore, India; {2}Samsung R&D
Institute India, Bangalore , India
- Hierarchical Functional Obfuscation of Integrated Circuits Using a Mode-Based Approach* 372**
Sandhya Koteswara, Chris H. Kim, Keshab K. Parhi
University of Minnesota Twin Cities, United States

Video Coding Implementations**Time:** Monday, May 29 (11:30-13:00)**Room:** Kent AB**Chair(s):** Saeid Nooshabadi - Michigan Technological University; Lu Yu - Zhejiang University

-
- A Dual-Clock VLSI Design of H.265 Sample Adaptive Offset Estimation for 8K Ultra-HD TV Encoding* 376**
Jianbin Zhou, Dajiang Zhou, Shihao Wang, Shuping Zhang, Takeshi Yoshimura, Satoshi Goto
Waseda University, Japan
- H.265/HEVC Encoder Optimization with Parallel-Efficient Algorithm and QP-Based Early Termination* 377**
Caoyang Jiang, Saeid Nooshabadi
Michigan Technological University, United States
- A Hardware-Friendly Hierarchical HEVC Motion Estimation Algorithm for UHD Applications* 381**
Li Hu, Jiawei Gu, Guanghui He, Weifeng He
Shanghai Jiao Tong University, China
- High-Level Synthesized 2-D IDCT/IDST Implementation for HEVC Codecs on FPGA*..... 385**
Vili Viitamäki, Panu Sjövall, Jarno Vanne, Timo Hämäläinen
Tampere University of Technology, Finland
- A Higher Order Transform Domain Filter Exploiting Non-Local Spatial Correlation for Video Coding* 389**
Qing Zhang, Lu Yu
Zhejiang University, China

Novel Memory Technologies**Time:** Monday, May 29 (11:30-13:00)**Room:** Essex AB**Chair(s):** Alyssa Apsel - Cornell University

-
- Highly Configurable Hybrid GC-eDRAM/SRAM Bitcell for Robust Low-Power Operation* 393**
Robert Giterman{1}, Adam Teman{1}, Pascal Meinerzhagen{2}
{1}Bar-Ilan University, Israel; {2}Intel Research Labs, United States
- Maximization of Crossbar Array Memory Using Fundamental Memristor Theory*..... 394**
Jason Kamran Jr Eshraghian{1}, Kyoung-Rok Cho{1}, Herbert Ho-Ching Lu{4}, Tyrone Fernando{4}, Sung-Mo Kang{3}, Kamran Eshraghian{2}
{1}Chungbuk National University, Korea, South; {2}iDataMap Corporation, Australia; {3}Korea Advanced Institute of
Science and Technology, Korea, South; {4}University of Western Australia, Australia

- A Time-Division Multiplexing Signaling Scheme for Low-Power Multi-Drop Memory Links*..... 397**
Gain Kim{1}, Chen Cao{1}, Kiarash Gharibdoust{2}, Yusuf Leblebici{1}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Kandou Bus, Switzerland
- Dynamic Reference Scheme for Variation-Resilient STT-MRAM Sensing*..... 398**
Kien Trinh Quang{2}, Sergio Ruocco{1}, Massimo Alioto{2}
{1}Agency for Science, Technology and Research, Singapore; {2}National University of Singapore, Singapore
- Universal Performance Parameters for Resistive Switching Devices* 399**
Jorge Gomez{2}, Ioannis Vourkas{2}, Angel Abusleme{2}, Marcos Maestro{3}, Rosana Rodríguez Martínez{3},
Javier Martin-Martinez{3}, Montserrat Nafria{3}, Georgios Ch. Sirakoulis{1}, Antonio Rubio{4}
{1}Democritus University of Thrace, Greece; {2}Pontificia Universidad Católica de Chile, Chile; {3}Universitat
Autònoma de Barcelona, Spain; {4}Universitat Politècnica de Catalunya, Spain

Testing & Verification**Time:** Monday, May 29 (14:00-15:30)**Room:** Dover A**Chair(s):** Degang Chen - Iowa State University; Igor Filanvosky - University of Alberta

-
- An Ultra Low-Power Capacitively-Coupled Chopper Instrumentation Amplifier for Wheatstone-Bridge Readout Circuits* 400**
Moaaz Ahmed{2}, Farid Boussaid{3}, Amine Bermak{1}
{1}Hamad Bin Khalifa University / Hong Kong University of Science and Technology, Hong Kong; {2}Hong Kong
University of Science and Technology, Hong Kong; {3}University of Western Australia, Australia
- Multi-Standard Low-Power DDR I/O Circuit Design in 7nm CMOS Process*..... 404**
Moo Sung Chae, Thomas Wilson, Eric Naviasky
Cadence Design Systems, United States
- A Self-Test on Wafer Level for a MEM Gyroscope Readout Based on $\Delta\Sigma$ Modulation*..... 408**
Sebastian Nessler, Maximilian Marx, Yiannos Manoli
Albert-Ludwigs-Universität Freiburg / IMTEK, Germany
- Accurate Spectral Testing of the Signals with Amplitude Drift* 412**
Yuming Zhuang, Degang Chen
Iowa State University, United States
- Floating-Gate FPAA Calibration for Analog System Design and Built-in Self Test*..... 416**
Sihwan Kim, Sahil Shah, Jennifer Hasler
Georgia Institute of Technology, United States

50 years of Circuits, Systems & Signals: A Session in Honor of Prof. Sanjit K. Mitra (Part II)**Time:** Monday, May 29 (14:00-15:30)**Room:** Dover BC**Chair(s):** PP Vaidyanathan - California Institute of Technology; Yao Wang - New York University

-
- INVITED: Tidbits on Tunable Analog Filters and Image Demosaicing*..... 420**
Henrique S. Malvar
Microsoft Research, USA

- Second-Order Analog Filter Sections with Independently Tunable Center Frequency and Bandwidth* 424**
Antonio Petraglia, Mariane Petraglia, Manoel Perez
Universidade Federal do Rio de Janeiro, Brazil

TECHNICAL SESSIONS – MONDAY, MAY 29TH

- Unsupervised Video Orchestration Based on Aesthetic Features*** 428
Alessandro Neri, Federica Battisti, Federico Colangelo, Marco Carli
Università degli Studi Roma TRE, Italy
- Signal Processing and Climate Understanding***..... 432
Jacques Szczupak, Leontina Pinto, Gabriel Torres
Engenho, Brazil
- Tunable FIR Digital Filters Using FIR Approximation of Spectral Transformation***..... 436
Anamitra Makur
Nanyang Technological University, Singapore

Deep Learning for Embedded Real Time Systems

Time: Monday, May 29 (14:00-15:30)

Room: Grand Ballroom I

Chair(s): Tinoosh Mohsenin - University of Maryland; Azalia Mirhoseini - Google Brain

- Tightly Integrated Deep Learning and Symbolic Programming on a Single Neuromorphic Chip*** 440
Bryan Dawson{1}, Jamie Infantolino{2}, Manuel Vindiola{2}, John Monaco{2}
{1}Secure Mission Solutions, United States; {2}U.S. Army Research Laboratory, United States

- INVITED: Towards Closing the Energy Gap Between Hog and CNN Features for Embedded Vision*** 444

Amr Suleiman{1}, Yu-Hsin Chen{1}, Joel Emer{2}, Vivienne Sze{1}
{1}Massachusetts Institute of Technology, United States; {2}Massachusetts Institute of Technology / Nvidia Corporation, United States

- PACENet: Energy Efficient Acceleration for Convolutional Network on Embedded Platform***..... 448
Adwaya Kulkarni, Tahmid Abtahi, Colin Shea, Amey Kulkarni, Tinoosh Mohsenin
University of Maryland, Baltimore County, United States

- TinyDL: Just-in-Time Deep Learning Solution for Constrained Embedded Systems*** 452
Bitá Darvish Rouhani{2}, Azalia Mirhoseini{1}, Farinaz Koushanfar{2}
{1}Rice University, United States; {2}University of California, San Diego, United States

- End-to-End Scalable FPGA Accelerator for Deep Residual Networks***..... 456
Yufei Ma, Minkyu Kim, Yu Cao, Sarma Vrudhula, Jae-Sun Seo
Arizona State University, United States

Ultra-efficient Approaches Enabling Long-term, Mobile EEG for Brain Monitoring

Time: Monday, May 29 (14:00-15:30)

Room: Grand Ballroom II

Chair(s): David Hairston - US Army Research Laboratory; Tinoosh Mohsenin - University of Maryland

- Wireless Brain Computer Interfaces Enabling Synchronized Optogenetics and Electrophysiology*** 460

Gabriel Gagnon-Turcotte, Léonard L. Gagnon, Guillaume Bilodeau, Benoit Gosselin
Université Laval, Canada

TECHNICAL SESSIONS – MONDAY, MAY 29TH

An EEG Artifact Identification Embedded System Using ICA and Multi-Instance Learning..... 464
Ali Jafari{2}, Sunil Gandhi{2}, Harsha Konuru{2}, William David Hairston{1}, Tim Oates{2}, Tinoosh Mohsenin{2}
{1}U.S. Army Research Laboratory, United States; {2}University of Maryland, Baltimore County, United States

Online Adaptive Data Acquisition Enabling Ultra-Low Power Real-World EEG 468
Michael Nonte{1}, Joseph Conroy{2}, Peter Gadfort{2}, William David Hairston{2}
{1}DCS Corporation, United States; {2}U.S. Army Research Laboratory, United States

INVITED: Towards Signal Processing Assisted Hardware for Continuous in-Band Electrode Impedance Monitoring..... 472
Siddharth Kohli, Alexander Casson
University of Manchester, United Kingdom

INVITED: Work Towards a Fieldable Multi-Channel EEG System for Continuous Monitoring..... NA
Paul Theilmann{1}, Julian Warchall{2}, Patrick Mercier{2}, Harinath Garudadri{2}
{1}Maxentric Technologies LLC, United States; {2}University of California, San Diego, United States

Oscillators, Phase-locked Loops & Others III

Time: Monday, May 29 (14:00-15:30)

Room: Grand Ballroom III

Chair(s): Nathan Neihart - Iowa State University; Ayman Fayed - Ohio State University

Charge-Controlled Oscillators and Their Application in Frequency Synthesis 476
Rohie Kaushik, Shouri Chatterjee, G. S. Visweswaran
Indian Institute of Technology Delhi, India

An Area-Efficient, 0.022-mm², Fully Integrated Resistor-Less Relaxation Oscillator for Ultra-Low Power Real-Time Clock Applications 477
Hiroki Asano, Tetsuya Hirose, Toshihiro Ozaki, Nobutaka Kuroki, Masahiro Numa
Kobe University, Japan

A 5-Bit Phase-Interpolator-Based Fractional-N Frequency Divider for Digital Phase-Locked Loops 481
Jianfu Lin, Hanjun Jiang, Baoyong Chi
Tsinghua University, China

Below-Ground Injection of Floating-Gate Transistors for Programmable Analog Circuits..... 485
Mir Mohammad Navidi{2}, David Graham{2}, Brandon Rumberg{1}
{1}Aspinity Inc., United States; {2}West Virginia University, United States

Analytic Modeling of Static Noise Margin Considering DIBL and Body Bias Effects 489
Fabián Olivera, Antonio Petraglia
Universidade Federal do Rio de Janeiro, Brazil

Innovations in Acoustics

Time: Monday, May 29 (14:00-15:30)

Room: Grand Ballroom IV

Chair(s): Muyinatu Bell - Johns Hopkins University; Ralph Etienne-Cummings - Johns Hopkins University

INVITED: Programmable Electronic Stethoscope NA
James E. West, Ian McLane, Mounya Elhilali, Dimitra Emmanouilidou
Johns Hopkins University, United States

Echo Flow Patterns Influence Bat Flight Behavior NA
Michaela Warnecke{1}, Benjamin Falk{1}, John Hallam{2}, Cynthia F. Moss{1}
{1}Johns Hopkins University, United States; {2}University of Southern Denmark, United States

- INVITED: Automatic Vascular Flow Reconstruction with Doppler Ultrasound** NA
Xin Kang^{2}, David Narrow^{2}, Devin O'Brien Coon^{1}
{1}Johns Hopkins University, United States; {2}Sonavex, Inc., United States
- INVITED: Perceptual Signal Processing for Audio-Visual Beamforming with the Eigenmike Microphone Array and an Omni-Camera** NA
Daniel R. Mendat, James E. West, Sudarshan Ramenahalli, Ernst Niebur, Andreas G. Andreou
Johns Hopkins University, United States
- Advanced Beamforming Methods for Ultrasound and Photoacoustic Imaging** NA
Muyinatu A. Lediju Bell
Johns Hopkins University, United States

Image Sensors**Time:** Monday, May 29 (14:00-15:30)**Room:** Grand Ballroom VII**Chair(s):** Shoushun Chen - Nanyang Technological University; Viktor Gruev - University of Illinois Urbana-Champaign

-
- A 1600 by 1200, 300 mW, 40 fps Multi-Spectral Imager for Near-Infrared Fluorescence Image-Guided Surgery**..... 493
Missael Garcia^{2}, Mohamed Zayed^{2}, Kyoung-Mi Park^{2}, Viktor Gruev^{1}
{1}University of Illinois at Urbana-Champaign, United States; {2}Washington University in St. Louis, United States
- A Novel Smoothness-Based Interpolation Algorithm for Division of Focal Plane Polarimeters** 497
Jieyun Zhang^{3}, Wenbin Ye^{3}, Ashfaq Ahmed^{2}, Zhurui Qiu^{1}, Yuan Cao^{3}, Xiaojin Zhao^{3}
{1}Chenghan International School, China; {2}Hong Kong University of Science and Technology, Hong Kong;
{3}Shenzhen University, China
- Analysis of CMS Noise Reduction for 65 nm CIS**..... 501
Raffaele Capoccia, Assim Boukhayma, ChristianENZ
École Polytechnique Fédérale de Lausanne, Switzerland
- Dead Time Effects in the Indirect Time-of-Fight Measurement with SPADs** 505
Maik Beer^{1}, Olaf Schrey^{1}, Bedrich Hosticka^{1}, Rainer Kokozinski^{2}
{1}Fraunhofer Institute for Microelectronic Circuits and Systems, Germany; {2}Universität Duisburg-Essen, Germany
-
- Energy-Efficient & Secure IoT**
- Time:** Monday, May 29 (14:00-15:30)
- Room:** Grand Ballroom VIII
- Chair(s):** Emre Salman - Stony Brook University; Milutin Stanecevic - Stony Brook University
-
- INVITED: Internet of Things and EDA: an Industrial Perspective** NA
Tuna Tarim
Texas Instruments Inc., United States
- Energy Efficient AC Computing Methodology for Wirelessly Powered IoT Devices**..... 509
Tutu Wan, Yasha Karimi, Milutin Stanačević, Emre Salman
Stony Brook University, United States
- Variance-Based Digital Logic for Energy Harvesting Internet-of-Things** 513
Sri Harsha Kondapalli, Xuan Zhang, Shantanu Chakrabartty
Washington Univeristy in St. Louis, USA
- A Novel Approximate Computing Based Security Primitive for the Internet of Things** 517
Mingze Gao, Gang Qu
University of Maryland, College Park, United States

Power Efficient AES Core for IoT Constrained Devices Implemented in 130nm CMOS 521
Shady Agwa{1}, Eslam Yahya{3}, Yehea Ismail{2}
{1}American University in Cairo, Egypt; {2}American University in Cairo / Zewail City of Science and Technology, Egypt; {3}American University in Cairo / Zewail City of Science and Technology / Banha University, Egypt

Wireless & Implantable/Injectable Technology Circuits & Systems I

Time: Monday, May 29 (14:00-15:30)

Room: Grand Ballroom IX

Chair(s): Andrew Mason; Virgilio Valente - University College London

A 3-Coil Simultaneous Power and Uplink Data Transmission Inductive Link for Battery-Less Implantable Devices..... 525

Min Li, Dake Liu, Chen Gong, Wan Qiao

Beijing Institute of Technology, Sweden; Beijing Institute of Technology, China

A Rectifier/AC Shunt Regulator Combo Circuit with Inherent AM Demodulation Front-End for Wireless Powered Implants 529

Edward Lee

Alfred Mann Foundation, United States

A Wireless Neuroprosthetic for Augmenting Perception Through Modulated Electrical Stimulation of Somatosensory Cortex..... 533

Xilin Liu{2}, Milin Zhang{1}, Xiaotie Wu{1}, Andrew Richardson{2}, Solymar Maldonado{2}, Sam DeLuccia{2},

Yohannes Ghenbot{2}, Timothy Lucas{2}, Jan Van der Spiegel{2}

{1}Tsinghua University, China; {2}University of Pennsylvania, United States

A Wireless System for Combined Heart Optogenetics and Electrocardiography Recording 537

Léonard L. Gagnon{2}, Gabriel Gagnon-Turcotte{2}, Aude Popek{2}, Aurélien Chatelier{1}, Mohamed Chahine{2},

Benoit Gosselin{2}

{1}Université de Poitiers, France; {2}Université Laval, Canada

A Model Based Approach for Realizing a Safe Wireless Biotelemetry System 541

Kerron Duncan, Ralph Etienne-Cummings

Johns Hopkins University, United States

Sigma-Delta Converters

Time: Monday, May 29 (14:00-15:30)

Room: Grand Ballroom X

Chair(s): George Yuan - Hong Kong University of Science and Technology; Jose Silva-Martinez - Texas A&M University

A Class of 1-Bit Multi-Step Look-Ahead Σ - Δ Modulators..... 545

Charis Basetas, Thanasis Orfanos, Paul Peter Sotiriadis

National Technical University of Athens, Greece

Passive Loop Filter Assistance for CTSDMs 546

Dries Vercaemer, Johan Raman, Pieter Rombouts

Ghent University, Belgium

Current-Mode Multi-Path Excess Loop Delay Compensation for GHz Sampling CT $\Sigma\Delta$ ADCs 547
Chenming Zhang{1}, Lucien J. Breems{2}, Georgi Radulov{1}, Muhammed Bolatkale{2}, Qilong Liu{1}, Hans Hegt{1}, Arthur H. M. van Roermund{1}
{1}Eindhoven University of Technology, Netherlands; {2}NXP Semiconductors N.V., Netherlands

A 3rd Order MASH Switched-Capacitor $\Sigma\Delta$ M Using Ultra Incomplete Settling Employing an Area Reduction Technique 551
David Fouto{1}, Nuno Paulino{2}
{1}Universidade Nova de Lisboa, Portugal; {2}Universidade Nova de Lisboa / CTS-UNINOVA, Portugal

Subtractive Dithering Technique for Delta-Sigma Modulator 555
Zhichao Tan, Roberto Maurino, Robert Adams, Khiem Nguyen
Analog Devices Inc., Italy; Analog Devices Inc., United States

Communication Circuits and Systems

Time: Monday, May 29 (14:00-15:30)

Room: Laurel AB

Chair(s): Zhiyuan Yan - Lehigh University; Christoph Studer - Rice University

Spurs-Free Single-Bit-Output All-Digital Frequency Synthesizers with Forward and Feedback Spurs and Noise Cancellation 559
Paul Peter Sotiriadis
National Technical University of Athens, Greece

An Efficient Parallel Resampling Structure Based on Iterated Short Convolution Algorithm 560
Hao Li{1}, Jie Guo{2}, Zhigang Wang{1}, Houjun Wang{1}
{1}University of Electronic Science and Technology of China, China; {2}University of Pittsburgh, United States

A Low-Voltage High-Swing Colpitts VCO with Inherent Tapped Capacitors Based Dynamic Body Bias Technique 564
Jun Chen, Benqing Guo, Fading Zhao, Yao Wang, Guangjun Wen
University of Electronic Science and Technology of China, China

Asynchronous Sampling Based Hybrid Equalizer 568
Namik Kocaman{1}, Michael Green{2}
{1}Broadcom Ltd., United States; {2}University of California, Irvine, United States

A High Temperature Variable Gain Amplifier Based on GaN HEMT Devices for Downhole Communications 572
Mohammed Ehteshamuddin, Jebreel Salem, Dong Ha
Virginia Polytechnic Institute and State University, United States

Low Power Architectures

Time: Monday, May 29 (14:00-15:30)

Room: Laurel CD

Chair(s): Zhiyuan Yan - Lehigh University; Yun Chen - Fudan University

Dark Memory and Accelerator-Rich System Optimization in the Dark Silicon Era..... 576

Ardavan Pedram{2}, Stephen Richardson{2}, Mark Horowitz{2}, Shahar Kvatinsky{3}, Sameh Galal{1}
{1}Citadel LLC, United States; {2}Stanford University, United States; {3}Technion – Israel Institute of Technology, Israel

Integration of Energy-Recycling Logic and Wireless Power Transfer for Ultra-Low-Power Implantables 577

Hsin-Tzu Lin{1}, Yi-Chung Wu{2}, Ping-Hsuan Hsieh{3}, Chia-Hsiang Yang{2}
{1}National Chiao Tung University, Taiwan; {2}National Taiwan University, Taiwan; {3}National Tsing Hua University, Taiwan

Seeking Low-Power Synchronous/Asynchronous Systems: a FIR Implementation Case Study 581

Ali Skaf{1}, Jean Simatic{2}, Laurent Fesquet{2}
{1}Syrian Private University, Syria; {2}Université Grenoble Alpes / TIMA Laboratory, France

Reducing Power, Area, and Delay of Threshold Logic Gates Considering Non-Integer Weights 585

Seyed Nima Mozaffari, Spyros Tragoudas, Themistoklis Haniotakis
Southern Illinois University Carbondale, United States

Power-Rail ESD Clamp Circuit with Hybrid-Detection Enhanced Triggering in a 65-nm, 1.2-V CMOS Process 589

Guangyi Lu, Yuan Wang, Yize Wang, Xing Zhang
Peking University, China

Visual Signal Enhancement, Presentation & Analysis

Time: Monday, May 29 (14:00-15:30)

Room: Kent AB

Chair(s): Chris Lee - National Cheng Kung University; Wan-Chi Siu - Hong Kong Polytechnic University

Image Co-Segmentation via Saliency Co-Fusion 593

Koteswar Rao Jerripothula{1}, Jianfei Cai{2}, Junsong Yuan{2}
{1}Graphic Era University, India; {2}Nanyang Technological University, Singapore

Complexity Reduction by Modified Scale-Space Construction in Sift Generation Optimized for a Mobile GPU 594

Chulhee Lee{2}, Hyuk-Jae Lee{2}, Chae Eun Rhee{1}
{1}Inha University, Korea, South; {2}Seoul National University, Korea, South

Low-Lighting Video Enhancement Using Constrained Spatial-Temporal Model for Real-Time Mobile Communication 595

Xinwei Gao, Haibo Deng, Yaoyao Guo, Chenchen Gu, Yongfang Shi, Anlin Gao, Licai Guo, Xunan Mao, Jing Lv
Tencent Holdings Limited, China

Detection of Abandoned Objects Using Robust Subspace Recovery with Intrinsic Video Alignment 599

Lucas Thomaz{2}, Allan Da Silva{2}, Eduardo Da Silva{2}, Sergio Netto{2}, Hamid Krim{1}
{1}North Carolina State University, United States; {2}Universidade Federal do Rio de Janeiro, Brazil

Subpixel Rendering Without Color Distortions for Diamond-Shaped PenTile Displays..... 603

Jae-Han Lee, Kyung-Rae Kim, Chang-Su Kim
Korea University, Korea, South

ULP Circuits for Implantables & Wearables

Time: Monday, May 29 (14:00-15:30)

Room: Essex AB

Chair(s): Alyssa Apsel - Cornell University

A Chopper Capacitively-Coupled Instrumentation Amplifier Capable of Handling Large Electrode Offset for Biopotential Recordings 607

Jiawei Zheng, Wing-Hung Ki, Langyu Hu, Chi-Ying Tsui
Hong Kong University of Science and Technology, Hong Kong

Self-Sustainable Smart Ring for Long Term Monitoring of Blood Oxygenation..... 608

Petar Jokic, Giovanni Antonio Salvatore, Michele Magno, Lars Bütke, Gerhard Tröster, Luca Benini
Eidgenössische Technische Hochschule Zürich, Switzerland

0.4-to-1-V Voltage Scalable $\Delta\Sigma$ ADC with Two-Step Hybrid Integrator for IoT Sensor Applications in 65nm LP CMOS..... 609

Jun-Eun Park, Young-Ha Hwang, Deog-Kyoon Jeong
Seoul National University, Korea, South

Kinetic AC/DC Converter for Electromagnetic Energy Harvesting in Autonomous Wearable Systems
..... 610

Robin Bolt{1}, Michele Magno{1}, Thomas Burger{1}, Aldo Romani{2}, Luca Benini{1}
{1}Eidgenössische Technische Hochschule Zürich, Switzerland; {2}Università di Bologna, Italy

Dual-Band Wireless Power Transfer System Using Circular Defected Ground Structure Resonators for Biomedical Applications 611

Fairus Tahar, Adel Barakat, Redzuan Saad, Kuniaki Yoshitomi, Ramesh Pokharel
Kyushu University, Japan

cass student design competition – monday, may 29th

CASS Student Design Competition

Time: Monday, May 29 (14:00-15:30)

Room: Atlantic

Chair(s): Eduardo da Silva - Universidade Federal do Rio de Janeiro

INDEPENDENT CLEANING ROBOT USING THE OPEN-HARDWARE PLATFORM ARDUINO NA

Beatriz Pontes Silva, Bryan Leite dos Santos, Eduardo Nascimento Emerich, Gabriella Duarte Silva Silveira, Gabrielle Silva de Andrade, Igor Menezes Santos, Isabella Barbosa Oliveira de Macedo, Izabele Bonfim Barbosa, Jean Paul Robert Barbosa Cerqueira, Viviane Cardoso Alves
Centro Federal de Educação Tecnológica Celso Suckow da Fonseca (CEFET/RJ), Nova Iguaçu, RJ, Brazil

AUTOMATED MINIATURE GREENHOUSE FOR DOMESTIC ORGANIC GARDEN..... NA

Beatriz Pontes Silva, Bryan Leite dos Santos, Eduardo Nascimento Emerich, Gabriella Duarte Silva Silveira, Gabrielle Silva de Andrade, Igor Menezes Santos, Isabella Barbosa Oliveira de Macedo, Izabele Bonfim Barbosa, Viviane Cardoso Alves
Centro Federal de Educação Tecnológica Celso Suckow da Fonseca (CEFET/RJ), Nova Iguaçu, RJ, Brazil

A MAN-MACHINE INTERACTION SYSTEM BASED ON EEG, EOG AND MACHINE LEARNING NA

Yufei Hu{1}, Qirui Zhang{1}, Xiaoyi Sun{1}, Bo Zhang{1}, Min Li{2}, Yufan Zhou{3}
{1}Shanghai Jiao Tong University, Shanghai, China; {2}Shanghai Jiao Tong University, Shanghai, China;
{3}Shanghai Jin Shan High School, Shanghai, China

SMART PET CLOTHING: GUARDIAN OF HEALTH AND MOOD..... NA

Yu-Jin Lin{1}, Yao-Tse Chang{1}, Hao-Yun Lee{1}, Zhan-Xian Liao{1}, You-Ren Du{1}, Yi-Wu Hung{2}, and Hao-Yu Tsai{2}
{1}National Cheng-Kung University, Tainan, Taiwan; {2} Tainan First High School, Tainan, Taiwan

***CASS Student Design Competition posters/demos will subsequently be on display in the poster hall in Harborside Ballroom during the Tuesday Poster Session from 15:00-16:30.*

Live DEMonstrations – monday, may 29th

Demonstration Session I

Time: Monday, May 29 (14:00-17:00)

Room: Harborside Ballroom

Chair(s): Jennifer Blain Christen - Arizona State University; Shih-Chii Liu - Swiss Federal Institute of Technology in Zurich

- O-1 - Live Demonstration: Photon Counting and Direct ToF Camera Prototype Based on CMOS SPADs** 612
.....
Ion Vornicu, Ricardo Carmona-Galán, Ángel Rodríguez-Vázquez
Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain
- O-2 - Live Demonstration: a 1600 by 1200, 300 mW, 40 fps Multi-Spectral Imager for Near-Infrared Fluorescence Image-Guided Surgery** 613
Missael Garcia{2}, Mohamed Zayed{2}, Kyoung-Mi Park{2}, Viktor Gruev{1}
{1}University of Illinois at Urbana-Champaign, United States; {2}Washington University in St. Louis, United States
- O-3 - Live Demonstration: Event-Driven Real-Time Spoken Digit Recognition System** 614
Jithendra Anumula, Daniel Neil, Xiaoya Li, Tobi Delbruck, Shih-Chii Liu
Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland
- O-4 - Live Demonstration: Hardware Implementation of Convolutional STDP for on-Line Visual Feature Learning** 615
Amirreza Yousefzadeh{1}, Timothee Masquelier{2}, Teresa Serrano-Gotarredona{1}, Bernabe Linares-Barranco{1}
{1}Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain; {2}Massachusetts Institute of Technology, France
- O-5 - Live Demonstration: Multiplexing AER Asynchronous Channels Over LVDS Links with Flow-Control and Clock-Correction for Scalable Neuromorphic Systems** 616
Amirreza Yousefzadeh{2}, Miroslav Jabłoński{1}, Taras Iakymchuk{4}, Alejandro Linares-Barranco{3}, Alfredo Rosado{4}, Luis Plana{5}, Teresa Serrano-Gotarredona{2}, Steve Furber{5}, Bernabe Linares-Barranco{2}
{1}AGH University of Science and Technology, Poland; {2}Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain; {3}Universidad de Sevilla, Spain; {4}Universitat de València, Spain; {5}University of Manchester, United Kingdom
- O-6 - Live Demonstration: Dynamic Voltage and Frequency Scaling for Neuromorphic Many-Core Systems** 617
Sebastian Höppner{1}, Yexin Yan{1}, Bernhard Vogginger{1}, Andreas Dixius{1}, Johannes Partzsch{1}, Prateek Joshi{1}, Felix Neumärker{1}, Stephan Hartmann{1}, Stefan Schiefer{1}, Stefan Scholze{1}, Georg Ellguth{1}, Love Cederstroem{1}, Matthias Eberlein{1}, Christian Mayr {1}, Steve Temple {2}, Luis Plana {2}, Jim Garside{2}, Simon Davison {2}, David R. Lester {2}, Steve Furber{2}
{1}Technische Universität Dresden, Germany; {2}University of Manchester, United Kingdom
- O-7 - Live Demonstration: a 768×640 Pixels 200Meps Dynamic Vision Sensor** 618
Menghan Guo, Jing Huang, Shoushun Chen
Nanyang Technological University, Singapore
- O-8 - Live Demonstration: a TiO₂ ReRAM Parameter Extraction Method** 619
Ioannis Messaris{1}, Spyridon Nikolaidis{1}, Alexantrou Serb{2}, Spyros Stathopoulos{2}, Isha Gupta{2}, Ali Khat{2}, Themistoklis Prodromakis{2}
{1}Aristotle University of Thessaloniki, Greece; {2}University of Southampton, United Kingdom
- O-9 - Live Demonstration: mNET: a Visually Rich Memristor Crossbar Simulator** 620
Radu Berdan{1}, Alexantrou Serb{2}, Christos Papavassiliou{1}, Themistoklis Prodromakis{2}
{1}Imperial College London, United Kingdom; {2}University of Southampton, United Kingdom
- O-10 - Live Demonstration: a Pulsar Signal Receiver System for Navigation** 621

Diogo Brito, Joao Santos, Jorge Fernandes, Gonçalo Tavares
Universidade Técnica de Lisboa / Instituto de Engenharia de Sistemas e Computadores - Investigação , Portugal

O-11 - Live Demonstration: FPGA Demonstration of Spiking Support Vector Networks Based on Growth Transform Neurons..... 622

John Mackay, Ahana Gangopadhyay, Shantanu Chakrabartty
Washington University in St. Louis, United States

O-12 - Live Demonstration: Feature Extraction System Using Restricted Boltzmann Machines on FPGA 623

Kodai Ueyoshi{2}, Takao Marukame{3}, Tetsuya Asai{2}, Masato Motomura{2}, Alexandre Schmid{1}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Hokkaido University, Japan; {3}Toshiba Corporation, Japan

O-13 - Live Demonstration: Convolutional Neural Network Driven by Dynamic Vision Sensor Playing RoShamBo..... 624

Iulia-Alexandra Lungu, Federico Corradi, Tobi Delbruck
Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland

O-14 - Live Demonstration - Multilayer Spiking Neural Network for Audio Samples Classification Using SpiNNaker..... 625

Juan P. Dominguez-Morales, Antonio Rios-Navarro, Daniel Gutierrez-Galan, Ricardo Tapiador-Morales, Angel Jimenez-Fernandez, Elena Cerezuela-Escudero, Manuel J. Dominguez-Morales, Alejandro Linares-Barranco
Universidad de Sevilla, Spain

O-15 - Live Demonstration: a Compact All-CMOS Spatiotemporal Compressed Sensing Video Camera 626

Tao Xiong{2}, Jie Zhang{3}, Chetan Singh Thakur{2}, John Rattray{2}, Sang Chin{1}, Trac Tran{2}, Ralph Etienne-Cummings{2}
{1}Boston University, United States; {2}Johns Hopkins University, United States; {3}Massachusetts Institute of Technology, United States

O-16 - Live Demonstration: Event-Based Image Processing on CMOS Mihalas-Niebur Neuron Array Transceiver..... 627

Jamal Molin, Adebayo Eisape, Ralph Etienne-Cummings
Johns Hopkins University, United States

O-17 - Live Demonstration: FPGA Neural Array Emulation for Real-Time, Event-Based Simultaneous Dewarping and Filtering for Aerial Vehicles 628

Jamal Molin, John Rattray, Ralph Etienne-Cummings
Johns Hopkins University, United States

O-18 - Live Demonstration: a Stimulation Platform for Optogenetic and Bionic Vision Restoration 629

Francesco Galluppi{2}, Guillaume Chenegros{3}, Didier Pruneau{2}, Gilles Cordurié{3}, Charlie Galle{3}, Nicolas Oddo{3}, Xavier Lagorce{1}, Christoph Posch{1}, Joel Chavas{2}, Ryad Benosman{3}
{1}Chronocam, France; {2}Gensight Biologics, France; {3}Université Pierre-et-Marie-Curie, France

Poster session – monday, may 29th

Sensory Systems

Time: Monday, May 29 (15:30-17:00)

Room: Harborside Ballroom

Chair(s): Piotr Dudek - The University of Manchester; Timothy Constandinou - Imperial College London

O-19 - Photon Counting and Direct ToF Camera Prototype Based on CMOS SPADs..... 630

Ion Vornicu, Ricardo Carmona-Galán, Ángel Rodríguez-Vázquez
Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain

O-20 - Highly Linear Integrate-and-Fire Modulators with Soft Reset for Low-Power High-Speed Imagers 634

Michele Dei, Roger Figueras, Josep Maria Margarit, Lluís Terés, Francisco Serra-Graells
Consejo Superior de Investigaciones Científicas, Spain

O-21 - Color Temporal Contrast Sensitivity in Dynamic Vision Sensors..... 638

Diederik Paul Moeys^{3}, Chenghan Li^{3}, Julien N.P. Martel^{3}, Simeon Bamford^{2}, Luca Longinotti^{2}, Vasyil Motsnyi^{1}, David San Segundo Bello^{1}, Tobi Delbruck^{3}
^{1}IMEC, Belgium; ^{2}iniLabs GmbH, Switzerland; ^{3}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland

O-22 - Real-Time Trajectory Calculation and Prediction Using Neighborhood-Level Parallel Processing 642

Mahir Gharzai, Dingyi Hong, Joseph Schmitz, Michael Hoffman, Sina Balkir
University of Nebraska-Lincoln, United States

O-23 - Dark Current Reduction by an Adaptive CTIA Photocircuit for Room Temperature SWIR Sensing 646

Andrew Berkovich^{3}, Alexander Castro^{3}, Mohammad Islam^{2}, Fow-Sen Choa^{2}, Geoffrey Barrows^{1}, Pamela Abshire^{3}
^{1}Centeye, Inc., United States; ^{2}University of Maryland, Baltimore County, United States; ^{3}University of Maryland, College Park, United States

O-24 - A Battery-Less, 255 Na Quiescent Current Temperature Sensor with Voltage Regulator Fully Powered by Harvesting Ambient Vibrational Energy..... 650

Shiquan Fan, Liuming Zhao, Peng Wang, Ran Wei, Xu-Qian Zheng, Zenghui Wang, Philip X.-L. Feng
Case Western Reserve University, United States

O-25 - A Passively Compensated Capacitive Sensor Readout with Biased Varactor Temperature Compensation and Temperature Coherent Quantization 654

Yong Wang^{2}, Yan Hong^{2}, Wang Ling Goh^{2}, Kevin Chai^{1}, Xin Lou^{3}, Wenbin Ye^{4}
^{1}Agency for Science, Technology and Research / Nanyang Technological University, Singapore; ^{2}Nanyang Technological University, Singapore; ^{3}ShanghaiTech University, China; ^{4}Shenzhen University, China

O-26 - Optimum Synchronous Phase Detection and its Application in Smart Sensor Interfaces 65

Sining Pan, Kofi Makinwa
Technische Universiteit Delft, Netherlands

Biomedical Signal Processing

Time: Monday, May 29 (15:00-17:30)

Room: Harborside Ballroom

Chair(s): Nitish Thakor - Johns Hopkins University; Timothy Constandinou - Imperial College London

- P-27 - Motion Artifact Reduction from PPG Signals During Intense Exercise Using Filtered X-LMS..... 662**
Khawaja Taimoor Tanweer^{1}, Syed Rafay Hasan^{2}, Awais Mehmood Kamboh^{1}
^{1}National University of Sciences and Technology, Pakistan; ^{2}Tennessee Technological University, United States
- P-28 - An Accurate Method for Fourier Synthesis of Photoplethysmographic Signals..... 666**
Saman Abeysekera
Nanyang Technological University, Singapore
- P-29 - An Optical Tracker Based Registration Method Using Feedback for Robot-Assisted Insertion Surgeries..... 670**
Zhuo Li, Xingtong Liu, Xiang Xie, Guolin Li, Songping Mai, Zhihua Wang
Tsinghua University, China
- P-30 - Palmprint Recognition Using Deep Scattering Network..... 674**
Shervin Minaee, Yao Wang
New York University, United States
- P-31 - On-Chip ID Generation for Multi-Node Implantable Devices Using SA-PUF 678**
Chang Gao, Sara Ghoreishizadeh, Yan Liu, Timothy Constandinou
Imperial College London, United Kingdom
- P-32 - An Aided Information to Characterize ECG Signals as Normal or Abnormal..... 682**
Krupa Bhavsar, Hen-Geul Yeh, Perla Ayala
California State University, Long Beach, United States
- P-33 - An Accurate Automatic System for Distinguishing Neuropathy and Healthy Electromyography Signals 686**
Salim Lahmiri^{1}, Mounir Boukadoum^{2}
^{1}École de Technologie Supérieure, Canada; ^{2}Université du Québec à Montréal, Canada
- P-34 - Real-Time Clustering Algorithm That Adapts to Dynamic Changes in Neural Recordings..... 690**
Sylmarie Dávila-Montero^{2}, Deren Barsakcioglu^{1}, Andrew Jackson^{3}, Timothy Constandinou^{1}, Andrew J. Mason^{2}
^{1}Imperial College London, United Kingdom; ^{2}Michigan State University, United States; ^{3}University of Newcastle, United Kingdom
- P-35 - Receiver Echo Cancellation with Real-Time Self Calibration for Passive Implanted Neuron Recorders 694**
Maryam Shafiee, Sule Ozev
Arizona State University, United States

P-36 - 32-Channel Ultra-Low-Noise Arbitrary Signal Generation Platform for Biopotential Emulation 698
Dorian Haci, Yan Liu, Timothy Constandinou
Imperial College London, United Kingdom

Optimization and Manufacturability**Time:** Monday, May 29 (15:30-17:00)**Room:** Harborside Ballroom**Chair(s):** Meng-Fan Chang - National Tsing Hua University; Gehm Moraes - Pontifical Catholic University of Rio Grande do Sul

Q-37 - Efficient SVM-Based Hotspot Detection Using Spectral Clustering 702
Fan Yang{1}, Charles C. Chiang{2}, Xuan Zeng{1}, Dian Zhou{1}
{1}Fudan University, China; {2}SYNOPSIS India Pvt. Ltd., United States

Q-38 - Non-Linear Library Characterization Method for FinFET Logic Cells by L1-Minimization 706
Byung Su Kim{2}, Hyo Sig Won{3}, Tae Hee Han{1}, Joon-Sung Yang{3}
{1}Samsung Electronics, Korea, South; {2}Samsung Electronics / Sungkyunkwan University, Korea, South;
{3}Sungkyunkwan University, Korea, South

Q-39 - A Grid-Based Detailed Routing Algorithm for Advanced 1D Process 710
Ye Zhang{1}, Fan Yang{1}, Dian Zhou{1,3}, Xuan Zeng{1} and Xiangdong Hu{2} {1}State Key Lab of ASIC &
System, School of Microelectronics, Fudan University, China; {2}Shanghai High-Performance Integrated-Circuit
Design Center, China; {3}University of Texas at Dallas, USA

Q-40 - Design of a Digital IP for 3D-IC Die-to-Die Clock Synchronization 714
Mehdi Sadi{2}, Sukeshwar Kannan{1}, Luke England{1}, Mark Tehranipoor{2}
{1}GLOBALFOUNDRIES US Inc., United States; {2}University of Florida, United States

Q-41 - A Survey of Path Search Algorithms for VLSI Detailed Routing 718
Stèphano Gonçalves, Leomar Da Rosa Jr., Felipe Marques
Universidade Federal de Pelotas, Brazil

Q-42 - Power-Efficient, Gate-Based Digital-to-Time Converter in CMOS 722
Øystein Bjørndal, Tor Sverre Lande
University of Oslo, Norway

Q-43 - Impacts of Different Shapes of Through-Silicon-Via Core on 3D IC Performance 726
Abdul Hamid Yousuf, Nahid Hossain, Masud Chowdhury
University of Missouri–Kansas City, United States

Q-44 - Stability of Rotary Traveling Wave Oscillators Under Process Variations and NBTI 730
Ragh Kuttappa, Leo Filippini, Scott Lerner, Baris Taskin
Drexel University, United States

Q-45 - A Multi-Measurements RO-TDC Implemented in a Xilinx Field Programmable Gate Array 734
Safa Berrima{2}, Yves Blaquièrè{1}, Yvon Savaria{2}
{1}École de Technologie Supérieure, Canada; {2}Polytechnique Montréal, Canada

Q-46 - On the Use of Approximate Adders in Carry-Save Multiplier-Accumulators 738
Darjn Esposito, Davide De Caro, Ettore Napoli, Nicola Petra, Antonio Strollo
Università degli Studi di Napoli Federico II, Italy

**Q-47 - A Framework to Automatically Generate Heterogeneous Organization Reconfigurable
Multiprocessing** 742
Josimar Sfreddo{1}, Rafael Fão de Moura{1}, Michael Guilherme Jordan{1}, Jackson Souza{2}, Antonio Carlos
Schneider Beck{2}, Mateus Beck Rutzig{1}

{1}Universidade Federal de Santa Maria, Brazil; {2}Universidade Federal do Rio Grande do Sul, Brazil

Q-48 - Efficient Computation of the Sensitization Probability of a Critical Path Considering Process Variations and Path Correlation 746
Pavan Kumar Javvaji, Spyros Tragoudas
Southern Illinois University Carbondale, United States

Q-49 - A Low Cost Technique for Scan Chain Diagnosis 750
Satyadev Ahlawat, Darshit Vaghani, Rohini Gulve, Virendra Singh
Indian Institute of Technology Bombay, India

Q-50 - Robustness of Sub-22nm Multigate Devices Against Physical Variability 754
Alexandra Lackmann Zimpeck{2}, Ygor Aguiar{2}, Cristina Meinhardt{1}, Ricardo Reis{2}
{1}Universidade Federal do Rio Grande, Brazil; {2}Universidade Federal do Rio Grande do Sul, Brazil

Q-51 - METS: a Multiple Event Transient Simulator 758
Adam Watkins, Spyros Tragoudas
Southern Illinois University Carbondale, United States

Communication Methods

Time: Monday, May 29 (15:30-17:00)

Room: Harborside Ballroom

Chair(s): Hsi-Pin Ma - National Tsing Hua University; Tokunbo Ogunfunmi - Santa Clara University

R-52 - A 8-Gb/s 0.256-pJ/b Transceiver for 5-mm on-Chip Interconnects in 130-nm CMOS 762
Xiangdong Jia, Glenn Cowan
Concordia University, Canada

R-53 - A 17.5-Gb/s Transceiver with a MaxEye-Based Autonomous Adaptation 766
Jahoon Jin, Xuefan Jin, Sang-Hoon Kim, Ik-Hwan Kim, Jaehong Jung, Kiwon Kwon, Jung-Hoon Chun
Sungkyunkwan University, Korea, South

R-54 - A 25 Gb/s 470 μ W Active Inductor Equalizer for Ground Referenced Signaling Receivers 770
Laura Fick{2}, Dennis Sylvester{2}, John Poulton{1}, John Wilson{1}, Tom Gray{1}
{1}Nvidia Corporation, United States; {2}University of Michigan, United States

R-55 - Secure Authentication and Access Mechanism for IoT Wireless Sensors 774
Mahzad Azarmehr, Arash Ahmadi, Rashid Rashidzadeh
University of Windsor, Canada

R-56 - A 170nW CMOS Wake-Up Receiver with -60 dBm Sensitivity Using AIN High-Q Piezoelectric Resonators 778
Scott Block, Xiaonan Jiang, Brad Harris, Can Cui, Jeronimo Segovia Fernandez, Rajeevan Amirtharajah, Dave Horsley, Hooman Rashtian, Xiaoguang Liu
University of California, Davis, United States

R-57 - High Temperature VCO Based on GaN Devices for Downhole Communications 782
Tianming Feng, Jebreel Salem, Dong Ha
Virginia Polytechnic Institute and State University, United States

R-58 - A 9.4 pJ/Bit 432 MHz 16-QAM/MSK Transmitter Based on Edge-Combining Power Amplifier 786
Yanshu Guo, Songping Mai, Zhaoyang Weng, Heng Liu, Hanjun Jiang, Zhihua Wang
Tsinghua University, China

R-59 - Adaptive Baseband Pre-Equalization for RF Impedance Matching Correction 790
Cyro Hems, Cristiano Panazio
Universidade de São Paulo, Brazil

- R-60 - On Envelope-Tracking for SOA Amplification of Multicarrier Signals** 794
Julio-Cesar Ortiz Cornejo{2}, Serban Bejan{3}, Stéphane Azou{1}, Jorge-Arturo Pardinias Mir{2}, Pascal Morel{1}
{1}École nationale d'ingénieurs de Brest, France; {2}Instituto Tecnológico y de Estudios Superiores de Occidente, Mexico; {3}Military Technical Academy, Romania
- R-61 - A 1 – 8 Gb/s Optical Wireless Communication Dual-Mode Receiver** 798
Waichiu Ng, Jie Yuan
Hong Kong University of Science and Technology, Hong Kong
- R-62 - 16-Channel Modular Platform for Automatic Control and Reconfiguration of Complex Photonic Circuits**..... 802
Emanuele Guglielmi, Marco Carminati, Francesco Zanetto, Andrea Annoni, Francesco Morichetti, Andrea Melloni, Marco Sampietro, Giorgio Ferrari
Politecnico di Milano, Italy
- R-63 - Phase Noise Analysis of a Homodyne Radar System Driven by a Phase-Locked Loop** 806
Frank Herzel, Dietmar Kissinger
IHP GmbH, Germany
- R-64 - Multi Component Carrier, Sub-Band DPD and GNURadio Implementation**..... 810
Chance Tarver{1}, Mahmoud Abdelaziz{2}, Lauri Anttila{2}, Joseph Cavallaro{1}
{1}Rice University, United States; {2}Tampere University of Technology, Finland
- R-65 - Design Guidelines for the High-Speed Dynamic Partial Reconfiguration Based Software Defined Radio Implementations on Xilinx Zynq FPGA**..... 814
Ahmed Kamaleldin{2}, Ahmed Mohamed{2}, Ahmed Nagy{2}, Youssef Gamal{2}, Ahmed Shalash{2}, Yehea Ismail{1}, Hassan Mostafa{3}
{1}American University in Cairo / Zewail City of Science and Technology, Egypt; {2}Cairo University, Egypt; {3}Cairo University / American University in Cairo / Zewail City of Science and Technology, Egypt

Video Signal Processing & Coding Algorithms

Time: Monday, May 29 (15:30-17:00)

Room: Harborside Ballroom

Chair(s): Qi Tian - University of Texas at San Antonio; Jianfei Cai - Nanyang Technological University

- S-66 - An Adaptive and Low-Complexity All-Zero Block Detection for HEVC Encoder** 818
Jing Cui{2}, Ruiqin Xiong{2}, Falei Luo{1}, Shanshe Wang{2}, Siwei Ma{2}
{1}Institute of Computing Technology, Chinese Academy of Sciences, China; {2}Peking University, China
- S-67 - A Convolutional Neural Network Approach for Half-Pel Interpolation in Video Coding** 822
Ning Yan, Dong Liu, Houqiang Li, Feng Wu
University of Science and Technology of China, China
- S-68 - Fast Rate Distortion Optimization with Adaptive Context Group Modeling for HEVC** 826
Hung-Cheng Chen, Tian Sheuan Chang
National Chiao Tung University, Taiwan
- S-69 - Fast Rate Distortion Optimized Quantization Method for HEVC**..... 830
Meng Wang, Xiaodong Xie, Hongfei Fan, Shanshe Wang, Junru Li, Shengfu Dong, Guoqing Xiang, Huizhu Jia
Peking University, China
- S-70 - Complexity Reduction by Modes Reduction in RD-List for Intra-Frame Prediction in 3D-HEVC Depth Maps** 834
Gustavo Sanchez{1}, Luciano Agostini{2}, César Marcon{1}
{1}Pontifícia Universidade Católica do Rio Grande do Sul, Brazil; {2}Universidade Federal de Pelotas, Brazil

S-71 - An Efficient Non-Selective Adaptive Motion Compensated Frame Rate Up Conversion..... 838
Nguyen Van Thang, Hyuk-Jae Lee
Seoul National University, Korea, South

S-72 - Low-Power and High-Throughput Hardware Design for the 3D-HEVC Depth Intra Skip 842
Vladimir Afonso{2}, Altamiro Susin{2}, Luan Audibert{1}, Mário Saldanha{1}, Ruhan Conceição{1}, Marcelo Porto{1}, Bruno Zatt{1}, Luciano Agostini{1}
{1}Universidade Federal de Pelotas, Brazil; {2}Universidade Federal do Rio Grande do Sul, Brazil

Complex Networks & Models

Time: Monday, May 29 (15:30-17:00)

Room: Harborside Ballroom

Chair(s): Yoshifumi Nishio - Tokushima University; Federico Bizzarri - Politecnico di Milano

T-73 - Synchronization in Dynamical Oscillatory Networks with Non-Uniform Coupling Distributions..... 846
Yoko Uwate, Yoshifumi Nishio
Tokushima University, Japan

T-74 - Multiobjective Transshipment Point Assignment in China Express Delivery Network..... 850
Zhongyan Fan, Xiaowen Bi, Doujie Li, Wallace K.S. Tang
City University of Hong Kong, Hong Kong

T-75 - Optimal Design of Coupling Preferences to Mitigate Traffic Congestion in Interconnected Networks 854
Jian Zhong, Jiajing Wu, Zhenhao Chen, Zibin Zheng
Sun Yat-sen University, China

T-76 - A Unifying Perspective on Phase Noise and Injection Locking 858
Douglas Frey
Lehigh University, United States

T-77 - Efficient Spectral Graph Sparsification via Krylov-Subspace Based Spectral Perturbation Analysis 862
Shuhan Zhang{1}, Fan Yang{1}, Xuan Zeng{1}, Dian Zhou{4}, Shun Li{2}, Xiangdong Hu{3}
{1}Fudan University, China; {2}Microsystem & Terahertz Research Center, China; {3}Shanghai High-Performance Integrated-Circuit Design Center, China; {4}University of Texas at Dallas, United States

T-78 - On Network-Based Leader-Following Consensus of Linear Multi-Agent Systems 866
Lei Ding, Wei Xing Zheng
Western Sydney University, Australia

T-79 - A Heuristics-Based VM Allocation Mechanism for Cloud Data Centers 870
Jing V. Wang, Nuwan Ganganath, Chi-Tsun Cheng, Chi Kong Tse
Hong Kong Polytechnic University, Hong Kong

T-80 - A Refinement Process for Nozzle Path Planning in 3D Printing 874
Kai Yin Fok, Chi-Tsun Cheng, Chi Kong Tse
Hong Kong Polytechnic University, Hong Kong

Data Converters II

Time: Monday, May 29 (15:30-17:00)

Room: Harborside Ballroom

Chair(s): Shahriar Mirabbasi - University of British Columbia; George Yuan - Hong Kong University of Science and Technology

- U-81 - A Four-Antenna Baseband Multipath Emulator for Millimeter-Wave Channels..... 878**
Mazen Soliman, Shih-Chang Hung, Jeyanandh Paramesh
Carnegie Mellon University, United States
- U-82 - A Low Power Read-Out Circuit with Frequency Accuracy of 0.2% for Capacitive and Resistive Sensors..... 882**
Qi Peng, Kun Wang, Xuelian Liu, Weifeng Liu, Xiaoming Li, Yiqi Zhuang
Xidian University, China
- U-83 - Zero-Bias True Random Number Generator Using LFSR-Based Scrambler..... 886**
Wei Mao^{1}, Yongfu Li^{1}, Chun-Huat Heng^{1}, Yong Lian^{2}
^{1}National University of Singapore, Singapore; ^{2}York University, Canada
- U-84 - Piecewise BJT Process Spread Compensation Exploiting Base Recombination Current..... 890**
Dapeng Sun^{2}, Man-Kay Law^{2}, Bo Wang^{1}, Pui-In Mak^{2}, Rui Paulo Martins^{2}
^{1}Hamad Bin Khalifa University / Hong Kong University of Science and Technology, Qatar; ^{2}University of Macau, Macau
- U-85 - Current Mirror Array: a Novel Lightweight Strong PUF Topology with Enhanced Reliability..... 894**
Zheng Wang^{2}, Yi Chen^{1}, Aakash Patil^{1}, Chip-Hong Chang^{1}, Arindam Basu^{1}
^{1}Nanyang Technological University, Singapore; ^{2}Shenzhen Institutes of Advanced Technology, Chinese Academy of Science, China
- U-86 - Power Efficient SAR ADC Adaptive to Input Activity for ECG Monitoring Applications..... 898**
Sungwon Yim, Yujin Park, Han Yang, Suhwan Kim
Seoul National University, Korea, South
- U-87 - Nonlinear Quantizer Design in Data Conversion Systems Using the Unscented Transform..... 902**
José E. G. de Medeiros, Sandro A. P. Haddad
Universidade de Brasília, Brazil
- U-88 - A Design-Oriented Approach for Modeling Integrators Non-Idealities in Discrete-Time Sigma-Delta Modulators..... 906**
Anthony Baltolu^{2}, Jean-Baptiste Begueret^{1}, Dominique Dallet^{1}, Frederic Chalet^{2}
^{1}IMS Laboratory, France; ^{2}NXP Semiconductors N.V., France
- U-89 - Designing CT Bandpass $\Sigma\Delta$ Modulators with Arbitrary STF Shapes 910**
Johannes Wagner, Jiazuo Chi, Maurits Ortmanns
Universität Ulm, Germany
- U-90 - Fundamental Limits on Energy Efficiency Performance of VCO-Based ADCs..... 914**
John McNeill^{2}, Sulin Li^{2}, Jianping Gong^{2}, Long Pham^{1}
^{1}Analog Devices Inc., United States; ^{2}Worcester Polytechnic Institute, United States
- U-91 - Digital Interferer Suppression and Jitter Reduction in Continuous-Time Bandpass $\Sigma\Delta$ Modulators 918**
Jiazuo Chi, Johannes Wagner, Jens Anders, Maurits Ortmanns
Universität Ulm, Germany
- U-92 - A Novel Clock-Pulse-Width Calibration Technique for Charge Redistribution DACs..... 922**
Hugo Cruz^{1}, Hong-Yi Huang^{2}, Ching-Hsing Luo^{1}, Lih-Yih Chiou^{1}, Shuenn-Yuh Lee^{1}
^{1}National Cheng Kung University, Taiwan; ^{2}National Taipei University, Taiwan

- U-93 - An 11-Bit 20-MSample/s Pipelined ADC with OTA Bias Current Regulation to Optimize Power Dissipation..... 926**
Jose Angel Díaz-Madrid^{2}, Gines Domenech-Asensi^{2}, Jose Alejandro Lopez-Alcantud^{2}, Matthias Oberst^{1}
^{1}Fraunhofer Institute for Integrated Circuits IIS, Germany; ^{2}Universidad Politécnica de Cartagena, Spain
- U-94 - A Digital Compensation Method Canceling Static and Non-Linear Time-Variant Feedback DAC Errors in $\Sigma\Delta$ Analog-to-Digital Converters 930**
Marcel Runge, Friedel Gerfers
Technische Universität Berlin, Germany
- U-95 - A 40 nm CMOS T/H-Less Flash-Like Stroboscopic ADC with 23dB THD and >50 GHz Effective Resolution Bandwidth 934**
Gibran L. Jaya and Shoushun Chen
Nanyang Technological University, Singapore
- U-96 - A Novel High-Rate Hybrid Window ADC Design for Monolithic Digitally-Controlled DC-DC Converters 938**
Yin Sun, Victor Adrian, Joseph Sylvester Chang
Nanyang Technological University, Singapore
-

Amplifiers, Analog Filtering, RF Circuits & Interface Circuits

Time: Monday, May 29 (15:30-17:00)

Room: Harborside Ballroom

Chair(s): Mohamad Sawan - Polytechnique Montréal; Nuno Paulino – UNINOVA

- V-97 - A CMOS Differential-Difference Amplifier with Class-AB Input Stages Featuring Wide Differential-Mode Input Range 942**
Bradley Minch
Franklin W. Olin College of Engineering, United States
- V-98 - Offset Based Feedforward Amplifier with Nonlinearity Compensation and P1dB Expansion 946**
Zhan Su^{1}, Hossein Noori^{1}, Fa Dai^{1}, Wei Zhou^{2}, Yudong Wang^{2}, Jun Fu^{2}
^{1}Auburn University, United States; ^{2}Tsinghua University, China
- V-99 - A Robust Fully-Dynamic Residue Amplifier for Two-Stage SAR Assisted Pipeline ADCs 950**
Shreya Singh^{1}, Pydi Bahubalindrani^{1}, João Goes^{2}
^{1}Indraprastha Institute of Information Technology Delhi, India; ^{2}Universidade Nova de Lisboa / CTS-UNINOVA, Portugal
- V-100 - A Cascode Miller Compensated Three-Stage Amplifier with Local Q-Factor Control for Wide Capacitive Load Applications 954**
Qi Cheng^{3}, Weimin Li^{1}, Xian Tang^{2}, Jianping Guo^{1}
^{1}Sun Yat-sen University, China; ^{2}Tsinghua University, China; ^{3}University of Texas at Dallas, United States
- V-101 - A Compact and Low Power Bandpass Amplifier for Low Bandwidth Signal Applications in 65-nm CMOS 958**
Fereidoon Hashemi Noshahr, Mohamad Sawan
Polytechnique Montréal, Canada
- V-102 - A 60-GHz Low-Noise Variable-Gain Amplifier in a 130-nm BiCMOS Technology for Sixport Applications 962**
Matthias Völkel, Marco Dietz, Amelie Hagelauer, Robert Weigel, Dietmar Kissinger
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
- V-103 - A 1.8 μ W 32 nV/ \sqrt Hz Current-Reuse Capacitively-Coupled Instrumentation Amplifier for EEG Detection 966**
Yangtao Dong, Lihan Tang, Xiaolin Yang, Menglian Zhao, Peng Sun, Xiaobo Wu
Zhejiang University, China

- V-104 - Linear Input Range Extension for Low-Voltage Operational Transconductance Amplifiers in Gm-C Filters** 970
Mahmoud Ibrahim, Marvin Onabajo
Northeastern University, United States
- V-105 - CMOS Mixed Signal SoC for Low-Side Current Sensing** 974
Rahul Thottathil^{1}, Veeresh Babu Vulligaddala^{1}, Bibhu Datta Sahoo^{2}
^{1}ams Semiconductors India Pvt Ltd, India; ^{2}University of Illinois at Urbana-Champaign, United States
- V-106 - An Energy/Bandwidth/Area Efficient Frequency-Domain OOK Transmitter with Phase Rotated Modulation** 978
Ranran Zhou, Yining Zhang, Woogeun Rhee, Zihua Wang
Tsinghua University, China
- V-107 - A Class-E RF Power Amplifier with a Novel Matching Network for High-Efficiency Dynamic Load Modulation** 982
Qianqian Liu, Victor Adrian, Bah-Hwee Gwee, Joseph Sylvester Chang
Nanyang Technological University, Singapore
- V-108 - A Load Variation Tolerant Readout Interface for High Linear MEMS Capacitive Microphones** 986
Han Yang, Jun Soo Cho, Youngtae Yang, Suhwan Kim
Seoul National University, Korea, South
- V-109 - A Widely Tunable Balun Based on 2-Port N-Path Bandpass Filters with Embedded Phase Shifting** 990
Prateek Kumar Sharma, Nagarjuna Nallam
Indian Institute of Technology Guwahati, India
- V-110 - A 0.9V 75MHz 2.8mW 4th-Order Analog Filter in CMOS-Bulk 28nm Technology** 994
Fulvio Ciciotti, Marcello De Matteis, Andrea Baschiroto
Università degli Studi di Milano-Bicocca, Italy
- V-111 - A Novel Charge Sensitive Pre-Amplifier Structure for Biological Temperature Readout Applications** 998
Hanfeng Wang^{2}, Song Yuan^{2}, Syed Islam^{2}, Charles Britton Jr.^{1}
^{1}Oak Ridge National Laboratory, United States; ^{2}University of Tennessee, United States
- V-112 - A 0.2V 492nW VCO-Based OTA with 60kHz UGB and 207 μ Vrms Noise** 1002
Sarthak Kalani^{1}, Alessandro Bertolini^{2}, Anna Richelli^{2}, Peter R. Kinget^{1}
^{1}Columbia University, United States; ^{2}Università degli Studi di Brescia, Italy
- V-113 - A High Temperature, 12-Bit-Time-Domain Sensor Interface Based on Injection Locked Oscillator** 1006
Emna Chabchoub^{1}, Franck Badets^{1}, Pascal Nouet^{3}, Mohamed Masmoudi^{2}, Frédéric Mailly^{3}
^{1}Commissariat à l'Energie Atomique et aux Energies Alternatives, France; ^{2}Ecole Nationale d'Ingénieurs de Sfax, Tunisia; ^{3}Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier, France
- V-114 - Closed-Loop Continuous-Time Analog Filter with Almost Constant IIP3 Over the Pass-Band** 1010
Marcello De Matteis, Antonio D'Amico, Fulvio Ciciotti, Andrea Baschiroto
Università degli Studi di Milano-Bicocca, Italy

Room: Harborside Ballroom

Chair(s): Xiaozhe Wang - McGill University; Zbigniew Galias - AGH University of Science and Technology

- W-115 - A Multidimensional Transfer Function Model for Frequency Dependent Transmission Lines** 1014
Maximilian Schäfer^{2}, Rudolf Rabenstein^{2}, Christian Strobl^{1}
^{1}E-T-A Elektrotechnische Apparate GmbH, Germany; ^{2}Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
- W-116 - A Method to Identify Dynamic Zones for Efficient Control of HVAC Systems** 1018
Vinay Kumar, Rakesh Kumar, Deepraj Patkar, Ajit S. Bopardikar
Samsung R&D Institute India, Bangalore, India; Samsung R&D Institute India, Bangalore , India
- W-117 - Distributed Optimal Power Flow: an Augmented Lagrangian-Sequential Quadratic Programming Approach** 1022
Zejiang Hou, Ho-Chun Wu, Shing-Chow Chan
University of Hong Kong, Hong Kong
- W-118 - An FPGA-Based Aperiodic Modulation Strategy for EMI Suppression in Quasi-Z-Source DC-DC Converters** 1026
Saad Ul Hasan, Graham E. Town
Macquarie University, Australia
- W-119 - On Optimum Placement of Sectionalizing Switches in Radial Distribution Networks** 1030
Zbigniew Galias
AGH University of Science and Technology, Poland
- W-120 - Dimensioning and Comparison of Common Compensation Topologies for IPT Systems**..... 1034
Martin Trautmann, Marius Ohlendorf, Benedikt Sanftl, Robert Weigel, Alexander Koelpin
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
- W-121 - Analysis of Coexisting Solutions and Control of Their Bifurcations in a Parallel LC Resonant Inverter**..... 1038
Luis Benadero^{2}, Enrique Ponce^{1}, Abdelali El Aroudi^{3}, Luis Martínez-Salamero^{3}
^{1}Universidad de Sevilla, Spain; ^{2}Universitat Politècnica de Catalunya, Spain; ^{3}Universitat Rovira i Virgili, Spain
- W-122 - Stability Conditions for Hybrid Supply Modulators** 1042
Min Tan^{2}, Wing-Hung Ki^{1}
^{1}Hong Kong University of Science and Technology, Hong Kong; ^{2}Huazhong University of Science and Technology, China
- W-123 - Dynamic ADC-Quantization for Oscillation-Free Performance of Digitally Controlled Converters** 1046
Asif Syed^{2}, Amit Patra^{1}
^{1}Indian Institute of Technology Kharagpur, India; ^{2}SiWays Microelectronics, India
- W-124 - Improving EDP in Multi-Core Embedded Systems Through Multidimensional Frequency Scaling** 1050
Wagner Marques^{1}, Paulo Souza^{1}, Arthur Lorenzon^{3}, Antonio Carlos Schneider Beck^{3}, Mateus Beck Rutzig^{2}, Fábio Rossi^{1}
^{1}Instituto Federal de Educação, Ciência e Tecnologia Farroupilha, Brazil; ^{2}Universidade Federal de Santa Maria, Brazil; ^{3}Universidade Federal do Rio Grande do Sul, Brazil
- W-125 - Sliding-Mode Approach for Start-Up Control and Voltage Regulation of a Boost Converter Driving a Constant Power Load** 1054
Blanca Areli Martínez-Treviño, Abdelali El Aroudi, Luis Martínez-Salamero
Universitat Rovira i Virgili, Spain

Education Tools

Time: Monday, May 29 (15:30-17:00)

Room: Harborside Ballroom

Chair(s): Yun He - Tsinghua University; Joos Vandewalle - Katholieke Universiteit Leuven

X-126 - An Intrinsic Complexity Model for the Problem of Total Resistance Determination 1058

Abdulahdi Shoufan, Abdulla Alnaqbi

Khalifa University, U.A.E.

X-127 - Using SoC FPAA and Integrated Simulator for Implementation of Circuits and Systems in Education 1062

Aishwarya Natarajan, Jennifer Hasler

Georgia Institute of Technology, United States

X-128 - An Academic EDA Suite for the Full-Custom Design of Mixed-Mode Integrated Circuits 1066

Jofre Pallarès{1}, Keith Sabine{2}, Lluís Terés{1}, Francisco Serra-Graells{1}

{1}Consejo Superior de Investigaciones Científicas, Spain; {2}Peardrop Design Systems Ltd, United Kingdom

Pioneers of CAS – monday, may 29th

Pioneers of Circuits and Systems I

Time: Monday, May 29 (17:00-18:00)

Room: Grand Ballroom V-VI

Chair(s): Pamela Abshire - University of Maryland

***Distributed Circuit Theory: Reminiscences* 1070**

Omar Wing

Columbia University, United States

***Present at the Beginning*..... NA**

Bede Liu

Princeton University, United States

***Reminiscence: 60 Years of Teaching Within 84 Years of Life*..... 1072**

Robert Newcomb

University of Maryland, College Park, United States

FutureCAS panel – monday, may 29th

FutureCAS Panel

Time: Monday, May 29 (6:00-7:30)

Room: Grand Ballroom V-VI

What challenges and opportunities does the future hold for the field of Circuits and Systems? NA

Moderator: Jennifer Blain Christen

Panelists: Jeannette M. Wing, Orla Feely, Mandy Pant, Frederica Darema

Technical Sessions – tuesday, May 30th

Radar Circuits and Systems

Time: Tuesday, May 30 (8:00-9:30)

Room: Dover A

Chair(s): Ioannis Syllaios - University of Texas at Dallas; Joseph Chang - Nanyang Technological University

***Time-of-Arrival Measurement Using Adaptive CMOS IR-UWB Range Finder with Scalable Resolution* 1073**

Tae Hwan Jin^{1}, Hong Gul Han^{2}, Tae Wook Kim^{2}

^{1}Samsung Electronic, Korea, South; ^{2}Yonsei University, Korea, South

***Real-Time Mitigation of Short-Range Leakage in Automotive FMCW Radar Transceivers* 1074**

Alexander Melzer^{2}, Mario Huemer^{2}, Florian Starzer^{1}, Herbert Jäger^{1}

^{1}DICE GmbH & Co KG, Austria; ^{2}Johannes Kepler Universität Linz, Austria

***Novel Mixed-Signal Based Short-Range Leakage Canceler for FMCW Radar Transceiver MMICs* 1075**

Alexander Melzer^{2}, Mario Huemer^{2}, Alexander Onic^{1}

^{1}DICE Danube Integrated Circuit Engineering GmbH & Co. KG, Austria; ^{2}Johannes Kepler Universität Linz, Austria

***Modeling and Analysis of the Effects of PLL Phase Noise on FMCW Radar Performance* 1079**

Debashis Dhar^{1}, P.T.M. van Zeijl^{2}, Dusan Milosevic^{1}, Hao Gao^{1}, Arthur H. M. van Roermund^{1}

^{1}Eindhoven University of Technology, Netherlands; ^{2}Omniradar BV, Netherlands

***A Dual Band FMCW Radar Receiver with Integrated Active Balun and Baseband AGC Loop*..... 1083**

Mohammed El-Shennawy, Belal Al-Qudsi, Niko Joram, Frank Ellinger

Technische Universität Dresden, Germany

IoVT Panel

Time: Tuesday, May 30 (8:00-9:30)

Room: Dover BC

Moderator(s): Dr. Yen-Kuang Chen - Intel Corporation, Prof. Eduard Alarcon - UPC

Deep Learning for Internet of Video Things – Hype or Hope? NA

Panelists:

Prof. Magdy Bayoumi, University of Louisiana at Lafayette, USA

Prof. Shao-Yi Chien, National Taiwan University, USA

Dr. Shipeng Li, Cogobuy/IngDan, China

Prof. Yung-Hsiang Lu, Purdue University, USA

Prof. Tokunbo Ogunfunmi, Santa Clara University, USA

Hardware Accelerators for Deep Learning & Cognitive Systems

Time: Tuesday, May 30 (8:00-9:30)

Room: Grand Ballroom I

Chair(s): Ralph Etienne-Cummings - Johns Hopkins University; Chetan Thakur - Johns Hopkins University

Fast Classification Using Sparsely Active Spiking Networks..... 1087

Hesham Mostafa, Bruno Pedroni, Sadique Sheik, Gert Cauwenberghs

University of California, San Diego, United States

A Fixed Point Exponential Function Accelerator for a Neuromorphic Many-Core System 1091

Johannes Partzsch^{1}, Sebastian Höppner^{1}, Matthias Eberlein^{1}, Rene Schüffny^{1}, Christian Mayr^{1}, David R. Lester^{2}, Steve Furber^{2}

^{1}Technische Universität Dresden, Germany; ^{2}University of Manchester, United Kingdom

Event-Driven Random Backpropagation: Enabling Neuromorphic Deep Learning Machines..... 1095

Emre Neftci^{2}, Charles Augustine^{1}, Somnath Paul^{1}, Georgios Detorakis^{2}

^{1}Intel Corporation, United States; ^{2}University of California, Irvine, United States

Pattern Representation and Recognition with Accelerated Analog Neuromorphic Systems 1099

Mihai Alexandru Petrovici^{2}, Sebastian Schmitt^{2}, Johann Klähn^{2}, David Stöckel^{2}, Anna Schroeder^{2}, G. Bellec^{4}, Johannes Bill^{2}, Oliver Breitwieser^{2}, Ilja Bytschok^{2}, Andreas Grübl^{2}, Maurice Güttler^{2}, Andreas Hartel^{2}, Stephan Hartmann^{3}, Dan Husmann^{2}, Kai Husmann^{2}, S. Jeltsch^{2}, Vitali Karasenko^{2}, M. Kleider^{2}, C. Koke^{2}, A. Kononov^{2}, C. Mauch^{2}, P. Müller^{2}, Johannes Partzsch^{3}, T. Pfeil^{2}, Stefan Schiefer^{3}, Stefan Scholze^{3}, A. Subramoney^{1}, V. Thanasoulis^{3}, Bernhard Vogginger^{3}, Robert Legenstein^{1}, Wolfgang Maass^{1}, Rene Schüffny^{3}, Christian Mayr^{3}, Johannes Schemmel^{2}, Karlheinz Meier^{2}

^{1}Graz University of Technology, Austria; ^{2}Ruprecht-Karls-Universität Heidelberg, Germany; ^{3}Technische Universität Dresden, Germany; ^{4}Technische Universität Graz, Germany

Ziksa: on-Chip Learning Accelerator with Memristor Crossbars for Multilevel Neural Networks 1103

Abdullah M. Zyarah^{1}, Nicholas Soures^{1}, Lydia Hays^{1}, Robin Jacobs-Gedrim^{2}, Sapan Agarwal^{2}, Matthew Marinella^{2}, Dhireesha Kudithipudi^{1}

^{1}Rochester Institute of Technology, United States; ^{2}Sandia National Laboratories, United States

Compressive Sensing

Time: Tuesday, May 30 (8:00-9:30)

Room: Grand Ballroom II

Chair(s): Wei-Ping Zhu - Concordia University; Yun Chen - Fudan University

Countering the False Myth of Democracy: Boosting Compressed Sensing Performance with Maximum-Energy Approach 1107

Mauro Mangia^{2}, Fabio Pareschi^{1}, Riccardo Rovatti^{2}, Gianluca Setti^{1}

^{1}Università degli Studi di Ferrara, Italy; ^{2}Università di Bologna, Italy

Subspace Learning in the Presence of Sparse Structured Outliers and Noise 1111

Shervin Minaee, Yao Wang

New York University, United States

Scaled Linearized Bregman Iterations for Fixed Point Implementation 1115

Michael Lunglmayr, Bernhard Hiptmair, Mario Huemer

Johannes Kepler Universität Linz, Austria

Two-Pass Lp-Regularized Least-Squares Algorithm for Compressive Sensing 1119

Jeevan Pant, Sridhar Krishnan

Ryerson University, Canada

TECHNICAL SESSIONS – TUESDAY, MAY 30TH

Approximate-DCT-Derived Measurement Matrices for Compressed Sensing 1123
Jianbin Zhou, Dajiang Zhou, Yoshimura Takeshi, Satoshi Goto
Waseda University, Japan

Circuits for Power Management & Voltage References

Time: Tuesday, May 30 (8:00-9:30)

Room: Grand Ballroom III

Chair(s): Nathan Neihart - Iowa State University; Jose Silva-Martinez - Texas A&M University

A Power-Efficient Reconfigurable Output-Capacitor-Less Low-Drop-Out Regulator for Low Power Analog Sensing Front-End 1127
Sheng-Yu Peng, Li-Han Liu, Pei-Ke Chang, Tzu-Yun Wang, Hao-Yu Li
National Taiwan University of Science and Technology, Taiwan

An All-MOSFET Sub-1 V Voltage Reference with a - 51 dB PSR Up to 60 MHz 1128
Nashiru Alhassan{1}, Edgar Sánchez-Sinencio{1}, Zekun Zhou{2}
{1}Texas A&M University, United States; {2}Texas A&M University / University of Electronic Science and Technology of China, United States

An All-MOSFET Voltage Reference with -50dB PSR @ 80 MHz for Low Power SoC Design 1129
Nashiru Alhassan{1}, Edgar Sánchez-Sinencio{1}, Zekun Zhou{2}
{1}Texas A&M University, United States; {2}Texas A&M University / University of Electronic Science and Technology of China, United States

A Simple LDO with Adaptable Bias for Internet of Things Applications 1130
Igor Filanovsky{4}, Luis Bica Oliveira{3}, Nikolay Tchamov{1}, Vadim Ivanov{2}
{1}Tampere University of Technology, Finland; {2}Texas Instruments Inc., United States; {3}Universidade Nova de Lisboa, Portugal; {4}University of Alberta, Canada

Hardware Security

Time: Tuesday, May 30 (8:00-9:30)

Room: Grand Ballroom IV

Chair(s): Ankur Srivastava - University of Maryland; Chip Hong Chang - Nanyang Technological University

A Voltage Regulator-Assisted Lightweight AES Implementation Against DPA Attacks 1134
Weize Yu, Selcuk Köse
University of South Florida, United States

CPA Secured Data-Dependent Delay-Assignment Methodology 1135
Itamar Levi, Osnat Keren, Alexander Fish
Bar-Ilan University, Israel

CMOS Based Gates for Blurring Power Information 1136
Moshe Avital, Itamar Levi, Osnat Keren, Alexander Fish
Bar-Ilan University, Israel

Charge-Withheld Converter-Reshuffling (CoRe): a Countermeasure Against Power Analysis Attacks 1137
Weize Yu, Selcuk Köse
University of South Florida, United States

Vision Sensors

Time: Tuesday, May 30 (8:00-9:30)

Room: Grand Ballroom VII

Chair(s): Piotr Dudek - The University of Manchester; Ricardo Carmona Galán - Instituto of Microelectrónica of Sevilla

INVITED: Development of an Always-on Vision Computer Vision Sensor NA

Venkat Rangan

Qualcomm Inc., United States

Always-on CMOS Image Sensor Pixel Design for Pixel-Wise Binary Coded Exposure 1138

Yi Luo

University of British Columbia., Canada

A Dynamic Vision Sensor with Direct Logarithmic Output and Full-Frame Picture-on-Demand 1142

Jing Huang, Menghan Guo, Shoushun Chen

Nanyang Technological University, Singapore

Impact of Fixed Pattern Noise on Embedded Image Compression Techniques 1146

William Guicquero, Laurent Alacoque

Commissariat à l'Energie Atomique et aux Energies Alternatives, France

High-Speed Depth from Focus on a Programmable Vision Chip Using a Focus Tunable Lens 1150

Julien N.P. Martel^{1}, Lorenz K. Müller^{1}, Stephen J. Carey^{2}, Piotr Dudek^{2}

^{1}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland; ^{2}University of Manchester, United Kingdom

Digitally Intensive Frequency Synthesis for Internet of Things Applications

Time: Tuesday, May 30 (8:00-8:30)

Room: Grand Ballroom VIII

Chair(s): Paul Sotiriadis - University of California, San Diego; Peter Kennedy - University College Cork

Analysis of Millimeter-Wave Digital Frequency Modulators for Ubiquitous Sensors and Radars 1154

Dmytro Cherniak^{3}, Salvatore Levantino^{2}, Carlo Samori^{2}, Roberto Nonis^{1}

^{1}Infineon Technologies, Austria; ^{2}Politecnico di Milano, Italy; ^{3}Politecnico di Milano / Infineon, Italy

All Digital FPGA-Implementable Time-Average-Frequency Direct Period Synthesis for IoT Applications 1158

Liming Xiu

BOE Technology Group CO., LTD., China

Hybrid-DPLL-Based Constant-Envelope Modulator for Internet-of-Things Chipsets 1162

Ioannis Syllaos

Cypress Semiconductor, United States

Single-Bit All Digital Frequency Synthesis with Homodyne Sigma-Delta Modulation for Internet of Things Applications 1166

Paul Peter Sotiriadis, Charis Basetas

National Technical University of Athens, Greece

Nonlinearity-Induced Spurious Tones and Noise in Digitally-Assisted Frequency Synthesizers 1170

Michael Peter Kennedy, Hongjia Mo, Dawei Mai

University College Cork, Ireland

Wireless & Implantable/Injectable Technology Circuits & Systems II

Time: Tuesday, May 30 (8:00-9:30)

Room: Grand Ballroom IX

Chair(s): Shantanu Chakrabartty - Washington University in St. Louis; Benoit Gosselin - Université Laval

***A CMOS Automatic Tuning System to Maximize Remote Powering Efficiency*..... 1174**

Paul Gosselin{1}, Roberto Puddu{2}, Alexis Carreira{1}, Mehrdad Ghanad{1}, Massimo Barbaro{2}, Catherine Dehollain{1}

{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Università degli Studi di Cagliari, Italy

***Feasibility of Hybrid Ultrasound-Electrical Nerve Stimulation for Electroceuticals*..... 1178**

Brittany Scheid, Shantanu Chakrabartty

Washington University in St. Louis, United States

A High-Sensitivity CMOS Biophotometry Sensor with Embedded Continuous-Time $\Sigma\Delta$ Modulation

..... 1182

Mehdi Noormohammadi Khiarak{2}, Sylvain Martel{1}, Yves De Koninck{2}, Benoit Gosselin{2}

{1}Polytechnique Montréal, Canada; {2}Université Laval, Canada

***In-Vivo Tests of an Inductively Powered Miniaturized Neural Stimulator*..... 1186**

Adam Khalifa{1}, Yasha Karimi{3}, Qihong Wang{1}, Elliot Greenwald{1}, Sherry Chiu{1}, Milutin Stanačević{3}, Nitish Thakor{2}, Ralph Etienne-Cummings{1}

{1}Johns Hopkins University, United States; {2}Johns Hopkins University / National University of Singapore, United States; {3}Stony Brook University, United States

Towards Low-Power Wearable Wireless Sensors for Molecular Biomarker and Physiological Signal

***Monitoring*..... 1190**

Xueyuan Zhao, Vidyasagar Sadhu, Tuan Le, Dario Pompili, Mehdi Javanmard

Rutgers University, United States

ADCs for Wireless Communication

Time: Tuesday, May 30 (8:00-9:30)

Room: Grand Ballroom X

Chair(s): Thierry Taris - Laboratoire de l'Intégration du Matériau au Système; Joseph Chang - Nanyang Technological University

Mismatch-Shaped Frequency-Interleaved Quadrature Data Converters for Carrier Aggregation in MU-MIMO

..... 1194

Sandipan Kundu{2}, Subhanshu Gupta{3}, David Allstot{3}, Jeyanandh Paramesh{1}

{1}Carnegie Mellon University, United States; {2}Intel Corporation, United States; {3}Washington State University, United States

***An Adaptive Blind Frequency Response Mismatches Calibration Method for Four-Channel TIADCs Based on Channel Swapping* 1195**

Husheng Liu, Hui Xu

National University of Defense Technology, China

***A 5-Bit 300–900-MS/s 0.8–1.2-V Supply Voltage ADC with Background Self-Calibration*..... 1196**

Fábio Alex Rabuske{2}, Taimur Gibran Rabuske{1}, Jorge Fernandes{2}

{1}Instituto de Engenharia de Sistemas e Computadores - Investigação e Desenvolvimento, Portugal;

{2}Universidade Técnica de Lisboa / Instituto de Engenharia de Sistemas e Computadores - Investigação, Portugal

***A 7.9 μ A 4-Bit 4Msps Successive Approximation Phase-Domain ADC for GFSK Demodulator*..... 1197**

Shaoquan Gao, Hanjun Jiang, Zhaoyang Weng, Yanshu Guo, Jingjing Dong, Zhihua Wang

Tsinghua University, China

A Two-Step Radio Receiver Architecture Fully Embedded Into a Charge-Sharing SAR ADC 1201
Nuno Pereira, Hugo Serra, João Goes
Universidade Nova de Lisboa / CTS-UNINOVA, Portugal

Cognitive Radio & Security Systems

Time: Tuesday, May 30 (8:00-9:30)

Room: Laurel AB

Chair(s): Maire O'Neill - Queens University; Joseph Cavallaro - Rice University

INVITED: Hardware Security at the Heart of IoT NA
Mathias Wagner
NXP Semiconductors N.V., United States

Computational Complexity Reduction for Signal Cyclostationarity Detection Based Spectrum Sensing
..... 2051
Shuske Narieda
National Institute of Technology, Akashi College, Japan

A 3DES Implementation Especially for CBC Feedback Loop Mode 1209
Yongcheng He, Shuguo Li
Tsinghua University, China

Compact and Provably Secure Lattice-Based Signatures in Hardware..... 1213
James Howe, Ciara Rafferty, Ayesha Khalid, Maire O'Neill
Queen's University Belfast, United Kingdom

A Sub-mW Spectrum Sensing Architecture for Portable IEEE 802.22 Cognitive Radio Applications
..... 1217
Kevin Banović, Anthony Chan Carusone
University of Toronto, Canada

Arithmetic & Logic Circuits

Time: Tuesday, May 30 (8:00-9:30)

Room: Laurel CD

Chair(s): Ettore Napoli - Università degli Studi di Napoli Federico II; Martin Kumm - Universität Kassel

Analysis of Stochastic Logic Circuits in Unipolar, Bipolar and Hybrid Formats 1221
Keshab K. Parhi
University of Minnesota Twin Cities, United States

Logarithmic Number System Addition-Subtraction Using Fractional Normalization..... 1225
Giorgos Tsiaras, Vassilis Paliouras
University of Patras, Greece

Post-Processing of Supergate Networks Aiming Cell Layout Optimization 1229
Gustavo Smaniotto^{2}, Regis Zanandrea^{2}, Maicon Cardoso^{2}, Renato de Souza^{2}, Matheus Moreira^{1}, Felipe Marques^{2}, Leomar Da Rosa Jr.^{2}
^{1}Pontificia Universidade Católica do Rio Grande do Sul, Brazil; ^{2}Universidade Federal de Pelotas, Brazil

Integration of Level Shifting in a TSPC Flip-Flop for Low-Power Robust Timing Closure in Dual-VDD ULV Circuits..... 1233
François Stas, David Bol
Université Catholique de Louvain, Belgium

Cell Spreading Optimization for Force-Directed Global Placers 1237
Xueyan Wang, Yici Cai, Qiang Zhou
Tsinghua University, China

TECHNICAL SESSIONS – TUESDAY, MAY 30TH

Advanced Video Streaming & Transmission

Time: Tuesday, May 30 (8:00-9:30)

Room: Kent AB

Chair(s): Hsu-Feng Hsiao - National Chiao Tung University; Jianfei Cai - Nanyang Technological University

Collaborative Wireless Freeview Video Streaming with Network Coding 1241

Bo Zhang{4}, Zhi Liu{3}, S.-H. Gary Chan{1}, Gene Cheung{2}

{1}Hong Kong University of Science and Technology, Hong Kong; {2}National Institute of Informatics, Japan; {3}Waseda University, Japan; {4}Zhengzhou University, China

Dynamic Threshold Based Rate Adaptation for HTTP Live Streaming..... 1242

Lan Xie, Chao Zhou, Xingdong Zhang, Zongming Guo

Peking University, China

View Direction and Bandwidth Adaptive 360 Degree Video Streaming Using a Two-Tier System 1246

Fanyi Duanmu, Eymen Kurdoglu, Yong Liu, Yao Wang

New York University, United States

A Robust Video Encoding Scheme to Enhance Error Concealment of Intra Frames..... 1250

Joao Carreira{1}, Pedro Assuncao{1}, Sergio Faria{1}, Erhan Ekmekcioglu{2}, Ahmet Kondoz{2}

{1}Intituto de Telecomunicacoes, Portugal; {2}Loughborough University London, United Kingdom

Video Streaming Optimization Using Degradation Estimation with Unequal Error Protection..... 1254

Philip Tovstogan, Hsu-Feng Hsiao

National Chiao Tung University, Ukraine; National Chiao Tung University, Taiwan

Mini-Tutorial

Time: Tuesday, May 30 (8:00-9:30)

Room: Essex AB

Multiply and Filter: An Universal Measurement Trick..... NA

Arijit Sinharay

Innovation Lab, Kolkata, India

Keynote

Time: Tuesday, May 30 (9:30-10:30)

Room: Grand Ballroom V-VI

A Matter of Trust..... NA

Kerry Bernstein, Program Manager, Microsystems Technology Office, DARPA

Nonlinear Dynamics in CAS

Time: Tuesday, May 30 (11:00-12:30)

Room: Dover A

Chair(s): Marco Storace - Università di Genova; Dimitri Galayco - Université Pierre-et-Marie-Curie

Control-Oriented Design Guidelines to Extend the Stability Margin of Switching Converters 1258

Kuntal Mandal{3}, Abdullah Abusorrah{2}, Mohammed M. Al-Hindawi{2}, Yusuf Al-Turki{2}, Abdelali El Aroudi{4}, Damian Giaouris{5}, Soumitro Banerjee{1}

{1}Indian Institute of Science Education and Research, Kolkata, India; {2}King Abdulaziz University, Saudi Arabia; {3}National Institute of Technology Sikkim, India; {4}Universitat Rovira i Virgili, Spain; {5}University of Newcastle, United Kingdom

A Modified CCM Approach for Simulating Hierarchical Interconnected Dynamical Systems 1262

Michael Popp, Wolfgang Mathis, Malte John, Olga Korolova, Axel Mertens, Bernd Ponick

Gottfried Wilhelm Leibniz Universität Hannover, Germany

CEPAGE: a Toolbox for Central Pattern Generator Analysis..... 1266
Matteo Lodi{2}, Andrey Shilnikov{1}, Marco Storace{2}
{1}Georgia State University, United States; {2}Università di Genova, Italy

Constant-Time Discontinuity Map for Forward Sensitivity Analysis to Initial Conditions: Spurs Detection in Fractional-N PLL as a Case Study 1270
Federico Bizzarri{1}, Angelo Brambilla{1}, Alessandro Colombo{1}, Sergio Callegari{2}
{1}Politecnico di Milano, Italy; {2}Università di Bologna, Italy

Semianalytical Model for High Speed Analysis of All-Digital PLL Clock-Generating Networks 1274
Eugene Koskin{2}, Dimitri Galayko{1}, Orla Feely{2}, Elena Blokhina{2}
{1}Laboratoire d'informatique de Paris 6 / Université Pierre et Marie Curie / Sorbonne Universités, France;
{2}University College Dublin, Ireland

Power Converters I

Time: Tuesday, May 30 (11:00-12:30)

Room: Dover BC

Chair(s): Abdelali El Aroudi - Universitat Rovira i Virgili; Hiroo Sekiya - Chiba University

A Low-Voltage Charge Pump with Improved Pumping Efficiency 1278
Xiaoxue Jiang, Xiaojian Yu, Jie Chen
University of Alberta, Canada

Modeling of 3-Level Buck Converters in Discontinuous Conduction Mode for Stand-by Mode Power Supply 1282
Yoshitaka Yamauchi, Toru Sai, Takayasu Sakurai, Makoto Takamiya
University of Tokyo, Japan

A Class-D Output Bridge with Dynamic Dead-Time, Small Delay and Reduced EMI 1286
Timucin Karaca, Mario Auer
Graz University of Technology, Austria

A Current Average Control Method for Transient-Glitch Reduction in Variable Frequency DC-DC Converters 1290
Hsin-Shu Chen, Jia-Nan Tai, Yi-Jan Emery Chen, Jau-Horng Chen
National Taiwan University, Taiwan

A Novel Nonlinear Modulation Technique for Stabilizing DC-DC Switching Converters..... 1294
Abdelali El Aroudi{4}, Kuntal Mandal{3}, Abdullah Abusorrah{2}, Mohammed M. Al-Hindawi{2}, Yusuf Al-Turki{2},
Damian Giaouris{5}, Soumitro Banerjee{1}
{1}Indian Institute of Science Education and Research, Kolkata, India; {2}King Abdulaziz University, Saudi Arabia;
{3}National Institute of Technology Sikkim, India; {4}Universitat Rovira i Virgili, Spain; {5}University of Newcastle,
United Kingdom

Pattern Recognition & Learning Systems I

Time: Tuesday, May 30 (11:00-12:30)

Room: Grand Ballroom I

Chair(s): Ibrahim Elfadel - Masdar Institute; Jeremy Holleman - University of North Carolina at Charlotte

INVITED: Using Machine Learning to Separate Signals NA

Peder Olsen

IBM Research, United States

Accelerating Convolutional Neural Network with FFT on Tiny Cores..... 1298

Tahmid Abtahi, Amey Kulkarni, Tinoosh Mohsenin

University of Maryland, Baltimore County, United States

A Mixed-Mode Array Computing Architecture for Online Dictionary Learning..... 1302

Jussi Poikonen, Mika Laiho

University of Turku, Finland

VLSI Implementation of LS-SVM Training and Classification Using Entropy Based Subset-Selection 1306

Andreas Bytyn, Jannik Springer, Rainer Leupers, Gerd Ascheid

Rheinisch-Westfälische Technische Hochschule Aachen, Germany

Fast Thermopile Readout Circuit Arrangement for Array Processors..... 1310

Mika Grönroos, Tapani Nevalainen, Jonne Poikonen, Ari Paasio

University of Turku, Finland

Statistical Signal Processing

Time: Tuesday, May 30 (11:00-12:30)

Room: Grand Ballroom II

Chair(s): Wei Xing Zheng - Western Sydney University; Tokunbo Ogunfunmi - Santa Clara University

Efficient Data Structures for Density Estimation for Large High-Dimensional Data 1314

Aref Majdara, Saeid Nooshabadi

Michigan Technological University, United States

Integer Frequency Offset Detection with Reduced Complexity in OFDM Systems 1318

Hamed Abdzadeh-Ziabari, Wei-Ping Zhu, M.N.S. Swamy

Concordia University, Canada

A New Regularized Recursive Dynamic Factor Analysis with Variable Forgetting Factor for Wireless Sensor Networks with Missing Data 1322

Jian-Qiang Lin, Ho-Chun Wu, Shing-Chow Chan

University of Hong Kong, Hong Kong

Study of Wind Profile Prediction with a Combination of Signal Processing and Computational Fluid Dynamics 1326

Mengdi Jiang, Wei Liu, Yi Li

University of Sheffield, United Kingdom

Multichannel Color Image Watermark Detection Utilizing Vector-Based Hidden Markov Model 1330

Marzieh Amini, Hamidreza Sadreazami, M. Omair Ahmad, M.N.S. Swamy

Concordia University, Canada

RF Circuits I**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Grand Ballroom III**Chair(s):** Joseph Chang - Nanyang Technological University; Ioannis Syllaios - University of Texas at Dallas***A 30 μ W, 3.3dB NF CMOS LNA for Wearable WSN Applications***..... 1334

Ehsan Kargaran, Danilo Manstretta, Rinaldo Castello

Università degli Studi di Pavia, Italy

A 6V CMOS Switching Mode Amplifier for Continuous-Wave Signals from DC to 3 GHz 1338

Robert Bieg, Martin Schmidt, Markus Grözing, Manfred Berroth

Universität Stuttgart, Germany

Common-Mode Termination Requirements in Concurrent Dual-Band Push-Pull Power Amplifiers
..... 1342

Byron Montgomery, Yifei Li, Nathan Neihart

Iowa State University, United States

A 1024-QAM Capable WLAN Receiver with -56.3 dB Image Rejection Ratio Using Self-Calibration Technique
..... 1346

Shusuke Kawai, Toshiyuki Yamagishi, Yosuke Hagiwara, Shigehito Saigusa, Ichiro Seto, Shoji Otaka, Shuichi Ito

Toshiba Corporation, Japan

Impact of Amplifier Bandwidth Limitations on Gain-Boosted N-Path Receivers..... 1350

Debasish Mitra{1}, Dusan Milosevic{1}, Salvatore Drago{2}, Jan van Sinderen{2}, Lucien J. Breems{2}

{1}Eindhoven University of Technology, Netherlands; {2}NXP Semiconductors N.V., Netherlands

Intellectual Property Protection: A special session in honor of Professor Miodrag Potkonjak**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Grand Ballroom IV**Chair(s):** Gang Qu - University of Maryland***20 Years of Research on Intellectual Property Protection*** 1354

Miodrag Potkonjak{2}, Gang Qu{4}, Farinaz Koushanfar{3}, Chip-Hong Chang{1}

{1}Nanyang Technological University, Singapore; {2}University of California, Los Angeles, United States;

{3}University of California, San Diego, United States; {4}University of Maryland, College Park, United States

INVITED: Cybersecurity and the Electric Grid: Innovation and Intellectual Property 1358

Theodore Wood{2}, Marc Dandin{1}

{1}Wood IP LLC, United States; {2}Wood IP LLC, United States

Practical IP Watermarking and Fingerprinting Methods for ASIC Designs 1359

Xi Chen{2}, Gang Qu{2}, Aijiao Cui{1}

{1}Harbin Institute of Technology, China; {2}University of Maryland, College Park, United States

Hardware-Based Anti-Counterfeiting Techniques for Safeguarding Supply Chain Integrity..... 1363

Md Tanvir Arafin{2}, Andrew Stanley{1}, Praveen Sharma{1}

{1}Koninklijke Philips N.V., United States; {2}University of Maryland, College Park, United States

Revisit Sequential Logic Obfuscation: Attacks and Defenses 1367

Travis Meade{1}, Zheng Zhao{2}, Shaojie Zhang{1}, David Pan{2}, Yier Jin{1}

{1}University of Central Florida, United States; {2}University of Texas at Austin, United States

TECHNICAL SESSIONS – TUESDAY, MAY 30TH

Sensing Circuits

Time: Tuesday, May 30 (11:00-12:30)

Room: Grand Ballroom VII

Chair(s): Meng-Fan Chang - National Tsing Hua University; Joseph Friedman - University of Texas at Dallas

From “MISSION: IMPOSSIBLE” to Mission Possible: Fully Flexible Intelligent Contact Lens for Image Classification with Analog-to-Information Processing 1371

Qin Li{2}, Zheyu Liu{2}, Fei Qiao{2}, Xing Wu{1}, Chaolun Wang{1}, Qi Wei{2}, Huazhong Yang{2}
{1}East China Normal University, China; {2}Tsinghua University, China

FPGA-Based Neural Probe Positioning to Improve Spike Sorting with OSort Algorithm 1375

László Schaffer{3}, Zoltán Nagy{2}, Zoltán Kincses{3}, Richárd Fiáth{1}
{1}Hungarian Academy of Sciences, Hungary; {2}Pázmány Peter Catholic University, Hungary; {3}University of Szeged, Hungary

A Novel ISFET Sensor Architecture Using Through-Silicon Vias for DNA Sequencing 1379

Wei Xiao, Nicholas Miscourides, Pantelis Georgiou
Imperial College London, United Kingdom

Behaving Cyborg Locusts for Standoff Chemical Sensing 1383

Darshit Mehta, Ege Altan, Rishabh Chandak, Baranidharan Raman, Shantanu Chakrabartty
Washington University in St. Louis, United States

A Modular Wireless Sensor Platform and its Applications 1387

Chun-Ming Huang, Yi-Jie Hsieh, Wei-Lin Lai, Yi-Jun Liu, Chun-Ying Juan, Ssu-Ying Chen, Chun-Yu Chen, Jin-Ju Chue, Chih-Chyau Yang, Chien-Ming Wu
National Applied Research Laboratories, Taiwan

Flexible-Hybrid & Printable Electronics Systems

Time: Tuesday, May 30 (11:00-12:30)

Room: Grand Ballroom VIII

Chair(s): Fayomi Christian - Université du Québec à Montréal; Gordon Roberts - McGill University

Printed Electronics: Effects of Bending and a Self-Compensation Means 1391

Jia Zhou, Tong Ge, Joseph Sylvester Chang
Nanyang Technological University, Singapore

Flexible Hydrogel Actuated Graphene-Cellulose Biosensor for Monitoring Ph 1392

George Knopf, Dogan Sinar
University of Western Ontario, Canada

Review: a Fully-Additive Printed Electronics Process with Very-Low Process Variations (Bent and Unbent Substrates) and PDK 1396

Tong Ge, Jia Zhou, Yang Kang, Joseph Sylvester Chang
Nanyang Technological University, Singapore

Powering Smart Wearable Systems with Flexible Solar Energy Harvesting 1400

Petar Jokic, Michele Magno
Eidgenössische Technische Hochschule Zürich, Switzerland

Towards a Smartphone-Aided Electronic ELISA for Real-Time Electrochemical Monitoring 1404

Nikolaos Pechlivanidis, Konstantinos Papadimitriou, Daniel Evans, Nikolaos Vasilakis, Themistoklis Prodromakis
University of Southampton, United Kingdom

CAS for Human Machine Interfaces / Brain Machine Interfaces

Time: Tuesday, May 30 (11:00-12:30)

Room: Grand Ballroom IX

Chair(s): Julius Georgiou - University of Cyprus; Pantelis Georgiou - Imperial College London

***A High Temporal Resolution Multiscale Recording System for in Vivo Neural Studies* 1408**

Gian Nicola Angotzi{2}, Mario Malerba{2}, Alessandro Maccione{2}, Fabio Boi{2}, Marco Crepaldi{2}, Alberto Bonanno{1}, Luca Berdondini{2}
{1}Istituto Italiano di Tecnologia, Italy; {2}Istituto Italiano di Tecnologia, Italy

***A Silicon Based fdNIRS System with Integrated tDCS on Chip for Non-Invasive Closed-Loop Neuro Stimulation*..... 1412**

Yun Miao, Valencia Koomson
Tufts University, United States

***A Fully Integrated Wireless Sensor-Brain Interface System to Restore Finger Sensation*..... 1416**

Xilin Liu{2}, Hongjie Zhu{2}, Milin Zhang{1}, Xiaotie Wu{1}, Andrew Richardson{2}, Srihari Sriharan{2}, Dengteng Ge{2}, Yang Shu{2}, Timothy Lucas{2}, Jan Van der Spiegel{2}
{1}Tsinghua University, China; {2}University of Pennsylvania, United States

***A Charge-Based Ultra-Low Power Continuous-Time ADC for Data Driven Neural Spike Processing* 1420**

Michal Maslik{1}, Yan Liu{1}, Tor Sverre Lande{2}, Timothy Constandinou{1}
{1}Imperial College London, United Kingdom; {2}University of Oslo, Norway

***Analysis of Passive Charge Balancing for Safe Current-Mode Neural Stimulation* 1424**

Luis Eduardo Rueda Guerrero{2}, Marco Ballini{1}, Nick Van Helleputte{1}, Srinjoy Mitra{3}
{1}IMEC, Belgium; {2}Universidad Industrial de Santander, Colombia; {3}University of Glasgow, United Kingdom

Data Converters I

Time: Tuesday, May 30 (11:00-12:30)

Room: Grand Ballroom X

Chair(s): Ioannis Syllaios - University of Texas at Dallas; George Yuan - Hong Kong University of Science and Technology

***A Novel Wavelet-Based Analog-to-Digital Converter*..... 1428**

Isadora Freire Martins{2}, José Edil Guimarães de Medeiros{2}, José Alberto Alves de Andrade{1}, Sandro Augusto Pavlik Haddad{2}
{1}DFchip Ltd., Brazil; {2}Universidade de Brasília, Brazil

***Voltage Domain Correction Technique for Timing Skew Errors in Time Interleaved ADCs*..... 1432**

Praveen Kumar Venkatachala{1}, Ahmed Elshater{1}, Yang Xu{1}, Manar El-Chammas{2}, Un-Ku Moon{1}
{1}Oregon State University, United States; {2}Texas Instruments Inc., United States

***A 700µW 1GS/s 4-Bit Folding-Flash ADC in 65nm CMOS for Wideband Wireless Communications* 1436**

Bayan Nasri, Sunit Sebastian, Kae-Dyi You, Ramkumar RanjithKumar, Davood Shahrjerdi
New York University, United States

***A Highly Linear OTA-Free VCO-Based 1-1 MASH $\Delta\Sigma$ ADC*..... 1440**

Hamidreza Maghami{2}, Pedram Payandehnia{2}, Hossein Mirzaie{2}, Kartikeya Mayaram{2}, Ramin Zanbaghi{1}, Terri Fiez{3}
{1}Cirrus logic, United States; {2}Oregon State University, United States; {3}University of Colorado Boulder, United States

Thermal Noise Canceling Pipelined ADC 1444
Chithira Ravi{1}, Diego James{1}, Vineeth Sarma{1}, Bibhu Datta Sahoo{3}, Amol Inamdar{2}
{1}Amrita Vishwa Vidyapeetham University, India; {2}Hypres Inc., New York, United States; {3}University of Illinois at Urbana-Champaign, United States

Cryptography & PUF Circuits

Time: Tuesday, May 30 (11:00-12:30)

Room: Laurel AB

Chair(s): Maire O'Neill - Queens University; Weiqiang Liu - Nanjing University of Aeronautics and Astronautics

Fast Inversion in GF(2^m) with Polynomial Basis Using Optimal Addition Chains 1448
Lijuan Li, Shuguo Li
Tsinghua University, China

XOR Gate Based Low-Cost Configurable RO PUF 1452
Lei Zhang{1}, Chenghua Wang{1}, Weiqiang Liu{1}, Maire O'Neill{3}, Fabrizio Lombardi{2}
{1}Nanjing University of Aeronautics and Astronautics, China; {2}Northeastern University, United States; {3}Queen's University Belfast, United Kingdom

Investigation of DRAM PUFs Reliability Under Device Accelerated Aging Effects 1456
Fatemeh Tehranipoor, Nima Karimian, Wei Yan, John Chandy
University of Connecticut, United States

A Technique to Transform 6T-SRAM Arrays Into Robust Analog PUF with Minimal Overhead 1460
Jiangyi Li, Teng Yang, Mingoo Seok
Columbia University, United States

Networks-on-Chip

Time: Tuesday, May 30 (11:00-12:30)

Room: Laurel CD

Chair(s): Emre Salman - Stony Brook University; Shuenn-Yuh Lee - National Cheng Kung University

A Low Latency Fault Tolerant Transmission Mechanism for Network-on-Chip 1464
Letian Huang, Xinxin Lin, Junshi Wang, Qiang Li
University of Electronic Science and Technology of China, China

A Two-Stage Variation-Aware Task Mapping Scheme for Fault-Tolerant Multi-Core Network-on-Chips 1468
Lei Zhang{1}, Jianxun Yang{2}, Chengbo Xue{1}, Yue Ma{1}, Shan Cao{1}
{1}Beijing Institute of Technology, China; {2}Tsinghua University, China

Runtime Mitigation of Illegal Packet Request Attacks in Networks-on-Chip 1472
N Prasad, Rajit Karmakar, Santanu Chattopadhyay, Indrajit Chakrabarti
Indian Institute of Technology Kharagpur, India

Comprehensive Performance and Robustness Analysis of 2D Turn Models for Network-on-Chips 1476
Siavoosh Payandeh Azad{1}, Behrad Niazmand{1}, Karl Janson{1}, Thilo Kogge{3}, Jaan Raik{1}, Gert Jervan{1}, Thomas Hollstein{2}
{1}Tallinn University of Technology, Estonia; {2}Tallinn University of Technology / Frankfurt University of Applied Sciences, Germany; {3}Technische Universität Darmstadt, Germany

Implications of Noise Insertion Mechanisms of Different Countermeasures Against Side-Channel Attacks 1480
Weize Yu, Selcuk Köse
University of South Florida, United States

Multimedia Content Analysis & Retrieval

Time: Tuesday, May 30 (11:00-12:30)

Room: Kent AB

Chair(s): Yeong-Kang Lai - National Chung Hsing University; Shao-Yi Chien - National Taiwan University

Implicit Analysis of Perceptual Multimedia Experience Based on Physiological Response: a Review 1484

Seong-Eun Moon, Jong-Seok Lee
Yonsei University, Korea, South

A New Algorithm for Accurate and Automatic Chessboard Corner Detection 1485

Yuchi Zhang, Guolin Li, Xiang Xie, Zhihua Wang
Tsinghua University, China

Better Deep Visual Attention with Reinforcement Learning in Action Recognition 1489

Gang Wang{1}, Wenmin Wang{1}, Jingzhuo Wang{1}, Yaohua Bu{2}
{1}Peking University, China; {2}Tsinghua University, China

Cross-Domain Shoe Retrieval Using a Three-Level Deep Feature Representation..... 1493

Huijing Zhan{1}, Boxin Shi{2}, Alex Kot{1}
{1}Nanyang Technological University, Singapore; {2}National Institute of Advanced Industrial Science and Technology, Japan

A 120 fps 1080p Resolution Block-Based Feature Extraction Architecture Implementation for Real-Time Action Recognition 1497

Chun-Ting Yen, Wan-Yu Chen, Liang-Gee Chen
National Taiwan University, Taiwan

Video Interfaces & High Speed IO

Time: Tuesday, May 30 (11:00-12:30)

Room: Essex AB

Chair(s): Eduard Alarcon - Universitat Politècnica de Catalunya

A Real-Time FHD Learning-Based Super-Resolution System Without a Frame Buffer 1501

Kuan-Ling Liu, Ming-Che Yang, Shao-Yi Chien
National Taiwan University, Taiwan

A 55.1 mW 1.62-to-8.1 Gb/s Video Interface Receiver Generating Up to 680 MHz Stream Clock Over 20 dB Loss Channel 1502

Kwanseo Park, Jinhyung Lee, Kwangho Lee, Deog-Kyoon Jeong
Seoul National University, Korea, South

A 28-Gb/s 1.6-pJ/b PAM-4 Transmitter with 3-Tap FFE and Gm-Regulated Resistive-Feedback Inverter Based Drivers in 28-nm CMOS 1503

Haram Ju, Moon-Chul Choi, Deog-Kyoon Jeong
Seoul National University, Korea, South

A Frequency Reconfigurable 360° Analog Phase Shifter with a Constant Loss..... 1504

Fatemeh Akbar, Amir Mortazawi
University of Michigan, United States

A 4GS/s Reconfigurable Folding Flash ADC for Time Interleaving in 16nm FinFET 1505

Luke Wang{2}, Marcandre Lacroix{1}, Anthony Chan Carusone{2}
{1}Huawei Technologies Canada, Canada; {2}University of Toronto, Canada

Modeling & Analysis of Nonlinear Circuits**Time:** Tuesday, May 30 (13:30-15:00)**Room:** Dover A**Chair(s):** Sergio Callegari - Università di Bologna; Elena Blokhina - University College Dublin***Closed-Form Model for Dual-Gate Ambipolar CNTFET Circuit Design*..... 1506**

Xuan Hu, Joseph Friedman

University of Texas at Dallas, United States

***Variability of Supercapacitor Fractional-Order Parameters Extracted from Discharging Behavior Using Least Squares Optimization*..... 1510**

Todd Freeborn{1}, Ahmed Elwakil{2}

{1}University of Alabama, United States; {2}University of Sharjah, U.A.E.

***Analysis of Power Consumption in LC Oscillators Based on the Inversion Coefficient* 1514**

Francesco Chicco, Alessandro Pezzotta, Christian Enz

École Polytechnique Fédérale de Lausanne, Switzerland

***Coefficient Extraction for MPM Using LSE, ORLS and SLS Applied to RF-PA Modeling* 1518**

Jose Cruz Núñez Pérez{2}, Edgar Allende-Chávez{3}, Jose Ricardo Cárdenas-Valdez{3}, Esteban Tlelo-Cuautle{1}

{1}Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico; {2}Instituto Politecnico Nacional, Mexico;

{3}Instituto Tecnológico de Tijuana, Mexico

***Analysis and Comparison of Charge-Pump Conditioning Circuits for Capacitive Electromechanical Energy Conversion* 1522**

Armine Karami{1}, Dimitri Galayko{1}, Mohammed Bedier{1}, Philippe Basset{2}

{1}Laboratoire d'informatique de Paris 6 / Université Pierre et Marie Curie / Sorbonne Universités, France;

{2}Université Paris-Est - ESIEE, France

Power Converters II**Time:** Tuesday, May 30 (13:30-15:00)**Room:** Dover BC**Chair(s):** Hirotaka Koizumi - Tokyo University of Agriculture and Technology; Stefano Gregori - University of Guelph***Master-Slave Battery Charging System Using Parallel DC-DC Converters for Thermal Safety* 1526**

John Hu, Suming Lai

Maxim Integrated, United States

***A Hybrid Nine-Level Inverter with Series/Parallel Conversion*..... 1530**

Yuya Nakagawa, Hirotaka Koizumi

Tokyo University of Science, Japan

***A 0.9-V Input PWM DCM Boost Converter with Low Output Ripples and Fast Load Transient Response Based on a Novel Square-Root Voltage Mode (SRVM) Control Approach* 1534**

Hao Luo, Lier Siek

Nanyang Technological University, Singapore

***A High-Speed Level Shifting Technique and its Application in High-Voltage, Synchronous DC-DC Converters with Quasi-ZVS*..... 1538**

Arunkumar Salimath{2}, Giovanni Gonano{1}, Edoardo Bonizzoni{2}, Davide Luigi Brambilla{1}, Edoardo Botti{1},

Franco Maloberti{2}

{1}STMicroelectronics, Italy; {2}Università degli Studi di Pavia, Italy

Design Trade-Offs of Integrated Polygonal Inductors for DC-DC Power Converters..... 1542
Ahmed Shaltout, Stefano Gregori
University of Guelph, Canada

Neural Arrays

Time: Tuesday, May 30 (13:30-15:00)

Room: Grand Ballroom I

Chair(s): Arindam Basu - Nanyang Technological University; Wei Xing Zheng - Western Sydney University

INVITED: Intelligent Virtual Agents at the Edge..... NA
M. Anthony Lewis
Qualcomm Inc., United States

Dynamic Voltage and Frequency Scaling for Neuromorphic Many-Core Systems 1546
Sebastian Höppner{1}, Yexin Yan{1}, Bernhard Vogginger{1}, Andreas Dixius{1}, Johannes Partzsch{1}, Felix Neumärker{1}, Stephan Hartmann{1}, Stefan Schiefer{1}, Stefan Scholze{1}, Georg Ellguth{1}, Love Cederstroem{1}, Matthias Eberlein{1}, Christian Mayr{1}, Steve Temple {2}, Luis Plana{2}, Jim Garside{2}, Simon Davison{2}, David R. Lester{2}, Steve Furber{2}
{1}Technische Universität Dresden, Germany; {2}University of Manchester, United Kingdom

Scalable Bio-Inspired Fault Detection to Support Fault Recovery in Networks-on-Chip 1550
Malachy McElholm, Jim Harkin, Junxiu Liu, Liam McDaid
Ulster University, United Kingdom

A 65-nm CMOS 7fJ Per Synaptic Event Clique-Based Neural Network in Scalable Architecture 1554
Benoit Larras{2}, Paul Chollet{1}, Cyril Lahuec{1}, Fabrice Seguin{1}, Matthieu Arzel{1}
{1}TELECOM Bretagne, France; {2}Université Lille 1 / Université de Valenciennes, France

A Biological-Realtime Neuromorphic System in 28 nm CMOS Using Low-Leakage Switched Capacitor Circuits..... 1558
Christian Mayr, Johannes Partzsch, Marko Noack, Stefan Hänzsche, Stefan Scholze, Sebastian Höppner, Georg Ellguth, Rene Schüffny
Technische Universität Dresden, Germany

DSP for Biosignals

Time: Tuesday, May 30 (13:30-15:00)

Room: Grand Ballroom II

Chair(s): Keshab K. Parhi - University of Minnesota at Minneapolis; Peter Lian - York University

Pupil Localization for Gaze Estimation Using Unsupervised Graph-Based Model 1559
Salah Rabba{1}, Yifeng He{1}, Matthew Kyan{2}, Ling Guan{1}
{1}Ryerson University, Canada; {2}York University, Canada

Statistical Modeling of Multimodal Neuroimaging Data in Non-Subsampled Shearlet Domain Using the Student's t Location-Scale Distribution..... 1563
Emimal Jabason, M. Omair Ahmad, M.N.S. Swamy
Concordia University, Canada

Dynamic Gene Regulatory Network Analysis Using Saccharomyces cerevisiae Large-Scale Time-Course Microarray Data 1567
Li Zhang, Ho-Chun Wu, Jian-Qiang Lin, Shing-Chow Chan
University of Hong Kong, Hong Kong

Low-Power Real-Time ECG Baseline Wander Removal: Hardware Implementation 1571
Onur Guven{1}, Amir Eftekhari{1}, Wilko Kindt{2}, Timothy Constandinou{1}
{1}Imperial College London, United Kingdom; {2}Texas Instruments Inc., Netherlands

TECHNICAL SESSIONS – TUESDAY, MAY 30TH

Constrained Kalman Filter for Improving Kinect Based Measurements 1575
Soumya Ranjan Tripathy{2}, Kingshuk Chakravarty{2}, Aniruddha Sinha{2}, Debatri Chatterjee{2}, Sanjoy Kumar Saha{1}
{1}Jadavpur University, India; {2}Tata Consultancy Services Ltd., India

RF Circuits II

Time: Tuesday, May 30 (13:30-15:00)

Room: Grand Ballroom III

Chair(s): Thierry Taris - Laboratoire de l'Intégration du Matériau au Système; Ioannis Syllaios - University of Texas at Dallas

Reconfigurable Inductorless Wideband CMOS LNA for Wireless Communications..... 1579
Thierry Taris{2}, Marcelo De Souza{1}, Andre Mariano{1}
{1}University Federal of Parana, Brazil; {2}University of Bordeaux, France

A Wideband RF Power Detector with -56 dB Sensitivity and 64 dB Dynamic Range in SiGe BiCMOS Technology 1580
Sreekesh Lakshminarayanan, Klaus Hofmann
Technische Universität Darmstadt, Germany

An 89 μ W MICS/ISM Band Receiver for Ultra-Low-Power Applications 1584
Zexue Liu, Fan Yang, Haoyun Jiang, Xiucheng Hao, Junhua Liu, Huailin Liao
Peking University, China

A Transformer-Less Duplexer with Out-of-Band Filtering for Same-Channel Full-Duplex Radios 1588
Prateek Kumar Sharma, Nagarjuna Nallam
Indian Institute of Technology Guwahati, India

A Low Phase Noise 8.8 GHz VCO Based on ISF Manipulation and Dual-Tank Technique 1592
Rong Jiang{1}, Hossein Noori{1}, Fa Dai{1}, Jun Fu{2}, Wei Zhou{2}, Yudong Wang{2}
{1}Auburn University, United States; {2}Tsinghua University, China

PUF Circuits & Hardware Trojans

Time: Tuesday, May 30 (13:30-15:00)

Room: Grand Ballroom IV

Chair(s): Chip Hong Chang - Nanyang Technological University; Inna Partin Vaisband - University of Illinois at Chicago

An Entropy Test for Determining Whether a Mux PUF Is Linear or Nonlinear 1596
Anoop Koyily, Chen Zhou, Chris H. Kim, Keshab K. Parhi
University of Minnesota Twin Cities, United States

Low-Cost Fortification of Arbiter PUF Against Modeling Attack 1600
Siarhei S. Zalivaka{2}, Alexander A. Ivaniuk{1}, Chip-Hong Chang{2}
{1}Belarusian State University of Informatics and Radioelectronics, Belarus; {2}Nanyang Technological University, Singapore

Enhancing PUF Reliability by Machine Learning 1604
Yuejiang Wen, Yingjie Lao
Clemson University, United States; Clemson University, United States

Single-Triggered Hardware Trojan Identification Based on Gate-Level Circuit Structural Characteristics 1608
Fuqiang Chen, Qiang Liu
Tianjin University, China

HTChecker: Detecting Hardware Trojans Based on Static Characteristics 1612
Haihua Shen, Yuehui Zhao
University of the Chinese Academy of Sciences, China

Amplifiers & Analog Filtering

Time: Tuesday, May 30 (13:30-15:00)

Room: Grand Ballroom VII

Chair(s): Joseph Chang - Nanyang Technological University; Nuno Paulino - UNINOVA

Continuous Class-B/J Power Amplifier Using Nonlinear Embedding Technique: Analyzing the Design Space..... 1616

Samarth Saxena{1}, Karun Rawat{1}, Patrick Roblin{2}

{1}Indian Institute of Technology Roorkee, India; {2}Ohio State University, United States

Area-Efficient Fully Integrated Dual-Band Class-E/F Power Amplifier with Switchable Output Power for a BPSK/OOK Transmitter 1617

Christopher Soell{2}, Juergen Roeber{2}, Heinrich Milosiu{1}, Robert Weigel{2}, Amelie Hagelauer{2}

{1}Fraunhofer Institute for Integrated Circuits IIS, Germany; {2}Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

A Multi-Path Ring Amplifier with Dynamic Biasing 1621

Jason Muhlestein{1}, Farshad Farahbakhshian{2}, Praveen Kumar Venkatachala{1}, Un-Ku Moon{1}

{1}Oregon State University, United States; {2}Texas Instruments Inc., United States

A Highly Compact Wideband Continuous-Time Transimpedance Low-Pass Filter 1625

Yang Xu, Praveen Kumar Venkatachala, Un-Ku Moon

Oregon State University, United States

Improved Nauta Transconductor for Wideband Intermediate-Frequency gm-C Filter 1629

Jianghui Deng{1}, Zhuojian Fu{1}, Zhao Wang{1}, Dihu Chen{1}, Xian Tang{2}, Jianping Guo{1}

{1}Sun Yat-sen University, China; {2}Tsinghua University, China

Flexible Internet of Things: From Devices to Systems

Time: Tuesday, May 30 (13:30-15:00)

Room: Grand Ballroom VIII

Chair(s): Xiaojun Guo - Shanghai Jiao Tong University; Yongpan Liu - Tsinghua University

Printed Organic TFT Sensor Tags..... 1633

Tse Nga Ng

University of California, San Diego, United States

Robust Design and Design Automation for Flexible Hybrid Electronics..... 1636

Tsung-Ching Huang{1}, Leilai Shao{4}, Ting Lei{3}, Ray Beausoleil{1}, Zhenan Bao{3}, Kwang-Ting Cheng{2}

{1}Hewlett Packard Labs, United States; {2}Hong Kong University of Science and Technology, China; {3}Stanford University, United States; {4}University of California, Santa Barbara, United States

An 8b 0.8kS/s Configurable VCO-Based ADC Using Oxide TFTs with Inkjet Printing Interconnection 1640

Wenyu Sun{3}, Qinghang Zhao{3}, Fei Qiao{3}, Yongpan Liu{3}, Huazhong Yang{3}, Xiaojun Guo{1}, Lei Zhou{2}, Lei Wang{2}

{1}Shanghai Jiao Tong University, China; {2}South China University of Technology, China; {3}Tsinghua University, China

Integrated Biomedical Systems, BioMEMS & Biosensors/Actuators I**Time:** Tuesday, May 30 (13:30-15:00)**Room:** Grand Ballroom IX**Chair(s):** Mohamad Sawan - Polytechnique Montréal; Ibrahim Elfadel - Masdar Institute

***A Stimulation Platform for Optogenetic and Bionic Vision Restoration*..... 1644**Francesco Galluppi{2}, Didier Pruneau{2}, Joel Chavas{2}, Xavier Lagorce{1}, Christoph Posch{1}, Guillaume Chenegros{3}, Gilles Corduri {3}, Charlie Galle{3}, Nicolas Oddo{3}, Ryad Benosman{3}
{1}Chronocam, France; {2}Gensight Biologics, France; {3}Universit  Pierre-et-Marie-Curie, France***A Miniaturized Low Power Biomedical Sensor Node for Clinical Research and Long Term Monitoring of Cardiovascular Signals* 1648**Jarno Tuominen, Eero Lehtonen, Mojtaba Jafari Tadi, Juho Koskinen, Mikko P nk  l , Tero Koivisto
University of Turku, Finland***An Efficient Electronic Measurement Interface for Memristive Biosensors*..... 1652**S bastien Naus{2}, Ioulia Tzouvadaki{1}, Pierre-Emmanuel Gaillardon{3}, Armando Biscontini{3}, Giovanni De Micheli{1}, Sandro Carrara{1}
{1} cole Polytechnique F d rale de Lausanne, Switzerland; {2}Universit  de Li ge, Belgium; {3}University of Utah, United States***Analyte Sampling in Paper Biosensors Powered by Graphite-Based Light Absorption* 1656**Mingquan Yuan, Keng-Ku Liu, Srikanth Singamaneni, Shantanu Chakrabartty
Washington University in St. Louis, United States***An Implantable 128-Channel Wireless Neural-Sensing Microsystem Using TSV-Embedded Dissolvable μ -Needle Array and Flexible Interposer* 1660**Po-Tsang Huang{3}, Yu-Chieh Huang{3}, Shang-Lin Wu{3}, Yu-Chen Hu Hu{3}, Ming-Wei Lu{3}, Ting-Wei Sheng{3}, Fung-Kai Chang{3}, Chun-Pin Lin{4}, Nien-Shang Chang{2}, Hung-Lieh Chen{2}, Chi-Shi Chen{2}, Jeng-Ren Duann{1}, Tzai-Wen Chiu{3}, Wei Hwang{3}, Kua-Neng Chen{3}, Ching-Te Chuang{3}, Jin-Chern Chiou{2}
{1}China Medical University, Taiwan; {2}Nation Chip Implementation Center, Taiwan; {3}National Chiao Tung University, Taiwan; {4}National Chip Implementation Center, Taiwan

Digital to Analog Conversion**Time:** Tuesday, May 30 (13:30-15:00)**Room:** Grand Ballroom X**Chair(s):** Randall Geiger - Iowa State University; Tong Ge - Nanyang Technological University

***A 14-Bit 2.5 Gs/s Digital Pre-Distorted DAC in 65 nm CMOS with SFDR > 70 dB Up to 1.2 GHz* 1664**Zhiheng Zuo, Qingjun Fan, Jinghong Chen
University of Houston, United States***A Digital Calibration Technique Canceling Non-Linear Switch and Package Impedance Effects of a 1.6 GS/s TX-DAC in 28 nm CMOS* 1668**Hossein Ghafarian, Friedel Gerfers
Technische Universit t Berlin, Germany***A 13Bit 200MS/s Pipeline ADC with Current-Mode MDACs*..... 1672**Carlos Briseno-Vidrios{1}, Dadian Zhou{2}, Suraj Prakash{2}, Qiyuan Liu{2}, Alexander Edward{2}, Jose Silva-Martinez{2}
{1}Silicon Labs, United States; {2}Texas A&M University, United States***The Analytic Expression of the Output Spectrum of $\Delta\Sigma$ ADCs with Nonlinear Binary-Weighted DACs and Gaussian Input Signals* 1676**Ghyslain Gagnon{1}, Fran ois Gagnon{1}, Gordon Roberts{2}
{1} cole de Technologie Sup rieure, Canada; {2}McGill University, Canada

Communication & Timing Circuits

Time: Tuesday, May 30 (13:30-15:00)

Room: Laurel AB

Chair(s): Jin-Ku Kang - Inha University; Shoba Krishnan - Santa Clara University

***A Low Latency and Area Efficient FFT Processor for Massive MIMO Systems*..... 1680**

Mojtaba Mahdavi, Ove Edfors, Viktor Öwall, Liang Liu
Lund University, Sweden

***A 1 Gpps Asynchronous Logic OOK IR-UWB Transmitter Based on Master-Slave PLL Synthesis*..... 1684**

Marco Crepaldi, Gian Nicola Angotzi, Antonio Maviglia, Luca Berdondini
Istituto Italiano di Tecnologia, Italy

***Settling Time of Mesochronous Clock Re-Timing Circuits in the Presence of Timing Jitter* 1688**

Naveen Kadayinti, Amitalok Budkuley, Dinesh Sharma
Indian Institute of Technology Bombay, India

***Hardware Optimization of the Perturbation for Probabilistic Gradient Descent Bit Flipping Decoders*..... 1692**

Khoa Le^{1}, Fakhreddine Ghaffari^{1}, David Declercq^{1}, Bane Vasic^{2}
^{1}École Nationale Supérieure de l'Électronique et de ses Applications, France; ^{2}University of Arizona, United States

***25-Gb/s Clock and Data Recovery IC Using Latch-Load Combined with CML Buffer Circuit for Delay Generation with 65-nm CMOS* 1696**

Tomonori Tanaka^{2}, Kosuke Furuichi^{2}, Hiromu Uemura^{2}, Ryosuke Noguchi^{2}, Natsuyuki Koda^{2}, Koki Arauchi^{2}, Daichi Omoto^{2}, Hiromi Inaba^{2}, Keiji Kishine^{2}, Shinsuke Nakano^{1}, Masafumi Nogawa^{1}, Hideyuki Nosaka^{1}
^{1}NTT Communications Corporation, Japan; ^{2}University of Shiga Prefecture, Japan

Memory Circuits

Time: Tuesday, May 30 (13:30-15:00)

Room: Laurel CD

Chair(s): Lan-Da Van - National Chiao Tung University; Yuan-Hao Huang - National Tsing Hua University

***Area-Efficient STT/CMOS Non-Volatile Flip-Flop*..... 1700**

Jaeyoung Park
University of Texas at Austin, United States

***TCache: an Energy-Efficient DRAM Cache Design* 1704**

Jiacong He, Joseph Callenes-Sloan
University of Texas at Dallas, United States

***Effective Write-Reduction Method for MLC Non-Volatile Memory*..... 1708**

Masashi Tawada, Shinji Kimura, Masao Yanagisawa, Nozomu Togawa
Waseda University, Japan

***A New Write-Contention Based Dual-Port SRAM PUF with Multiple Response Bits Per Cell*..... 1712**

Chao Qun Liu, Yue Zheng, Chip-Hong Chang
Nanyang Technological University, Singapore

TECHNICAL SESSIONS – TUESDAY, MAY 30TH

Video Coding & Multimedia System Architecture

Time: Tuesday, May 30 (13:30-15:00)

Room: Kent AB

Chair(s): Chris Lee - National Cheng Kung University; Shao-Yi Chien - National Taiwan University

***A Fast Intra Encoding Platform for AVS2*..... 1716**

Kui Fan, Ronggang Wang, Zhenyu Wang, Ge Li, Wen Gao
Peking University, China

***High-Throughput HEVC Intrapicture Prediction Hardware Design Targeting UHD 8K Videos* 1717**

Marcel Corrêa, Bruno Zatt, Marcelo Porto, Luciano Agostini
Universidade Federal de Pelotas, Brazil

***VLSI Architecture Design of Layer-Based Bilateral and Median Filtering for 4k2k Videos at 30fps* 1721**

Ming-Yi Tai, Wei-Chih Tu, Shao-Yi Chien
National Taiwan University, Taiwan

***A Multiplierless Parallel HEVC Quantization Hardware for Real-Time UHD 8K Video Coding* 1725**

Luciano Braatz, Luciano Agostini, Bruno Zatt, Marcelo Porto
Universidade Federal de Pelotas, Brazil

***Corner Proposals from HEVC Bitstreams* 1729**

Hyomin Choi, Ivan Bajić
Simon Fraser University, Canada

Applied Signal Processing & Deep Learning

Time: Tuesday, May 30 (13:30-15:00)

Room: Essex AB

Chair(s): Eduard Alarcon - Universitat Politècnica de Catalunya

***Fully-Parallel Area-Efficient Deep Neural Network Design Using Stochastic Computing* 1733**

Yi Xie{1}, Siyu Liao{1}, Bo Yuan{1}, Yanzhi Wang{3}, Zhongfeng Wang{2}
{1}City University of New York, United States; {2}Nanjing University, United States; {3}Syracuse University, United States

***Bringing Offline Mining to Online Learning System: Low-Cost and Efficient Self-Healing Synaptic Storage for Deep Learning* 1734**

Jonathon Edstrom, Dongliang Chen, Yifu Gong, Jinhui Wang, Na Gong
North Dakota State University, United States

***Deep Texture Features for Robust Face Spoofing Detection* 1735**

Gustavo Souza{2}, Daniel Santos{1}, Rafael Pires{2}, Aparecido Marana{1}, João Papa{1}
{1}São Paulo State University, Brazil; {2}Universidade Federal de São Carlos, Brazil

***Chattering Free Fixed-Time Convergent Sliding Mode Controller* 1736**

Jyoti Prakash Mishra, Xinghuo Yu, Mahdi Jalili
Royal Melbourne Institute of Technology, Australia

***Accurate Spectral Testing with Non-Coherent Sampling for Multi Tone Applications* 1737**

Yuming Zhuang, Degang Chen
Iowa State University, United States

LIVE DEMONSTRATIONS – tuesday, may 30TH

Demonstration Session II

Time: Tuesday, May 30 (13:30-16:30)

Room: Harborside Ballroom

Chair(s): Jennifer Blain Christen - Arizona State University; Shih-Chii Liu - Swiss Federal Institute of Technology in Zurich

O-1 - Live Demonstration: Automated Data Acquisition and Digital Curation Platform for Enhancing Research Precision, Productivity and Reproducibility..... 1738

Yousef Gtat, Sina Parsnejad, Andrew J. Mason
Michigan State University, United States

O-2 - Live Demonstration: Unipolar Symmetrical Variable-Capacitance Generators for Energy Harvesting 1739

Antonio de Queiroz, Luiz de Oliveira Filho
Universidade Federal do Rio de Janeiro, Brazil

O-3 - Live Demonstration: a Wearable EIT System Using Active Electrodes for Monitoring Respiration 1740

Yu Wu{2}, Dai Jiang{2}, Andy Bardill{1}, Serena De Gelidi{1}, Richard Bayford{1}, Andreas Demosthenous{2}
{1}Middlesex University, United Kingdom; {2}University College London, United Kingdom

O-4 - Live Demo of a Vibration-Powered Bluetooth Sensor with Running PFC Power Conditioning..... 1741

Kang Zhao, Yuheng Zhao, Junrui Liang
ShanghaiTech University, China

O-5 - Live Demonstration: Depth from Focus on a Focal Plane Processor Using a Focus Tunable Liquid Lens..... 1742

Julien N.P. Martel{1}, Lorenz K. Müller{1}, Stephen J. Carey{2}, Jonathan Müller{1}, Yulia Sandamirskaya{1}, Piotr Dudek{2}
{1}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland; {2}University of Manchester, United Kingdom

O-6 - Live Demonstration: a Wirelessly Powered Highly Miniaturized Neural Stimulator 1743

Adam Khalifa{1}, Sherry Chiu{1}, Yasha Karimi{2}, Milutin Stanačević{2}, Ralph Etienne-Cummings{1}
{1}Johns Hopkins University, United States; {2}Stony Brook University, United States

O-7 - Live Demonstration: Behaving Cyborg Locusts for Standoff Chemical Sensing 1744

Darshit Mehta, Ege Altan, Rishabh Chandak, Baranidharan Raman, Shantanu Chakrabarty
Washington University in St. Louis, United States

O-8 - Live Demonstration: Prosthesis Grip Force Modulation Using Neuromorphic Tactile Sensing 1745

Luke Osborn{2}, Harrison Nguyen{2}, Rahul Kaliki{1}, Nitish Thakor{3}
{1}Infinite Biomedical Technologies, United States; {2}Johns Hopkins University, United States; {3}Johns Hopkins University / National University of Singapore, United States

O-9 - Live Demonstration - an Adaptable Prosthetic Socket: Regulating Independent Air Bladders Through Closed-Loop Control 1746

Daniel Candrea{1}, Avinash Sharma{3}, Luke Osborn{4}, Yikun Gu{2}, Nitish Thakor{5}
{1}Duke University, United States; {2}Harbin Institute of Technology, China; {3}Indian Institute of Technology Delhi, India; {4}Johns Hopkins University, United States; {5}Johns Hopkins University / National University of Singapore, United States

O-10 - Live Demonstration: Real-Time, Dynamic Visual Saliency Computation in a VR Environment Seeing Through the Eyes of a Mobile Robot 1747

Jamal Molin{1}, Christopher Simmons{1}, Garrett Nixon{2}, Ralph Etienne-Cummings{1}
{1}Johns Hopkins University, United States; {2}Sidwell Friends High School, United States

O-11 - Live Demonstration: a CMOS-Based ISFET Array for Rapid Diagnosis of the Zika Virus..... 1748
Nicolas Moser, Jesus Rodriguez-Manzano, Ling-Shan Yu, Melpomeni Kalofonou, Sara de Mateo, Xiaoxiang Li, Tor Sverre Lande, Christofer Toumazou, Pantelis Georgiou
Imperial College London, United Kingdom

O-12 - Live Demonstration: Real-Time Chemical Imaging of Ionic Solutions Using an ISFET Array 1749
Nicolas Moser, Chi Leng Leong, Yuanqi Hu, Martyn Boutelle, Pantelis Georgiou
Imperial College London, United Kingdom

O-13 - Live Demonstration: a Highly Sensitive and Quantitative Fluorescence Sensing Platform, for Disease Diagnosis..... 1750
Uwadiae Obahiagbon, Joseph Smith, Hany Arafa, Dixie Kullman, Jennifer Blain Christen
Arizona State University, United States

O-14 - Live Demonstration: a Wireless Headstage Enabling Combined Optogenetics and Multichannel Electrophysiological Recording..... 1751
Gabriel Gagnon-Turcotte{2}, Yoan Lechasseur{1}, Cyril Bories{2}, Younès Messaddeq{2}, Yves De Koninck{2}, Benoit Gosselin{2}
{1}Doric Lenses, Canada; {2}Université Laval, Canada

O-15 - Live Demonstration: a Multimodal Adaptive Wireless Control Interface for People with Upper-Body Disabilities 1752
Cheikh Latyr Fall{2}, Francis Quevillon{2}, Alexandre Campeau-Lecours{2}, Simon Latour{1}, Martine Blouin{1}, Clément Gosselin{2}, Benoit Gosselin{2}
{1}Kinova Robotics, Canada; {2}Université Laval, Canada

O-16 - Live Demonstration: a Frequency-Based System for Wireless Electrical Stimulation of iEAPs 1753
Yi Huang, Daniel Browe, Joseph Freeman, Laleh Najafizadeh
Rutgers University, United States

poster session – tuesday, may 30th

Integrated Biomedical Systems & BioMEMS

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Nitish Thakor - Johns Hopkins University; Pantelis Georgiou - Imperial College London

O-17 - An Adaptable Prosthetic Socket: Regulating Independent Air Bladders Through Closed-Loop Control 1754

Daniel Candrea{1}, Avinash Sharma{3}, Luke Osborn{4}, Yikun Gu{2}, Nitish Thakor{5}
{1}Duke University, United States; {2}Harbin Institute of Technology, China; {3}Indian Institute of Technology Delhi, India; {4}Johns Hopkins University, United States; {5}Johns Hopkins University / National University of Singapore, United States

O-18 - A Dual Switched-Capacitor Integrator Architecture for Versatile, Real-Time Amperometric Biosensing..... 1758

Michail Pligouroudis, Konstantinos Papadimitriou, Daniel Evans, Themistoklis Prodromakis
University of Southampton, United Kingdom

O-19 - Iontophoresis Instrumentation for the Enhancement of Gene Therapy in Wound Healing 1762

Martina Leistner{1}, Samantha Wang{1}, Ralph Etienne-Cummings{1}, Frank Lay{2}, Louis Born{2}, Zahra Alikhassy{2}, Ali Karim Ahmed{2}, John W. Harmon{2}
{1}Johns Hopkins University, United States; {2}Johns Hopkins University School of Medicine, United States

O-20 - pH Sensing Threads with CMOS Readout for Smart Bandages..... 1766

Meera Punjija{2}, Hojatollah Rezaei Nejad{2}, Pooria Mostafalu{1}, Sameer Sonkusale{2}
{1}Harvard University, United States; {2}Tufts University, United States

O-21 - A Multimodal Adaptive Wireless Control Interface for People with Upper-Body Disabilities 1770

Cheikh Latyr Fall{2}, Francis Quevillon{2}, Alexandre Campeau-Lecours{2}, Simon Latour{1}, Martine Blouin{1}, Clément Gosselin{2}, Benoit Gosselin{2}
{1}Kinova Robotics, Canada; {2}Université Laval, Canada

O-22 - Dielectric Analysis of Changes in Electric Properties of Leukemic Cells Through Travelling and Negative Dielectrophoresis with 2-D Electrodes..... 1774

Sameh Sherif{1}, Yehya H. Ghallab{2}, Hamdy Abd El Hamid{2}, Yehea Ismail{2}
{1}American University in Cairo, Egypt; {2}American University in Cairo / Zewail City of Science and Technology, Egypt

O-23 - Separation and Electrochemical Detection Platform for Portable Individual PM2.5 Monitoring 1778

Heyu Yin, Hao Wan, Andrew J. Mason
Michigan State University, United States

O-24 - A 32-by-32 CMOS Microelectrode Array for Capacitive Biosensing and Impedance Spectroscopy 1782

Virgilio Valente, Andreas Demosthenous
University College London, United Kingdom

O-25 - Characterization of a High Dynamic Range Lab-on-CMOS Capacitance Sensor Array..... 1786

Bathiya Senevirathna, Sheung Lu, Pamela Abshire
University of Maryland, College Park, United States

Other Areas in Analog & Mixed Signal Circuits & Systems

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Tong Ge - Nanyang Technological University; Igor Filanvosky - University of Alberta

P-26 - A New 1.8V Pierce-Gate Crystal Oscillator Based on the Constant gm Cell in 28nm CMOS Technology for Automotive Radar Applications 1790

Giuseppe Macera, Patrick Crowley
Analog Devices Inc., Ireland

P-27 - A Merged Window Comparator Based Relaxation Oscillator with Low Temperature Coefficient 1794

Lin Ma, Kuan Chuang Koay, Pak Kwong Chan
Nanyang Technological University, Singapore

P-28 - Multi-Band Inductor-Less VCO for IoT Applications..... 1798

Fayrouz Haddad, Imen Ghorbel, Wenceslas Rahajandraibe
Universités de Toulon Laboratoire Matériaux et Microelectronique de Provence, France

P-29 - A 0.13 μm CMOS Fully Integrated 0.1~12 GHz Frequency Synthesizer for Avionic SDR Applications 1802

Zakaria El Alaoui Ismaili{1}, Wessam Ajib{2}, François Gagnon{1}, Frédéric Nabki{1}
{1}École de Technologie Supérieure, Canada; {2}Université du Québec à Montréal, Canada

P-30 - A Charge Limiting and Redistribution Method for Delay Line Locking in Multi-Output Clock Generation 1806

Yury Antonov, Kari Stadius, Jussi Ryyänen
Aalto University, Finland

P-31 - A 7 μA 1.6ppm/ $^{\circ}\text{C}$ Bandgap Design Realizable in CMOS Process..... 1810

Kin Keung Jeff Lau
Silicon Mitus Technology, United States

P-32 - A PVT Resistant Coarse-Fine Time-to-Digital Converter..... 1814

Esrafil Jedari, Rashid Rashidzadeh, Mehrdad Saif
University of Windsor, Canada

P-33 - A 0.6V 50-to-145MHz PVT Tolerant Digital PLL with DCO-Dedicated $\Delta\Sigma$ LDO and Temperature Compensation Circuits in 65nm CMOS 1818

Yudong Zhang{1}, Xiaofeng Liu{2}, Woogeun Rhee{2}, Hanjun Jiang{2}, Zhihua Wang{2}
{1}Columbia University, United States; {2}Tsinghua University, China

P-34 - A Low-Power Temperature-Compensated CMOS Peaking Current Reference in Subthreshold Region 1822

Mohammad Sadegh Eslampanah{1}, Siavash Kananian{4}, Elaheh Zندهrouh{5}, Mohammad Sharifkhani{3}, Amir Masoud Sodagar{2}, Mahdi Shabany{3}
{1}Georgia Institute of Technology, United States; {2}Khajeh Nasir Toosi University of Technology, Iran; {3}Sharif University of Technology, Iran; {4}Stanford University, United States; {5}West Tehran Islamic Azad University, Iran

P-35 - Analog Layout Density Uniformity Improvement Using Interconnect Widening and Dummy Fill Insertion 1826

Gholamreza Shomalnasab{1}, Lihong Zhang{2}
{1}Memorial University, Canada; {2}Memorial University of Newfoundland, Canada

P-36 - A 5mW Batteryless Start-Up Boost Charger for Wireless Power Transfer 1830

Seok-Tae Koh{1}, Se-Un Shin{1}, Yu-Jin Yang{1}, Minseong Choi{1}, Seungchul Jung{2}, Gyu-Hyung Cho{1}
{1}Korea Advanced Institute of Science and Technology, Korea, South; {2}Samsung Electronics, Korea, South

- P-37 - Ultra Miniature Offset Cancelled Bandgap Reference with $\pm 0.534\%$ Inaccuracy from -10°C to 110°C** 1834
Natan Vinshtok-Melnik, Robert Giterman, Joseph Shor
Bar-Ilan University, Israel
- P-38 - Using Dynamic Dependence Analysis to Improve the Quality of High-Level Synthesis Designs** 1838
Rafael Garibotti, Brandon Reagen, Yakun Sophia Shao, Gu-Yeon Wei, David Brooks
Harvard University, United States
- P-39 - DPA-Resistant QDI Dual-Rail AES S-Box Based on Power-Balanced Weak-Conditioned Half-Buffer** 1842
James Lim, Weng-Geng Ho, Kwen-Siong Chong, Bah-Hwee Gwee
Nanyang Technological University, Singapore
- P-40 - A Voltage Reference Generator Targeted at Extracting the Silicon Bandgap VGO from VBE** 1846
Zhiqiang Liu, Degang Chen
Iowa State University, United States
- P-41 - A Calibration-Free Low-Power Supply-Pushing Reduction Circuit (SPRC) for LC VCOs** 1850
Muhammad Ahmed Swilam, Ahmed Naguib, Brian Dupaix, Waleed Khalil, Ayman Fayed
Ohio State University, United States
- P-42 - Deep Modeling: Circuit Characterization Using Theory Based Models in a Data Driven Framework** 1854
David Bolme{1}, Aravind Mikkilineni{1}, Derek Rose{1}, Srikanth Yoginath{1}, Mohsen Judy{2}, Jeremy Holleman{2}
{1}Oak Ridge National Laboratory, United States; {2}University of Tennessee, United States
- P-43 - A Size-Adaptive Time-Step Algorithm for Accurate Simulation of Aging in Analog ICs** 1858
Pablo Martín-Lloret{1}, Antonio Toro-Frías{1}, Javier Martín-Martínez{2}, Rafael Castro-Lopez{1}, Elisenda Roca{1},
Rosana Rodríguez Martínez{2}, Montserrat Nafria{2}, Francisco V. Fernandez{1}
{1}Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain; {2}Universitat Autònoma de
Barcelona, Spain
- P-44 - Timing Speculative SRAM** 1862
Elnaz Ebrahimi, Matthew Guthaus, Jose Renau
University of California, Santa Cruz, United States
- P-45 - Low Power Speech Detector on a FPAA** 1866
Sahil Shah, Jennifer Hasler
Georgia Institute of Technology, United States
- P-46 - Wafer-Level Adaptive Trim Seed Forecasting Based on E-Tests** 1870
Constantinos Xanthopoulos{2}, Ali Ahmadi{2}, Sirish Boddikurapati{1}, Amit Nahar{1}, Bob Orr{1}, Yiorgos
Makris{2}
{1}Texas Instruments Inc., United States; {2}University of Texas at Dallas, United States
- P-47 - CMOS Current-Mode PWL Implementation Using MAX and MIN Operators** 1874
Oscar Jair Cinco-Izquierdo{1}, María Teresa Sanz-Pascual{1}, Luis Hernández{1}, Carlos Arostóteles de la Cruz-
Blas{2}
{1}Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico; {2}Universidad Pública de Navarra, Spain

P-48 - An Efficient and Fair Scheduling Policy for Multiprocessor Platforms 1878
Theodoros Marinakis{2}, Alexandros-Herodotos Haritatos{1}, Konstantinos Nikas{1}, Georgios Goumas{1}, Iraklis Anagnostopoulos{2}
{1}National Technical University Of Athens, Greece; {2}Southern Illinois University Carbondale, United States

P-49 - Design Methodology for Area and Energy Efficient OxRAM-Based Non-Volatile Flip-Flop 1882
Mahesh Nataraj{4}, Alexandre Levisse{2}, Bastien Giraud{2}, Jean-Philippe Noel{2}, Pascal Meinerzhagen{3}, Jean-Michel Portal{1}, Pierre-Emmanuel Gaillardon{4}
{1}Aix-Marseille Universite, France; {2}Commissariat à l'Energie Atomique et aux Energies Alternatives, France; {3}Intel Research Labs, United States; {4}University of Utah, United States

P-50 - An Analog Phase Prediction Based Fractional-N PLL 1866
Aaron Bluestone, Ryan Kaveh, Luke Theogarajan
University of California, Santa Barbara, United States

DSP : Algorithms and Implementations

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Arjuna Madanayake - University of Akron; Mohsin Jamali - University of Toledo

Q-51 - Pipeline Tracking and Event Classification for an Automatic Inspection Vision System 1890
Felipe Petraglia, Roberto Campos, José Gabriel Gomes, Mariane Petraglia
Universidade Federal do Rio de Janeiro, Brazil

Q-52 - Fast Human-Animal Detection from Highly Cluttered Camera-Trap Images Using Joint Background Modeling and Deep Learning Classification 1894
Hayder Yousif{2}, Jianhe Yuan{2}, Roland Kays{1}, Zhihai He{2}
{1}North Carolina State University, United States; {2}University of Missouri, United States

Q-53 - Face Hallucination Using Deep Collaborative Representation for Local and Non-Local Patches 1898
Tao Lu{2}, Lanlan Pan{2}, Hao Wang{2}, Yanduo Zhang{2}, Bo Wang{1}, Zixiang Xiong{1}
{1}Texas A&M University, United States; {2}Wuhan Institute of Technology, China

Q-54 - A 0.53mW Ultra-Low-Power 3D Face Frontalization Processor for Face Recognition with Human-Level Accuracy in Wearable Devices 1902
Sanghoon Kang, Jinmook Lee, Kyeongryeol Bong, Changhyeon Kim, Hoi-Jun Yoo
Korea Advanced Institute of Science and Technology, Korea, South

Q-55 - Single Image Super-Resolution Using Hybrid Patch Search and Local Self-Similarity 1906
Shen-Li Lo, Ching-Te Chiu
National Tsing Hua University, Taiwan

Q-56 - Design of Composite Filters with Equiripple Passbands and Least-Squares Stopbands 1910
Wu-Sheng Lu{2}, Takao Hinamoto{1}
{1}Hiroshima University, Japan; {2}University of Victoria, Canada

Q-57 - An Indirect Approach to Synthesis of Noise Shaping IIR Filters in $\Delta\Sigma$ Modulators 1914
Muhammad Rizwan Tariq, Shuichi Ohno
Hiroshima University, Japan

Q-58 - Speech Recognition Using TVLPC Based MFCC for Similar Pronunciation Phrases 1918
George Mufungulwa{1}, Alia Asheralieva{1}, Hiroshi Tsutsui{1}, Shini-Ichi Abe{2}, Yoshikazu Miyanaga{1}
{1}Hokkaido University, Japan; {2}Vehicle Information and Communication System Center, Japan

Q-59 - sWMF: Separable Weighted Median Filter for Efficient Large-Disparity Stereo Matching 1922
Shiqiang Chen, Xuchong Zhang, Hongbin Sun, Nanning Zheng
Xi'an Jiaotong University, China

- Q-60 - Joint-Domain Unsupervised Stylization for Portraits** 1926
Saboya Yang, Jiaying Liu, Shuai Yang, Wenhan Yang, Zongming Guo
Peking University, China
- Q-61 - Census Transform-Based Static Caption Detection for Frame Rate Up-Conversion** 1930
Gyujin Bae{1}, Young Hwan Kim{1}, Suk-Ju Kang{2}
{1}Pohang University of Science and Technology, Korea, South; {2}Sogang University, Korea, South
- Q-62 - Variable Pixel G-Neighbor Filters**..... 1934
Yerbol Akhmetov{2}, Joshin John Mathew{1}, Alex James{2}
{1}ARS Traffic & Transport Technology, India; {2}Nazarbayev University, Russia
- Q-63 - FPGA Acceleration of Hyperspectral Image Processing for High-Speed Detection Applications**
..... 1938
Simon Vellas, George Lentaris, Konstantinos Maragos, Dimitrios Soudris, Zacharias Kandylakis, Konstantinos Karantzalos
National Technical University of Athens, Greece
- Q-64 - Throughput Evaluation of DSP Applications Based on Hierarchical Dataflow Model** 1942
Hamza Deroui{1}, Karol Desnos{1}, Jean-François Nezan{1}, Alix Munier-Kordon{2}
{1}Institut National des Sciences Appliquées de Rennes, France; {2}Laboratoire d'informatique de Paris 6 /
Université Pierre et Marie Curie / Sorbonne Universités, France
- Q-65 - Robust Speaker Verification with a Two Classifier Format and Feature Enhancement** 1946
Joshua Edwards, Ravi Ramachandran, Umashanger Thayasivam
Rowan University, United States
- Q-66 - Sparse FIR Filter Design via Partial L1 Optimization**..... 1950
Li Zheng{1}, Aimin Jiang{1}, Hon Keung Kwan{2}
{1}Hohai University, China; {2}University of Windsor, Canada
- Q-67 - A QCQP Design Method of the Symmetric Pulse-Shaping Filters Against Receiver Timing Jitter**
..... 1954
Chia-Yu Yao, Shui-Chin Wang
National Taiwan University of Science and Technology, Taiwan
- Q-68 - Least-Squares Estimation of the Common Acoustical Poles in Room Acoustics and Head Related Transfer Functions** 1958
Sahar Hashemgeloogerd, Mark Bocko
University of Rochester, United States
- Q-69 - Efficient Implementation of Modular Multiplication by Constants Applied to RNS Reverse Converters**
..... 1962
Roberto de Matos{1}, Rogerio Paludo{3}, Nikolay Chervyakov{2}, Pavel Lyakhov{2}, Hector Pettenghi{3}
{1}Instituto Federal de Santa Catarina, Brazil; {2}North Caucasus Federal University, Russia; {3}Universidade
Federal de Santa Catarina, Brazil
- Q-70 - A New Electric Encoder Position Estimator Based on the Chinese Remainder Theorem for the CMG Performance Improvements** 1966
Gian Carlo Cardarilli{2}, Luca Di Nunzio{2}, Rocco Fazzolari{2}, Luca Gerardi{2}, Marco Re{2}, Giovanni Campolo{1}, Domenico Cascone{1}
{1}Thales Alenia Space, Italy; {2}Università degli Studi di Roma Tor Vergata, Italy

Nanoelectronics & Memristor Technology

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Danella Zhao - University of Louisiana at Lafayette; Hao Jiang - San Francisco State University

R-71 - Exploring Logic Architectures Suitable for TFETs Devices..... 1970

Juan Núñez, María J. Avedillo

Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain

R-72 - A High Performance Full Adder Based on Ballistic Deflection Transistor Technology..... 1974

Poorna Marthi{2}, Nazir Hossain{2}, Huan Wang{2}, Jean-Francois Millithaler{2}, Martin Margala{2}, Ignacio Iñiguez-de-la-Torre{1}, Javier Mateos{1}, Tomas González{1}

{1}Universidad de Salamanca, Spain; {2}University of Massachusetts Lowell, United States

R-73 - A Compliance Current Circuit with Nanosecond Response Time for ReRAM Characterization.... 1978

Qingjiang Li, Jinling Xing, Zhaolin Sun, Fei Jing, Hui Xu

National University of Defense Technology, China

R-74 - Transient Response Enhancement of RF MEMS Tuners Using Digital Signal Processing 1982

Mohammad Abu Khater, Mahmoud Abdelfattah, Yu-Chiao Wu, Wesley Allen, Dimitrios Peroulis

Purdue University, United States

R-75 - A Unified Analytical Reliability Model of NBTI and HCD for Undoped Double Gate PMOS..... 1986

Omnia Samy{1}, Hamdy Abd El Hamid{2}, Yehea Ismail{2}, Abd El Halim Zekry{3}

{1}Ain Shams University, Egypt; {2}American University in Cairo / Zewail City of Science and Technology, Egypt;

{3}Arizona State University, Egypt

R-76 - Adapting Large-Area Flexible Hybrid TFT/CMOS Electronics and Display Technology to Create an Optical Sensor Array Architecture 1990

Joseph Smith, Edward Bawolek, Jovan Trujillo, Gregory Raupp, David Allee, Jennifer Blain Christen

Arizona State University, United States

R-77 - Size-Dependent Switching Coherence of Elliptical Single-Domain Magnetostrictive Nanomagnets in Straintronic Circuit 1994

Huanqing Cui, Li Cai, Li Xu, Sen Wang, Xiaokuo Yang, Chaowen Feng

Air Force Engineering University, China

R-78 - Process Variation Immune and Energy Aware Sense Amplifiers for Resistive Non-Volatile Memories 1998

Soheil Salehi, Ronald F. DeMara

University of Central Florida, United States

R-79 - A TiO₂ ReRAM Parameter Extraction Method 2002

Ioannis Messaris{1}, Spyridon Nikolaidis{1}, Alexantrou Serb{2}, Spyros Stathopoulos{2}, Isha Gupta{2}, Ali Khat{2}, Themistoklis Prodromakis{2}

{1}Aristotle University of Thessaloniki, Greece; {2}University of Southampton, United Kingdom

R-80 - A Practical Hafnium-Oxide Memristor Model Suitable for Circuit Design and Simulation 2006

Sherif Amer{2}, Sagarvarma Sayyaparaju{2}, Garrett S. Rose{2}, Karsten Beckmann{1}, Nathaniel C. Cady{1}

{1}State University of New York Polytechnic Institute, United States; {2}University of Tennessee, United States

R-81 - Novel Hafnium Oxide Memristor Device: Switching Behaviour and Size Effect..... 2010

Heba Abunahla, Baker Mohammad, Maguy Abi Jaoude, Mahmoud Al-Qutayri

Khalifa University, U.A.E.

R-82 - Design and Optimization of a Strong PUF Exploiting Sneak Paths in Resistive Cross-Point Array 2014

Rui Liu, Pai-Yu Chen, Shimeng Yu

Arizona State University, United States

- R-83 - A Pulse-Based Memristor Programming Circuit** 2018
Olufemi Akindele Olumodeji, Massimo Gottardi
Fondazione Bruno Kessler, Italy
- R-84 - Test Point Insertion for RSFQ Circuits** 2022
Gleb Krylov, Eby G. Friedman
University of Rochester, United States
- R-85 - A Memristor Based Image Sensor Exploiting Compressive Measurement for Low-Power Video Streaming**..... 2026
Fengyu Qian, Yanping Gong, Lei Wang
University of Connecticut, United States
- R-86 - A Placement Management Circuit for Efficient Realtime Hardware Reuse on FPGAs Targeting Reliable Autonomous Systems** 2030
Godwin Enemali, Adewale Adetomi, Tughrul Arslan
University of Edinburgh, United Kingdom

Spiking and Learning Systems

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Ricardo Carmona Galán - Instituto of Microelectrónica of Sevilla; Shoushun Chen - Nanyang Technological University

- S-87 - PredictiveNet: an Energy-Efficient Convolutional Neural Network via Zero Prediction**..... 2034
Yingyan Lin, Charbel Sakr, Yongjune Kim, Naresh Shanbhag
University of Illinois at Urbana-Champaign, United States
- S-88 - A Real-Time 17-Scale Object Detection Accelerator with Adaptive 2000-Stage Classification in 65nm CMOS** 2038
Minkyu Kim^{1}, Abinash Mohanty^{1}, Deepak Kadetotad^{1}, Naveen Suda^{2}, Luning Wei^{3}, Pooja Saseendran^{1}, Xiaofei He^{3}, Yu Cao^{1}, Jae-Sun Seo^{1}
^{1}Arizona State University, United States; ^{2}ARM, Inc., United States; ^{3}Zhejiang University, China
- S-89 - Comparison of Three FPGA Architectures for Embedded Multidimensional Categorization Through Kohonen's Self-Organizing Maps**..... 2042
Miguel Sousa, Emilio Del-Moral-Hernandez
Universidade de São Paulo, Brazil
- S-90 - Energy-Efficient Scheduling Method with Cross-Loop Model for Resource-Limited CNN Accelerator Designs** 2046
Kaiyi Yang, Shihao Wang, Jianbin Zhou, Takeshi Yoshimura
Waseda University , Japan; Waseda University, Japan
- S-91 - Robust Reconstruction of Network Topology via Huber Algorithm**..... 2050
Juan Liu^{1}, Jinhu Lü^{1}, Maciej J. Ogorzalek^{2}, Kexin Liu^{3}
^{1}Academy of Mathematics and Systems Science, Chinese Academy of Sciences, China; ^{2}Jagiellonian University, Poland; ^{3}Peking University, China
- S-92 - Multiplexing AER Asynchronous Channels Over LVDS Links with Flow-Control and Clock-Correction for Scalable Neuromorphic Systems** 2054
Amirreza Yousefzadeh^{2}, Miroslav Jabłoński^{1}, Taras Iakymchuk^{4}, Alejandro Linares-Barranco^{3}, Alfredo Rosado^{4}, Luis Plana^{5}, Teresa Serrano-Gotarredona^{2}, Steve Furber^{5}, Bernabe Linares-Barranco^{2}
^{1}AGH University of Science and Technology, Poland; ^{2}Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain; ^{3}Universidad de Sevilla, Spain; ^{4}Universitat de València, Spain; ^{5}University of Manchester, United Kingdom

- S-93 - Online Multiclass Passive-Aggressive Learning on a Fixed Budget..... 2058**
Chung-Hao Wu, Wei-Chen Hsi, Henry Horng-Shing Lu, Hsueh-Ming Hang
National Chiao Tung University, Taiwan
- S-94 - Compact Digital-Controlled Neuromorphic Circuit with Low Power Consumption..... 2062**
Jin Zhang, Yuan Wang, Xing Zhang, Ru Huang
Peking University, China
- S-95 - Neural Network Based ECG Anomaly Detection on FPGA and Trade-Off Analysis 2066**
Matthias Wess, Sai Dinakarrao, Axel Jantsch
Technische Universität Wien, Austria
- S-96 - A Switched-Capacitor Dendritic Arbor for Low-Power Neuromorphic Applications..... 2070**
Pezhman Mamdouh, Alice Parker
University of Southern California, United States
- S-97 - Taking Advantage of Correlation in Stochastic Computing..... 2074**
Rahul Kumar Budhwani{1}, Rengarajan Ragavan{2}, Olivier Sentieys{1}
{1}IRISA/ INRIA, University of Rennes, France; {2}University of Rennes, France
- S-98 - Towards Bioinspired Close-Loop Local Motor Control: a Simulated Approach Supporting Neuromorphic Implementations..... 2078**
Fernando Pérez-Peña{1}, Juan Antonio Leñero-Bardallo{1}, Alejandro Linares-Barranco{2}, Elisabetta Chicca{3}
{1}Universidad de Cádiz, Spain; {2}Universidad de Sevilla, Spain; {3}Universität Bielefeld, Germany
- S-99 - Snowflake: an Efficient Hardware Accelerator for Convolutional Neural Networks..... 2082**
Vinayak Gokhale, Aliasger Zaidy, Andre Chang, Eugenio Culurciello
Purdue University, United States
- S-100 - Extending the Neural Engineering Framework for Nonideal Silicon Synapses..... 2086**
Aaron Voelker{2}, Ben Benjamin{1}, Terrence Stewart{2}, Kwabena Boahen{1}, Chris Eliasmith{2}
{1}Stanford University, United States; {2}University of Waterloo, Canada

Signal Processing for Interaction & Augmented Reality

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Susanto Rahardja - Northwestern Polytechnical University; Zicheng Liu - Microsoft Research

- T-101 - D-PET: A Direct 6 DoF Pose Estimation and Tracking System on Graphics Processing Units 2090**
Hung-Yu Tseng, Po-Chen Wu, Yu-Sheng Lin, Shao-Yi Chien
National Taiwan University, Taiwan
- T-102 - An Efficient DFT-Based Algorithm for the Charger Noise Problem in Capacitive Touch Applications 2094**
Shih-Lun Huang, Sheng-Yi Hung, Chung-Ping Chen
National Taiwan University, Taiwan
- T-103 - Reflection Removal Based on Single Light Field Capture..... 2098**
Yun Ni, Jie Chen, Lap-Pui Chau
Nanyang Technological University, Singapore
- T-104 - Bare-Finger Projector-Camera-Touchpad (PCT) HCI System Using Color Structured Light..... 2102**
Sen Li, Xiang Xie, Guolin Li, Zhihua Wang
Tsinghua University, China

T-105 - Real-Time Streaming Challenges in Internet of Video Things (IoVT) 2106
Ahmed Sammoud{2}, Ashok Kumar{2}, Magdy Bayoumi{2}, Tarek Elarabi{1}
{1}Penn State Behrend, United States; {2}University of Louisiana at Lafayette, United States

Digital Integrated Circuits and Systems

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Saeid Nooshabadi - Michigan Technological University

U-106 - Hardware Accelerators for Recurrent Neural Networks on FPGA..... 2110
Andre Xian Ming Chang, Eugenio Culurciello
Purdue University, United States

U-107 - Residual Sampling Clocking Offset Estimation and Compensation for FBMC-OQAM Baseband Receiver in the 60 GHz Band 2114
Chun-Yi Liu{2}, Yu-Cheng Yao{3}, Meng-Siou Sie{1}, Edmund Wen Jen Leong{1}, Henry Lopez{2}, Chih-Wei Jen{2}, Shyh-Jye Jou{2}
{1}MediaTek, Taiwan; {2}National Chiao Tung University, Taiwan; {3}Realtek Semiconductor Corp., Taiwan

U-108 - Scalable Memory-Less Architecture for String Matching with FPGAs 2118
Ideh Sarbishei{1}, Shervin Vakili{2}, J.M. Pierre Langlois{2}, Yvon Savaria{2}
{1}École Polytechnique de Montréal, Canada; {2}Polytechnique Montréal, Canada

U-109 - Design of Majority Logic Based Approximate Arithmetic Circuits..... 2122
Carson Labrado{2}, Himanshu Thapliyal{2}, Fabrizio Lombardi{1}
{1}Northeastern University, United States; {2}University of Kentucky, United States

U-110 - Noise Voltage Analysis of Spiral Inductor for on-Chip Buck Converter Design..... 2126
Emeshaw Ashenafi, Masud Chowdhury
University of Missouri–Kansas City, United States

U-111 - A New Digital True Random Number Generator Based on Delay Chain Feedback Loop 2130
Xufan Wu, Shuguo Li
Tsinghua University, China

U-112 - A Digital Clock-Less Pulse Stretcher with Application in Deep Sub-Nanosecond Pulse Detection 2134
Zhiqiang Liu{1}, Nanqi Liu{1}, Shravan Chaganti{1}, Degang Chen{1}, Amitava Majumdar{2}
{1}Iowa State University, United States; {2}Xilinx Inc., United States

U-113 - A New Watermarking Scheme on Scan Chain Ordering for Hard IP Protection 2138
Xiaonan Huang{1}, Aijiao Cui{1}, Chip-Hong Chang{2}
{1}Harbin Institute of Technology, China; {2}Nanyang Technological University, Singapore

U-114 - A 450kHz PVT-Resilient All-Digital BPSK Demodulator for Energy Harvesting Sensor Nodes 2142
Adelson Chua, Louis Alarcon
University of the Philippines - Diliman, Philippines

U-115 - Single Supply CMOS Up Level Shifter for Dual Voltage System 2146
Jose Carlos García{2}, Juan Montiel-Nelson{2}, Saeid Nooshabadi{1}
{1}Michigan Technological University, United States; {2}Universidad de Las Palmas de Gran Canaria, Spain

U-116 - Nodal Thermal Analysis for Multi-VT SOFET Based Subthreshold Circuits 2150
Emeshaw Ashenafi, Azzedin Es-Sakhi, Masud Chowdhury
University of Missouri–Kansas City, United States

- U-117 - Trojan-Feature Extraction at Gate-Level Netlists and its Application to Hardware-Trojan Detection Using Random Forest Classifier** 2154
Kento Hasegawa, Masao Yanagisawa, Nozomu Togawa
Waseda University, Japan
- U-118 - Non-Blocking BIST for Continuous Reliability Monitoring of Networks-on-Chip** 2158
Junshi Wang{3}, Letian Huang{3}, Masoumeh Ebrahimi{1}, Qiang Li{3}, Guangjun Li{3}, Axel Jantsch{2}
{1}KTH Royal Institute of Technology / University of Turku, Finland; {2}Technische Universität Wien, Austria;
{3}University of Electronic Science and Technology of China, China
- U-119 - Combined Packet and TDM Circuit Switching NoCs with Novel Connection Configuration Mechanism**..... 2162
Yong Chen, Emil Matus, Gerhard Fettweis
Technische Universität Dresden, Germany
- U-120 - A Cost-Efficient Delay-Fault Monitor** 2166
Gaole Sai, Basel Halak, Mark Zwolinski
University of Southampton, United Kingdom
- U-121 - Level Shifter Design for Voltage Stacking** 2170
Elnaz Ebrahimi, Rafael Possignolo, Jose Renau
University of California, Santa Cruz, United States
- U-122 - 130nm Low Power Asynchronous AES Core** 2174
Nada El-Meligy{3}, Moustafa Amin{3}, Eslam Yahya{2}, Yehea Ismail{1}
{1}American University in Cairo / Zewail City of Science and Technology, Egypt; {2}American University in Cairo / Zewail City of Science and Technology / Banha University, Egypt; {3}Banha University, Egypt
- U-123 - A Low-Cost Masquerade and Replay Attack Detection Method for CAN in Automobiles** 2178
Mohammad Raashid Ansari, Tom Miller, Chenghua She, Qiaoyan Yu
University of New Hampshire, United States

Communications Security

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Weiqiang Liu - Nanjing University of Aeronautics and Astronautics; Maire O'Neill - Queens University

- V-124 - Interpolation Based Wideband Beamforming Architecture**..... 2182
Bindi Wang, Hao Gao, Marion Matters-Kammerer, Peter Baltus
Eindhoven University of Technology, Netherlands
- V-125 - Concatenated LDPC-Polar Codes Decoding Through Belief Propagation** 2186
Syed Mohsin Abbas, Youzhe Fan, Ji Chen, Chi-Ying Tsui
Hong Kong University of Science and Technology, Hong Kong
- V-126 - Rate-Compatible and High-Throughput Architecture Designs for Encoding LDPC Codes**..... 2190
Nishil Talati{1}, Zhiying Wang{2}, Shahar Kvatinsky{1}
{1}Technion – Israel Institute of Technology, Israel; {2}University of California, Irvine, United States
- V-127 - A Low-Complexity Fully Scalable Interleaver/Address Generator Based on a Novel Property of QPP Interleavers** 2194
Arash Ardakani, Mahdi Shabany
Sharif University of Technology, Iran
- V-128 - FPGA-Based Strong PUF with Increased Uniqueness and Entropy Properties** 2198
Chongyan Gu, Neil Hanley, Maire O'Neill
Queen's University Belfast, United Kingdom

V-129 - Optimization of the PLL Based TRNG Design Using the Genetic Algorithm..... 2202
Oto Petura, Ugo Mureddu, Nathalie Bochar, Viktor Fischer
University of Lyon, Jean Monnet University Saint-Etienne, France

V-130 - Low-Latency Hardware Architecture for Cipher-Based Message Authentication Code 2206
Imed Ben Dhaou{2}, Tuan Nguyen Gia{3}, Pasi Liljeberg{3}, Hannu Tenhunen{1}
{1}KTH Royal Institute of Technology, Sweden; {2}Qassim University, Saudi Arabia; {3}University of Turku, Finland

V-131 - A Delay-Efficient Ring-LWE Cryptography Architecture for Biometric Security 2210
Tuy Nguyen Tan, Hanho Lee
Inha University, Korea, South

V-132 - Secure Dynamic Authentication of Passive Assets and Passive IoTs Using Self-Powered Timers 2214
Liang Zhou, Shantanu Chakrabarty
Washington University in St. Louis, United States

V-133 - A Reliable True Random Number Generator Based on Novel Chaotic Ring Oscillator 2218
Yunfan Yang, Song Jia, Yuan Wang, Shaonan Zhang, Chao Liu
Peking University, China

V-134 - An Energy-Based Attack Flow for Temporal Misalignment Countermeasures on Cryptosystems 2222
Rodrigo Lellis{2}, Rafael Soares{2}, Adão Souza Jr.{1}
{1}Instituto Federal Sul-Rio-Grandense, Brazil; {2}Universidade Federal de Pelotas, Brazil

V-135 - Highly Secured State-Shift Local Clock Circuit to Countermeasure Against Side Channel Attack 2226
Ali Akbar Pammu, Kwen-Siong Chong, Bah-Hwee Gwee
Nanyang Technological University, Singapore

Power Transfer & Charging Circuits

Time: Tuesday, May 30 (15:00-16:30)

Room: Harborside Ballroom

Chair(s): Hiroo Sekiya - Chiba University; Junrui Liang – Shanghai Tech University

W-136 - A Delay Time Controlled Active Rectifier with 95.3% Peak Efficiency for Wireless Power Transmission Systems..... 2230
Zhongming Xue, Dan Li, Wei Gou, Lina Zhang, Shiquan Fan, Li Geng
Xi'an Jiaotong University, China

W-137 - Analysis and Implementation of Wireless Power Transfer System with Phase and Supply Modulation Control 2234
Chao-Yen Huang, Chern-Lin Chen
National Taiwan University, Taiwan

W-138 - A 13.56 MHz One-Stage High-Efficiency 0X/1X R³ Rectifier for Implantable Medical Devices..... 2238
Xinyuan Ge, Lin Cheng, Wing-Hung Ki
Hong Kong University of Science and Technology, Hong Kong

W-139 - Adaptive 6.78-MHz ISM Band Wireless Charging for Small Form Factor Receivers 2242
Mohamed Abouzeid, Ahmet Tekin
Özyeğin University, Turkey

W-140 - A Primary-Side Output Current Estimator with Process Compensator for Flyback LED Drivers 2246
Zong-You Hou, Zong-Ying Ho, Jhieh-Cheng You, Chua-Chin Wang
National Sun Yat-Sen University, Taiwan

W-141 - High-Speed Driver for SiC MOSFET Based on Class-E Inverter..... 2250
Yuchong Sun^{2}, Ryoko Sugano^{2}, Xiuqin Wei^{1}, Takashi Hikiyama^{3}, Hiroo Sekiya^{2}
{1}Chiba Institute of Technology, Japan; {2}Chiba University, Japan; {3}Kyoto University, Japan

**W-142 - An Auxiliary Switched-Capacitor Power Converter (SCPC) Applied in Stacked Digital Architecture
for Energy Utilization Enhancement..... 2254**
Shiquan Fan, Zhuoqi Guo, Jie Zhang, Xu Yang, Li Geng
Xi'an Jiaotong University, China

**W-143 - Switch-Mode Gyrator-Based Emulated Inductor Enabling Self-Tunability in WPT Receivers
..... 2258**
Mohamed Saad, Elisenda Bou-Balust, Eduard Alarcón-Cot
Universitat Politècnica de Catalunya, Spain

**W-144 - A Vibration-Powered Bluetooth Wireless Sensor Node with Running PFC Power Conditioning
..... 2262**
Kang Zhao, Yuheng Zhao, Junrui Liang
ShanghaiTech University, China

**W-145 - On-Chip High-Voltage SPAD Bias Generation Using a Dual-Mode, Closed-Loop Charge Pump
..... 2266**
Boyu Shen, Soumya Bose, Matthew Johnston
Oregon State University, United States

W-146 - A Regulated Charge Pump for Injecting Floating-Gate Transistors..... 2270
Mir Mohammad Navidi, David Graham
West Virginia University, United States

PIONEERS OF CAS – tuesday, may 30th

Pioneers of Circuits and Systems II

Time: Tuesday, May 30 (16:30-17:30)

Room: Grand Ballroom V-VI

Chair(s): Pamela Abshire - University of Maryland

***A Random Walk Through Five Decades of Research in Filters and Signal Processing* NA**

Sanjit K. Mitra

University of California, Santa Barbara, United States

***Beyond SPICE* 2274**

Ibrahim Hajj

University of Illinois at Urbana-Champaign, United States

technical sessions – wednesday, may 31st

Complex Networks & Chaos

Time: Wednesday, May 31 (8:00-9:30)

Room: Dover A

Chair(s): Michael Tse - Hong Kong Polytechnic University; Zbigniew Galias - AGH University of Science and Technology

***Vaccinating Sis Epidemics in Networks with Zero-Determinant Strategy*..... 2275**

Xiaojie Li, Cong Li, Xiang Li
Fudan University, China

***Modeling Cascading Failure Propagation in Power Systems*..... 2279**

Xi Zhang, Choujun Zhan, and Chi K. Tse
Hong Kong Polytechnic University, Hong Kong

***Modeling of Cascading Failures in Cyber-Coupled Power Systems*..... 2283**

Dong Liu, Xi Zhang, Choujun Zhan, Chi Kong Tse
Hong Kong Polytechnic University, Hong Kong

***Optimal Resource Allocation with Node and Link Capacity Constraints in Complex Networks* 2287**

Rui Li^{2}, Yongxiang Xia^{2}, Chi Kong Tse^{1}
{1}Hong Kong Polytechnic University, Hong Kong; {2}Zhejiang University, China

***Full Digital Implementation of a Chaotic Time-Delay Sampled-Data System*..... 2291**

Ramazan Yeniçeri, Alptekin Vardar, Mustak Erhan Yalçın
Istanbul Technical University, Turkey

Circuits & Systems for Energy Harvesting

Time: Wednesday, May 31 (8:00-9:30)

Room: Dover BC

Chair(s): Dong He - Virginia Polytechnic Institute and State University; Philip X.-L. Feng - Case Western Reserve University

***INVITED: Leveraging the Internet of Things in the Commercial Space* NA**

Julien Stamatakis
Senseware, United States

***How to Design Battery-Assisted Photovoltaic Switched-Inductor CMOS Charger-Supplies*..... 2295**

Rajiv Damodaran Prabha, Gabriel Rincón-Mora
Georgia Institute of Technology, United States

***Energy Harvesting Circuit with Input Matching in Boundary Conduction Mode for Electromagnetic Generators*..... 2299**

Yudong Xu^{2}, Dong Ha^{2}, Ming Xu^{1}
{1}FSP-Powerland Technology Inc., China; {2}Virginia Polytechnic Institute and State University, United States

***An Ultra-Low Quiescent Current Power Management ASIC with MPPT for Vibrational Energy Harvesting* 2203**

Shiquan Fan^{1}, Liuming Zhao^{1}, Ran Wei^{1}, Li Geng^{2}, Philip X.-L. Feng^{1}
{1}Case Western Reserve University, United States; {2}Xi'an Jiaotong University, China

***A Digital Reverse Current Self-Calibration Technique in 90% High Efficiency Rectified Power Supply for Near Field Communication Through Magnetic Field Induction* 2307**
Li-Chi Lin^{1}, Kuan-Yu Chen^{1}, Wen-Hau Yang^{1}, Ru-Yu Huang^{1}, Ke-Horng Chen^{1}, Ying-Hsi Lin^{2}, Shian-Ru Lin^{2}, Tsung-Yen Tsai^{2}
{1}National Chiao Tung University, Taiwan; {2}Realtek Semiconductor Corp., Taiwan

Neuromorphic Vision

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom I

Chair(s): Fathi Salem - Michigan Statue University; Alejandro Linares-Barranco - Universidad de Sevilla

***INVITED: Why Ai Needs Video*..... NA**

Roland Memisevic

Twenty Billion Neurons GmbH, Germany

***Spatially Supervised Recurrent Convolutional Neural Networks for Visual Object Tracking* 2311**

Guanghan Ning^{3}, Zhi Zhang^{3}, Chen Huang^{3}, Xiaobo Ren^{2}, Haohong Wang^{2}, Canhui Cai^{1}, Zhihai He^{3}
{1}Huaqiao University, China; {2}TCL Research America, United States; {3}University of Missouri, United States

***Neuromorphic Visual Saliency Implementation Using Stochastic Computation*..... 2315**

Chetan Singh Thakur^{1}, Jamal Molin^{1}, Tao Xiong^{1}, Jie Zhang^{2}, Ernst Niebur^{1}, Ralph Etienne-Cummings^{1}
{1}Johns Hopkins University, United States; {2}Massachusetts Institute of Technology, United States

***Image Classification by Cellular Nonlinear Networks*..... 2319**

Simon Walz, Jens Müller, Ronald Tetzlaff

Technische Universität Dresden, Germany

***Hardware Implementation of Convolutional STDP for on-Line Visual Feature Learning*..... 2323**

Amirreza Yousefzadeh^{1}, Timothee Masquelier^{2}, Teresa Serrano-Gotarredona^{1}, Bernabe Linares-Barranco^{1}
{1}Consejo Superior de Investigaciones Cientificas / Universidad de Sevilla, Spain; {2}Massachusetts Institute of Technology, France

Adaptive Filters

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom II

Chair(s): Mrityunjoy Chakraborty - Indian Institute of Technology Kharagpur; Wei Xing Zheng - Western Sydney University

***Modified Subband Adaptive Notch Filters for Eliminating Multiple Sinusoids with Reduced Bias and Faster Convergence* 2327**

Yasutomo Kinugasa^{2}, Tapio Saramäki^{4}, Yoshio Itoh^{5}, Naoto Sasaoka^{5}, Kazuki Shiogai^{3}, Masaki Kobayashi^{1}

{1}Chubu University, Japan; {2}National Institute of Technology, Mastue College, Japan; {3}National Institute of Technology, Niihama College, Japan; {4}Tampere University of Technology, Finland; {5}Tottori University, Japan

***A Mixed-Signal Adaptive Filter for Level-Crossing Analog-to-Digital Converter*..... 2331**

Yuxuan Luo, Chun-Huat Heng

National University of Singapore, Singapore

***A Block-Based Convex Combination of NLMS and ZA-NLMS for Identifying Sparse Systems with Variable Sparsity*..... 2335**

Bijit K. Das, Mrityunjoy Chakraborty

Indian Institute of Technology Kharagpur, India

***A Comparison of NLMS and LMS Algorithms for Cyclostationary Input Signals*..... 2339**
Sheng Zhang, Wei Xing Zheng
Western Sydney University, Australia

***A New Kernel Kalman Filter Algorithm for Estimating Time-Varying Nonlinear Systems* 2343**
Juliano Rosinha{1}, Sérgio de Almeida{1}, José Bermudez{2}
{1}Universidade Católica de Pelotas, Brazil; {2}Universidade Federal de Santa Catarina, Brazil

RF Circuits III

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom III

Chair(s): Nathan Neihart - Iowa State University; Ayman Fayed - Ohio State University

***A 180-nW Static Power UWB IR Transmitter Front-End for Energy Harvesting Applications*..... 2347**
Tuomas Haapala, Mika Pulkkinen, Jarno Salomaa, Kari Halonen
Aalto University, Finland

***Low-Power Low-Noise Amplifier IIP3 Improvement Under Consideration of the Cascode Stage* 2351**
Chun-Hsiang Chang{2}, Marvin Onabajo{1}
{1}Northeastern University, United States; {2}OmniVision Technologies Inc., United States

***Realization of a 10 GHz PLL in IBM 130 nm SiGe BiCMOS Process for Optical Transmitter* 2335**
Kehan Zhu{2}, Sakkarapani Balagopal{1}, Xinyu Wu{3}, Vishal Saxena{3}
{1}Broadcom Ltd., United States; {2}MultiPhy, Ltd., United States; {3}University of Idaho, United States

***EMI Common-Mode (CM) Noise Suppression from Self-Calibration of High-Speed SST Driver Using on-Chip Process Monitoring Circuit*..... 2359**
Khawaja Qasim Maqbool{1}, Duona Luo{1}, Guang Zhu{1}, Xingyun Luo{2}, Huichun Yu{2}, Chik Patrick Yue{1}
{1}Hong Kong University of Science and Technology, Hong Kong; {2}Huawei Technologies Co., Ltd., China

***Highly Linear Reconfigurable Mixer Designed for Environment-Aware Receiver* 2363**
Mohammadmahdi Mohsenpour, Carlos Saavedra
Queen's University, Canada

Trust in Fabrication & Post-Silicon Adaptation for Hardware Security

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom IV

Chair(s): Aijiao Cui - Harbin Institute of Technology Shenzhen, China

***A Guide to Graceful Aging: How Not to Overindulge in Post-Silicon Burn-in for Enhancing Reliability of Weak PUF*..... 2367**
Md Nazmul Islam, Vinay C Patil, Sandip Kundu
University of Massachusetts Amherst, United States

***Privacy Leakages in Approximate Adders* 2371**
Shahrazad Keshavarz, Daniel Holcomb
University of Massachusetts Amherst, United States

***An Overview of Hardware Intellectual Property Protection*..... 2375**
Jeyavijayan Rajendran
University of Texas at Dallas, United States

***Introducing TFUE: the Trusted Foundry and Untrusted Employee Model in IC Supply Chain Security* 2379**
Yuntao Liu, Chongxi Bao, Yang Xie, Ankur Srivastava
University of Maryland, College Park, United States

A Secure Test Solution for Sensor Nodes Containing Crypto-Cores 2383
Shoaleh Hashemi Namin, Ankit Mehta, Parham Hosseinzadeh Namin, Rashid Rashidzadeh, Majid Ahmadi
University of Windsor, Canada

Analog & Digital Senses

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom VII

Chair(s): Andreas Andreou - Johns Hopkins University; Amine Bermak - Hamad Bin Khalifa University

In-Vivo Validation of Fully Implantable Multi-Panel Devices for Remote Monitoring of Metabolism 2387

Camilla Baj-Rossi{1}, Andrea Cavallini{1}, Enver G. Kilinc{1}, Francesca Stradolini{1}, Tanja Rezzonico Jost{2}, Michele Proietti{2}, Giovanni De Micheli{1}, Fabio Grassi{2}, Catherine Dehollain{1}, Sandro Carrara{1}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Università della Svizzera italiana / Institute for Research in Biomedicine, Switzerland

High-Precision, Mixed-Signal Mismatch Measurement of Metal-Oxide-Metal Capacitors 2388

Danilo Bustamante{1}, Eric Swindlehurst{2}, Shiu-Hua Wood Chiang{1}, Devon Janke{1}
{1}Brigham Young University, United States; {2}Georgia Institute of Technology, United States

CMOS Amperometric ADC with High Sensitivity, Dynamic Range and Power Efficiency for Air Quality Monitoring 2389

Haitao Li{1}, Sam Boiling{2}, Andrew J. Mason{2}
{1}Maxim Integrated Products Inc., United States; {2}Michigan State University, United States

A Two-Step Prediction ADC Architecture for Integrated Low Power Image Sensors 2390

Hang Yu{1}, Menghan Guo{1}, Shoushun Chen{1}, Wei Tang{2}
{1}Nanyang Technological University, Singapore; {2}New Mexico State University, United States

A PFM Based Digital Pixel with Off-Pixel Residue Measurement for Small Pitch FPAs 2391

Shahbaz Abbasi, Arman Galioglu, Atia Shafique, Omer Ceylan, Melik Yazici, Yasar Gurbuz
Sabanci University, Turkey

Signal Integrity & Energy Efficiency

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom VIII

Chair(s): Duncan Elliott - University of Alberta; Antonio Strollo - Università degli Studi di Napoli Federico II

A 4Gb/s Half-Rate DFE with Switched-Cap and IIR Summation for Data Correction 2392

Gyunam Jeon, Yong-Bin Kim
Northeastern University, United States

In-Package Spiral Inductor Characterization for High Efficiency Buck Converters 2396

Chen Yan, Zhihua Gan, Emre Salman
Stony Brook University, United States

KKT-Condition Inspired Solution of DVFS with Limited Number of Voltage Levels 2400

Mineo Kaneko
Japan Advanced Institute of Science and Technology, Japan

A 0.2V 2.3pJ/Cycle 28dB Output SNR Hybrid Markov Random Field Probabilistic-Based Circuit for Noise Immunity and Energy Efficiency 2404

Xuwei Jin, Wei Jin, Hao Zhang, Jianfei Jiang, Weifeng He
Shanghai Jiao Tong University, China

Design of Clock Generation Circuitry for High-Speed Subranging Time-Interleaved ADCs 2408
Seyed Alireza Zahrai^{2}, Nicolas Le Dortz^{1}, Marvin Onabajo^{2}
^{1}Analog Devices Inc., United States; ^{2}Northeastern University, United States

Wearable Sensors, Circuits & Systems

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom IX

Chair(s): Wouter Serdijn - Delft University of Technology; Zhihua Wang - Tsinghua University

Electromechanical Cardiac Monitoring SoC for Atrial Fibrillation Detection 2412
Jonas Eriksson, Mika Kutila, Tapani Nevalainen, Phong Nguyen, Kati Sairanen, Marko Ylitolva, Tero Koivisto,
Mikko Pänkäälä
University of Turku, Finland

Structured Electronic Design of High-Pass $\Sigma\Delta$ Converters and Their Application to Cardiac Signal Acquisition 2416
Samprajani Rout, Wouter Serdijn
Technische Universiteit Delft, Netherlands

Wearable Wireless Sensor Patch for Continuous Monitoring of Skin Temperature, Pressure, and Relative Humidity 2420
John McNeill^{3}, Devdip Sen^{3}, Yitzhak Mendelson^{3}, Matthew Crivello^{1}, Shamsur Mazumder^{3}, Amanda Agdeppa^{3}, Syed Ali Hussain^{3}, Hyunsoo Kim^{3}, Victoria Loehle^{3}, Raymond Dunn^{2}, Kelli Hickle^{2}
^{1}Analog Devices Inc., United States; ^{2}University of Massachusetts Medical School, United States; ^{3}Worcester Polytechnic Institute, United States

Ultrasound Sensors and its Application in Human Heart Rate Monitoring 2424
Amirhossein Shahshahani^{1}, Davood Raeisi Nafchi^{2}, Zeljko Zilic^{1}
^{1}McGill University, Canada; ^{2}Tehran University, Iran

Design and Parametric Analysis of a Wearable Dual-Photoplethysmograph Based System for Pulse Wave Velocity Detection 2428
Zachary Trujillo, Viswam Nathan, Gerard Coté, Roozbeh Jafari
Texas A&M University, United States

Filter Design

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom X

Chair(s): Igor Filanovsky - University of Alberta; Nuno Paulino - UNINOVA

Property of Rational Functions Related to Band-Pass Transformation with Application to Symmetric Filters Design 2432
Igor Filanovsky
University of Alberta, Canada

Analysis of Second-Order Intermodulation in Miller Bandpass Filters 2433
Joung Won Park^{1}, Behzad Razavi^{2}
^{1}Qualcomm Technologies, Inc., United States; ^{2}University of California, Los Angeles, United States

A New 2nd-Order Allpass Filter in 130nm CMOS 2434
Brent Maundy^{2}, Peyman Ahmadi^{2}, Ahmed Elwakil^{3}, Leonid Belostotski^{2}, Arjuna Madanayake^{1}
^{1}University of Akron, United States; ^{2}University of Calgary, Canada; ^{3}University of Sharjah, U.A.E.

A 50 Hz SC Notch Filter for IoT Applications 2435
Hugo Serra, João Pedro Oliveira, Nuno Paulino
Universidade Nova de Lisboa / CTS-UNINOVA, Portugal

Error Correcting Codes**Time:** Wednesday, May 31 (8:00-9:30)**Room:** Laurel AB**Chair(s):** Zhiyuan Yan - Lehigh University; Xinmiao Zhang - Case Western University

***A Fast Polar Code List Decoder Architecture Based on Sphere Decoding*..... 2439**

Seyyed Ali Hashemi, Carlo Condo, Warren Gross

McGill University, Canada

Efficient Metric Sorting Schemes for Successive Cancellation List Decoding of Polar Codes* 2440**Haochuan Song^{2}, Shunqing Zhang^{1}, Xiaohu You^{2}, Chuan Zhang^{2}^{1}Intel Corporation, China; ^{2}Southeast University, ChinaLow-Complexity Transformed Encoder Architectures for Quasi-Cyclic Nonbinary LDPC Codes Over Subfields*..... 2444**

Xinmiao Zhang, Ying Tai

Western Digital, United States

***Efficient Approximate Layered LDPC Decoder*..... 2445**

Yangcan Zhou, Jun Lin, Zhongfeng Wang

Nanjing University, China

***Symmetric Split-Row LDPC Decoders*..... 2449**Mohammad Shahrads^{1}, Mahdi Shabany^{2}^{1}Princeton University, United States; ^{2}Sharif University of Technology, Iran

Design for Test & Manufacturability**Time:** Wednesday, May 31 (8:00-9:30)**Room:** Laurel CD**Chair(s):** Ricardo Reis - Federal University of Rio Grande do Su; Massimo Alioto - NTU

Design-Oriented Models for Quick Estimation of Path Delay Variability via the Fan-Out-of-4 Metric* 2453**Massimo Alioto^{1}, Giuseppe Scotti^{2}, Alessandro Trifiletti^{2}^{1}National University of Singapore, Singapore; ^{2}Sapienza – Università di Roma, ItalyA Secure Scan Chain Test Scheme Exploiting Retention Loss of Memristors*..... 2457**

Yanping Gong, Fengyu Qian, Lei Wang

University of Connecticut, United States

Layout Decomposition for Hybrid E-Beam and DSA Double Patterning Lithography* 2461**Yunfeng Yang^{1}, Fan Yang^{1}, Wai-Shing Luk^{1}, Changhao Yan^{1}, Xuan Zeng^{1}, Xiangdong Hu^{2}^{1}Fudan University, China; ^{2}Shanghai High-Performance Integrated-Circuit Design Center, ChinaTest Pattern Generation for Multiple Stuck-at Faults Not Covered by Test Patterns for Single Faults*..... 2465**

Conrad Moore, Peikun Wang, Amir Masoud Gharehbaghi, Masahiro Fujita

University of Tokyo, Japan

***A New Approach for Diagnosing Bridging Faults in Logic Designs* 2469**

Amir Masoud Gharehbaghi, Masahiro Fujita

University of Tokyo, Japan

CAS-T papers on Memory**Time:** Wednesday, May 31 (8:00-9:30)**Room:** Kent AB**Chair(s):** Pierre-Emmanuel Gaillardon - University of Utah; Lan-Da Van - National Chiao Tung University

***A Study on the Programming Structures for RRAM-Based FPGA Architectures*..... 2473**Xifan Tang{1}, Gain Kim{1}, Giovanni De Micheli{1}, Pierre-Emmanuel Gaillardon{2}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}University of Utah, United States***Reconfigurable Writing Architecture for Reliable RRAM******Operation in Wide Temperature Ranges* 2474**Fernando García-Redondo, Pablo Royer, Marisa López-Vallejo, Hernan Aparicio, Pablo Ituero, Carlos López-Barrio
Universidad Politécnica de Madrid, Spain***PEVA: a Page Endurance Variance Aware Strategy for the Lifetime Extension of NAND Flash* 2475**Debao Wei, Liyan Qiao, Peng Zhang, Xiyuan Peng, Libao Deng
Harbin Institute of Technology, China***28-nm 1T-1MTJ 8Mb 64 I/O STT-MRAM with Symmetric 3-Section Reference Structure and Cross-Coupled Sensing Amplifier* 2476**Artur Antonyan, Suksoo Pyo, Hyuntaek Jung, Gwan-Hyeob Koh, Taejoong Song
Samsung Electronics, Korea, South

Spintronic-based Technology**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Dover A**Chair(s):** Malgorzata Chrzanows-Jeske - Portland State University; Mircea Stan - University of Virginia

***Energy-Efficient Magnetic Circuits Based on Nanoelectronic Devices* 2480**Fazel Sharifi, Himanshu Thapliyal
University of Kentucky, United States***A Variation-Aware Simulation Framework for Hybrid CMOS/Spintronic Circuits*..... 2484**Raffaele De Rose{6}, Marco Lanuzza{6}, Felice Crupi{6}, Giulio Siracusano{3}, Riccardo Tomasello{5}, Giovanni Finocchio{4}, Mario Carpentieri{2}, Massimo Alioto{1}
{1}National University of Singapore, Singapore; {2}Politecnico di Bari, Italy; {3}Università degli Studi di Catania, Italy; {4}Università degli Studi di Messina, Italy; {5}Università degli Studi di Perugia, Italy; {6}Università della Calabria, Italy***Hybrid Polymorphic Logic Gate Using 6 Terminal Magnetic Domain Wall Motion Device*..... 2488**Farhana Parveen, Shaahin Angizi, Zhezhi He, Deliang Fan
University of Central Florida, United States***Rectified-Linear and Recurrent Neural Networks Built with Spin Devices* 2492**Qing Dong, Kaiyuan Yang, Laura Fick, David Blaauw, Dennis Sylvester
University of Michigan, United States***Cross-Layer Design and Analysis of a Low Power, High Density******STT-MRAM for Embedded System*..... 2496**Manu Komalan{1}, Sushil Sakhare{1}, Trong Huynh Bao{1}, Siddharth Rao{1}, Woojin Kim{1}, Christian Tenllado{2}, Jose Ignaico Gómez{2}, Gouri Sankar Kar{1}, Arnaud Furnemont{1}, Francky Catthoor{1}
{1}IMEC, Belgium; {2}Universidad Complutense de Madrid, Spain

Energy Grids & Systems**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Dover BC**Chair(s):** Chika Nwankpa - Drexel University; Xiaozhe Wang - McGill University

Implementation of Power Factor Corrector with Fractional Capacitor 2500Yuehai Lu, Dongyuan Qiu, Bo Zhang, Yanfeng Chen, Yanwei Jiang
South China University of Technology, China**Subsystem Size Optimization for Efficient Parallel Restoration of Power Systems 2504**Nuwan Ganganath{1}, Chi-Tsun Cheng{1}, Herbert Ho-Ching Lu{2}, Tyrone Fernando{2}
{1}Hong Kong Polytechnic University, Hong Kong; {2}University of Western Australia, Australia**PMU-Based Estimation of Dynamic State Jacobian Matrix 2508**Xiaozhe Wang{2}, Konstantin Turitsyn{1}
{1}Massachusetts Institute of Technology, United States; {2}McGill University, Canada**Battery Energy Storage Dispatch Analysis Within the Storage Placement Problem 2512**Jesse Hill, Chika Nwankpa
Drexel University, United States**Adaptive Droop Control with Self-Adjusted Virtual Impedance for Three-Phase Inverter Under Unbalanced Conditions 2516**Zelun Lu{1}, Wenxuan Li{1}, Zhen Li{1}, Xi Chen{2}, Herbert Ho-Ching Lu{3}, Ning Dong{1}, Xiangdong Liu{1}
{1}Beijing Institute of Technology, China; {2}Global Energy Interconnection Research Institute North America, United States; {3}University of Western Australia, Australia

Brain Inspired Circuits and Systems**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Grand Ballroom I**Chair(s):** Sankar Basu - National Science Foundation; Mona Zaghloul - George Washington University

INVITED: Implications of a Spontaneously Active Ground State for Computing with Brain-Inspired Circuits 2520Narayan Srinivasa
Intel Corporation, United States**Demonstrating Hybrid Learning in a Flexible Neuromorphic Hardware System 2524**Simon Friedmann, Johannes Schemmel, Andreas Grübl, Andreas Hartel, Matthias Hock, Karlheinz Meier
Ruprecht-Karls-Universität Heidelberg, Germany**Calibrating Silicon-Synapse Dynamics Using Time-Encoding and Decoding Machines 2525**Eric Kauderer-Abrams, Kwabena Boahen
Stanford University, United States**Path Planning on the TrueNorth Neurosynaptic System 2529**Kate Fischl{2}, Kaitlin Fair{1}, Wei-Yu Tsai{3}, Jack Sampson{3}, Andreas G. Andreou{2}
{1}Georgia Institute of Technology, United States; {2}Johns Hopkins University, United States; {3}Pennsylvania State University, United States**Low-Power, Low-Mismatch, Highly-Dense Array of VLSI Mihalas-Niebur Neurons 2533**Jamal Molin{2}, Adebayo Eisape{2}, Chetan Singh Thakur{2}, Vigil Varghese{3}, Christian Brandli{1}, Ralph Etienne-Cummings{2}
{1}Insightness AG, Switzerland; {2}Johns Hopkins University, United States; {3}Nanyang Technological University, Singapore

Digital Filters & Filter Banks

Time: Wednesday, May 31 (13:30-15:00)

Room: Grand Ballroom II

Chair(s): Tapio Saramaki - Tampere University of Technology; Zhiping Lin - Nanyang Technological University

Roundoff Noise Minimization for 2-D Separable-Denominator Digital Filters Using Jointly Optimal High-Order Error Feedback and Realization 2537

Takao Hinamoto^{2}, Akimitsu Doi^{1}, Wu-Sheng Lu^{3}

^{1}Hiroshima Institute of Technology, Japan; ^{2}Hiroshima University, Japan; ^{3}University of Victoria, Canada

Design of IIR Frequency-Response Masking Filters with Near Linear Phase Using Constrained Optimization 2541

Qinglai Liu^{2}, Yong Ching Lim^{2}, Zhiping Lin^{2}, Xiaoping Lai^{1}

^{1}Hangzhou Dianzi University, China; ^{2}Nanyang Technological University, Singapore

FPGA Implementation of 2-D Wave Digital Filters for Real Time Motion Feature Extraction 2545

Lech Kolonko, Joerg Velten, Daniel Wagner, Anton Kummert

Bergische Universität Wuppertal, Germany

Design of Cascaded Integrator-Comb Decimation Filters for Direct-RF Sampling Receivers 2549

Takao Kihara, Hiroyuki Yano, Tsutomu Yoshimura

Osaka Institute of Technology, Japan

Design of Orthogonal Filterbanks with Rational Coefficients Using Gröbner Bases..... 2553

Nhu Y Le^{4}, Zhiping Lin^{4}, David Tay^{3}, Li Xu^{1}, Jiuwen Cao^{2}

^{1}Akita Prefectural University, Japan; ^{2}Hangzhou Dianzi University, China; ^{3}La Trobe University, Australia;

^{4}Nanyang Technological University, Singapore

Wireless Power & Data Transfer to Biomedical Implants

Time: Wednesday, May 31 (13:30-15:00)

Room: Grand Ballroom III

Chair(s): Pedram Mohseni - Case Western Reserve; Mehdi Kiani - Pennsylvania State University

Inductive and Ultrasonic Wireless Power Transmission to Biomedical Implants 2557

Ahmed Ibrahim, Miao Meng, Mehdi Kiani

Pennsylvania State University, United States

Transcutaneous Capacitive Wireless Power Transfer (C-WPT) for Biomedical Implants..... 2561

Reza Erfani^{1}, Fatemeh Marefat^{1}, Amir Sodagar^{2}, Pedram Mohseni^{1}

^{1}Case Western Reserve University, United States; ^{2}Khajeh Nasir Toosi University of Technology, Iran

A Wirelessly Powered High-Speed Transceiver for High-Density Bidirectional Neural Interfaces..... 2565

Esmaeel Maghsoudloo, Masoud Rezaei, Benoit Gosselin

Université Laval, Canada

Design and Modeling of an Inductive Coupling Wireless Power Transfer Using Printed Spirals on Medical Hydrocolloid Dressings..... 2569

Haneen Alsuradi^{1}, Jerald Yoo^{2}

^{1}Masdar Institute of Science and Technology, U.A.E.; ^{2}Masdar Institute of Science and Technology / National University of Singapore, Singapore

INVITED: Wireless Power Transfer: Far Field to Near Field NA

Zohaib Hameed, Kambiz Moez

3M Corporate Research Laboratories-SEMS, United States

3D Integrated Circuits**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Grand Ballroom IV**Chair(s):** Eby Friedman - University of Rochester; Hassan Mostafa - University of Waterloo

Hybrid Energy Harvesting in 3-D IC IoT Devices 2573

Boris Vaisband, Eby G. Friedman

University of Rochester, United States

Fault Tolerant Techniques for TSV-Based Interconnects in 3-D ICs 2577

Siroos Madani{2}, Magdy Bayoumi{1}

{1}University of Louisiana at Lafayette, United States; {2}University of Louisiana, United States

Open Source Cell Library Mono3D to Develop Large-Scale Monolithic 3D Integrated Circuits..... 2581

Chen Yan, Scott Kontak, Hailang Wang, Emre Salman

Stony Brook University, United States

Contactless Inter-Tier Communication for Heterogeneous 3-D ICs 2585

Ioannis Papistas, Vasilis Pavlidis

University of Manchester, United Kingdom

Runtime Energy Management Under Real-Time Constraints in MPSoCs 2589

André Martins, Marcelo Ruaro, Anderson Santana, Fernando Moraes

Pontificia Universidade Católica do Rio Grande do Sul, Brazil

Analog Signal Processing**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Grand Ballroom VII**Chair(s):** Filippo Neri - u-blox, Switzerland; Nuno Paulino - UNINOVA

A High-Speed and Ultra Low-Power Subthreshold Signal Level Shifter 2593

Esmaeel Maghsoudloo{2}, Masoud Rezaei{2}, Benoit Gosselin{2}, Mohamad Sawan{1}

{1}Polytechnique Montréal, Canada; {2}Université Laval, Canada

Analysis and Design of the Classical CMOS Schmitt Trigger in Subthreshold Operation 2594

Luiz Alberto Pasini Melek, Anselmo Luís da Silva Jr., Márcio Cherem Schneider, Carlos Galup-Montoro

Universidade Federal de Santa Catarina, Brazil

A Low Power Analog Voltage Similarity Circuit 2595

Mehdi Azadmehr, Luca Marchetti, Yngvar Berg

University College of SouthEast Norway, Norway

Chopping in Continuous-Time Sigma-Delta Modulators 2599

Hui Jiang, Burak Gönen, Kofi Makinwa, Stoyan Nihitanov

Technische Universiteit Delft, Netherlands

On Linear Periodically Time Varying (LPTV) Systems with Modulated Inputs, and Their Application to Smoothing Filters 2603

Shanthi Pavan

Indian Institute of Technology Madras, India

Biosignal Amplifiers

Time: Wednesday, May 31 (13:30-15:00)

Room: Grand Ballroom IX

Chair(s): Timothy Constandinou - Imperial College London; Ross M Walker - Michigan State University

Two-Electrode Impedance-Sensing Cardiac Rhythm Monitor for Charge-Aware Shock Delivery in Cardiac Arrest 2607

M. Reza Pazhouhandeh^{2}, Omid Shoaie^{1}, Roman Genov^{2}
{1}University of Tehran, Iran; {2}University of Toronto, Canada; {2}University of Toronto, Iran

A 16-Channel CMOS Chopper-Stabilized Analog Front-End Acquisition Circuits for ECoG Detection..... 2611

Cheng-Hsiang Cheng, Zhi-Xin Chen, Chung-Yu Wu
National Chiao Tung University, Taiwan

A Noise-Power-Area Optimized Novel Programmable Gain and Bandwidth Instrumentation Amplifier for Biomedical Applications 2615

Devarshi Mrinal Das, Abhishek Srivastava, Aman Gupta, Kashyap Barot, Maryam Shojaei Baghini
Indian Institute of Technology Bombay, India

A 0.5V Time-Domain Instrumentation Circuit with Clocked and Unclocked $\Delta\Sigma$ Operation..... 2619

Lieuwe Leene, Timothy Constandinou
Imperial College London, United Kingdom

An ECG Chopper Amplifier Achieving 0.92 NEF and 0.85 PEF with AC-Coupled Inverter-Stacking for Noise Efficiency Enhancement 2623

Somok Mondal, Drew A. Hall
University of California, San Diego, United States

Regulators & References

Time: Wednesday, May 31 (13:30-15:00)

Room: Grand Ballroom X

Chair(s): Ayman Fayed - Ohio State University; Nathan Neihart - Iowa State University

Low Power Output-Capacitorless Class-AB CMOS LDO Regulator..... 2627

Vahideh Shirmohammadi^{2}, Alireza Saberhari^{2}, Herminio Martínez-García^{1}, Eduard Alarcón-Cot^{1}
{1}Universitat Politècnica de Catalunya, Spain; {2}University of Guilan, Iran

A 276nW, Area-Efficient CMOS Subbandgap Reference Circuit..... 2631

Vahid Mohammadi Bonehi, Soheil Aghaie, Kai Hussmann, Ralf Wunderlich, Stefan Heinen
Rheinisch-Westfälische Technische Hochschule Aachen, Germany

A Multi-Phase VCO Quantizer Based Adaptive Digital LDO in 65nm CMOS Technology..... 2635

Somnath Kundu, Chris H. Kim
University of Minnesota Twin Cities, United States

Transient-Enhanced Output-Capacitorless CMOS LDO Regulator for Battery-Operated Systems..... 2639

Jorge Pérez-Bailón, Alejandro Márquez, Belén Calvo, Nicolás Medrano
Universidad de Zaragoza, Spain

Memristor-Based Technology & Circuits I**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Laurel AB**Chair(s):** Yeong-Kang Lai - National Chung Hsing University; Meng-Fan Chang - National Tsing Hua University

Computation of Boolean Matrix Chain Products in 3D ReRAM..... 2643Alvaro Velasquez, Sumit Jha
University of Central Florida, United States**An RF Memristor Model and Memristive Single-Pole Double-Throw Switches 2647**Nicolas Wainstein, Shahar Kvatinsky
Technion – Israel Institute of Technology, Israel**A Memristor-CMOS Hybrid Architecture Concept for on-Line Template Matching 2651**Alexantrou Serb{2}, Christos Papavassiliou{1}, Themistoklis Prodromakis{2}
{1}Imperial College London, United Kingdom; {2}University of Southampton, United Kingdom**Design of Compact Memristive in-Memory Computing Systems Using Model Counting..... 2655**Dwaipayan Chakraborty, Sumit Kumar Jha
University of Central Florida, United States**Cell-to-Array Thermal-Aware Analysis of Stacked RRAM..... 2659**Yingyi Luo, Seda Ogrenici-Memik, Jie Gu
Northwestern University, United States

Logic Circuits & Synthesis**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Laurel CD**Chair(s):** Kwen-Siong Chong - Nanyang Technological University; Ricardo Reis - Federal University of Rio Grande do Sul

Publish-Subscribe Programming for a NoC-Based Multiprocessor System-on-Chip..... 2663Jean Carlo Hamerski{1}, Geancarlo Abich{2}, Ricardo Reis{2}, Luciano Ost{3}, Alexandre Amory{1}
{1}Pontificia Universidade Católica do Rio Grande do Sul, Brazil; {2}Universidade Federal do Rio Grande do Sul, Brazil; {3}University of Leicester, United Kingdom**Highly Parallel Bitmap-Based Regular Expression Matching for Text Analytics..... 2667**Xuan-Thuan Nguyen{3}, Hong-Thu Nguyen{3}, Katsumi Inoue{1}, Osamu Shimojo{2}, Cong-Kha Pham{3}
{1}Advanced Original Technologies Co., Ltd., Japan; {2}Nippon Computer Dynamics Co., Ltd, Japan; {3}University of Electro-Communications, Japan**Memory Partitioning-Based Modulo Scheduling for High-Level Synthesis 2671**Tianyi Lu, Shouyi Yin, Xianqing Yao, Zhicong Xie, Leibo Liu, Shaojun Wei
Tsinghua University, China**Search Space Reduction for the Non-Exact Projective NPNP Boolean Matching Problem 2675**Feng Wang, Jiaxi Zhang, Lange Wu, Wentai Zhang, Guojie Luo
Peking University, China**A 50Gb/s Repeater and 2×50Gb/s 2⁷-1 PRBS Generator..... 2679**Dengrong Li, Liji Wu, Shuai Yuan, Xiangmin Zhang
Tsinghua University, China

Memory: DRAM, SRAM, ReRAM, Flash, Racetrack**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Kent AB**Chair(s):** Daniele Ielmini - Politecnico di Milano; Sorin Cotofana - Delft University of Technology

Area and Energy-Efficient Complementary Dual-Modular Redundancy Dynamic Memory for Space Applications..... 2683Robert Giterman, Lior Atias, Adam Teman
Bar-Ilan University, Israel***Alternative Architectures Towards Reliable Memristive Crossbar Memories..... 2684***Ioannis Vourkas{1}, Dimitrios Stathis{1}, Georgios Ch. Sirakoulis{1}, Said Hamdioui{2}
{1}Democritus University of Thrace, Greece; {2}Technische Universiteit Delft, Netherlands***Fixation Ratio of Error Location-Aware Strategy for Increased Reliable Retention Time of Flash Memory..... 2685***Debao Wei, Liyan Qiao, Shiyuan Wang, Xiyuan Peng
Harbin Institute of Technology, China***Domain Wall Racetrack Memory for in Memory Computing 2686***Kejie Huang{2}, Rong Zhao{1}
{1}Singapore University of Technology and Design, Singapore; {2}Zhejiang University, China

Spiking & Event-Based Systems I**Time:** Wednesday, May 31 (15:15-16:45)**Room:** Dover A**Chair(s):** Majid Ahmadi - University of Windsor; Chiara Bartolozzi - Istituto Italiano di Tecnologia

Obstacle Avoidance with LGMD Neuron: Towards a Neuromorphic UAV Implementation..... 2687Llewyn Salt{2}, Giacomo Indiveri{1}, Yulia Sandamirskaya{1}
{1}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland; {2}University of Queensland, Australia***Pipeline AER Arbitration with Event Aging 2691***Juan Antonio Leñero-Bardallo{2}, Fernando Pérez-Peña{2}, Ricardo Carmona-Galán{1}, Ángel Rodríguez-Vázquez{1}
{1}Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain; {2}Universidad de Cádiz, Spain***Integer Factorization with a Neuromorphic Sieve 2695***John Monaco, Manuel Vindiola
U.S. Army Research Laboratory, United States***INVITED: Synaptic Integrators Implement Inhibitory Plasticity, Eliminate Loops and Create a "Winnerless" Network 2699***James Kozloski
IBM Research, United States***Ring Oscillator Based Sub-1V Leaky Integrate-and-Fire Neuron Circuit..... 2703***Bibhu Datta Sahoo
University of Illinois at Urbana-Champaign, United States

Neuromorphic Circuits & Systems for Robotics

Time: Wednesday, May 31 (15:15-16:45)

Room: Dover BC

Chair(s): Scott Koziol - Baylor University; Jeff Krichmar - University of California, Irvine

***A Complete Neuromorphic Solution to Outdoor Navigation and Path Planning* 2707**

Tiffany Hwu, Jeffrey Krichmar, Xinyun Zou
University of California, Irvine, United States

***Effect of Synaptic Charge Convergence on Path Planning Over a Neural Network*..... 2711**

Shashikant Koul, Timothy Horiuchi
University of Maryland, College Park, United States

***Towards a Neuromorphic Implementation of Hierarchical Temporal Memory on SpiNNaker*..... 2715**

Florian Walter, Marwin Sandner, Florian Röhrbein, Alois Knoll
Technische Universität München, Germany

***Obstacle Avoidance and Target Acquisition in Mobile Robots Equipped with Neuromorphic Sensory-Processing Systems* 2719**

Moritz Milde^{1}, Alexander Dietmüller^{1}, Hermann Blum^{1}, Giacomo Indiveri^{2}, Yulia Sandamirskaya^{2}
^{1}Eidgenössische Technische Hochschule Zürich, Switzerland; ^{2}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland

***A Population-Level Approach to Temperature Robustness in Neuromorphic Systems* 2723**

Eric Kauderer-Abrams^{1}, Andrew Gilbert^{1}, Aaron Voelker^{2}, Ben Benjamin^{1}, Terrence Stewart^{2}, Kwabena Boahen^{1}
^{1}Stanford University, United States; ^{2}University of Waterloo, Canada

Emerging Technologies in Neural System Implementations

Time: Wednesday, May 31 (15:15-16:45)

Room: Grand Ballroom I

Chair(s): Chiara Bartolozzi - Istituto Italiano di Tecnologia; Jim Harkin - Ulster University

***INVITED: Cognitive Computing Revolution: the Transformation of Embedded Neural Network Systems*..... 2723**

Chris Rowen
Cognite Ventures, United States

***Associative Search Using Pseudo-Analog Memristors*..... 2727**

Mika Laiho^{2}, Mika Grönroos^{2}, Jussi Poikonen^{2}, Eero Lehtonen^{2}, Reon Katsumura^{1}, Atsushi T. Fukuchi^{1}, Masashi Arita^{1}, Yasuo Takahashi^{1}
^{1}Hokkaido University, Japan; ^{2}University of Turku, Finland

***Mitigating Noise Effects in Volatile Nano-Metal Oxide Neural Detector* 2731**

Isha Gupta, Alexantrou Serb, Ali Khiat, Themistoklis Prodromakis
University of Southampton, United Kingdom

***Reducing Circuit Design Complexity for Neuromorphic Machine Learning Systems Based on Non-Volatile Memory Arrays*..... 2735**

Prithish Narayanan^{2}, Lucas L. Sanches^{2}, Alessandro Fumarola^{2}, Robert M. Shelby^{2}, Stefano Ambrogio^{2}, Junwoo Jang^{2}, Hyunsang Hwang^{3}, Yusuf Leblebici^{1}, Geoffrey W. Burr^{2}
^{1}École Polytechnique Fédérale de Lausanne, Switzerland; ^{2}IBM Research, United States; ^{3}Pohang University of Science and Technology, Korea, South

Nonlinear Dynamics of Memristor Oscillators via the Flux–Charge Analysis Method..... 2739
Fernando Corinto^{1}, Mauro Forti^{2}
{1}Politecnico di Torino, Italy; {2}Università degli Studi di Siena, Italy

Image Processing

Time: Wednesday, May 31 (15:15-16:45)

Room: Grand Ballroom II

Chair(s): Omair Ahmed - Concordia University; Kai-Kuang Ma - Nanyang Technological University

Patch-Based Salient Region Detection Using Statistical Modeling in the Non-Subsampled Contourlet Domain..... 2743

Masoumeh Rezaie Abkenar, Hamidreza Sadreazami, M. Omair Ahmad
Concordia University, Canada

Fast Image Super-Resolution via Randomized Multi-Split Forests..... 2747

Zhi-Song Liu, Wan-Chi Siu, Yui-Lam Chan
Hong Kong Polytechnic University, Hong Kong

Data-Adaptive Color Image Denoising and Enhancement Using Graph-Based Filtering..... 2751

Hamidreza Sadreazami, Amir Asif, Arash Mohammadi
Concordia University, Canada

Document Image Binarization via Optimized Hybrid Thresholding..... 2755

Yunfeng Liang^{3}, Zhiping Lin^{3}, Lei Sun^{1}, Jiuwen Cao^{2}
{1}Beijing Institute of Technology, China; {2}Hangzhou Dianzi University, China; {3}Nanyang Technological University, Singapore

Single Underwater Image Restoration Using Attenuation-Curve Prior..... 2759

Yi Wang, Hui Liu, Lap-Pui Chau
Nanyang Technological University, Singapore

Low Power Digital Circuits

Time: Wednesday, May 31 (15:15-16:45)

Room: Grand Ballroom III

Chair(s): Jun Zhou - Agency for Science, Technology and Research; Fengbo Ren - Arizona State University

Power-Precision Scalable Latch Memories..... 2763

Darjn Esposito^{2}, Antonio Strollo^{2}, Massimo Alioto^{1}
{1}National University of Singapore, Singapore; {2}Università degli Studi di Napoli Federico II, Italy

Adiabatic Capacitive Logic: a Paradigm for Low-Power Logic..... 2767

Gael Pillonnet^{2}, Herve Fanet^{2}, Samer Hourri^{1}
{1}Technische Universiteit Delft, Netherlands; {2}Université Grenoble Alpes / Commissariat à l'énergie atomique et aux énergies alternatives, France

Transistor Sizing Strategy for Simultaneous Energy-Delay Optimization in CMOS Buffers..... 2771

Longyang Lin, Kien Trinh Quang, Massimo Alioto
National University of Singapore, Singapore

Evaluation of Dual Mode Logic in 28nm FD-SOI Technology..... 2775

Ramiro Taco^{2}, Itamar Levi^{1}, Marco Lanuzza^{2}, Alexander Fish^{1}
{1}Bar-Ilan University, Israel; {2}Università della Calabria, Italy

A 0.4V 0.08fJ/Cycle Retentive True-Single-Phase-Clock 18T Flip-Flop in 28nm FDSOI CMOS..... 2779
François Stas, David Bol
Université Catholique de Louvain, Belgium

Oscillators, Phase-locked Loops & Others II

Time: Wednesday, May 31 (15:15-16:45)

Room: Grand Ballroom IV

Chair(s): Igor Filanvosky - University of Alberta; Degang Chen - Iowa State University

Design of a Low-Jitter Wideband Frequency Synthesizer for 802.11ad Wireless OFDM Systems Using a Frequency Sixtupler 2783
Frank Herzel, Arzu Ergintav, Johannes Borngraeber, Herman Jalli Ng, Dietmar Kissinger
IHP GmbH, Germany

Optimum Scaling of Stages in a Frequency Divider Chain for Best Jitter FoM 2787
Sumit Kumar, Nagendra Krishnapura
Indian Institute of Technology Madras, India

A 0.4V 4.8µW 16MHz CMOS Crystal Oscillator Achieving 74-Fold Startup-Time Reduction Using Momentary Detuning..... 2791
Ka-Meng Lei, Pui-In Mak, Rui Paulo Martins
University of Macau, Macau

Phase-Locked Loops Using Switched-Gain Control..... 2795
Haixiang Zhao, Soumyajit Mandal
Case Western Reserve University, United States

A 69-Mbps Dual Tuning 8PSK/QPSK Transmitter Using Injection Locking and RF Phase Modulation 2799
Zina Saheb, Ezz El-Masry, Jean-Francois Bousquet
Dalhousie University, Canada

Sensory Circuits & Systems

Time: Wednesday, May 31 (15:15-16:45)

Room: Grand Ballroom VII

Chair(s): Amine Bermak - Hamad Bin Khalifa University; Timothy Constandinou - Imperial College London

462-nW 2-Axis Gesture Sensor Interface Based on Capacitively Controlled Ring Oscillators 2803
Mika Pulkkinen, Jarno Salomaa, Mohammad Mehdi Moayer, Tuomas Haapala, Kari Halonen
Aalto University, Finland

Dual Transduction Gas Sensor Based on a Surface Acoustic Wave Resonator 2807
Feng Gao^{2}, Amine Bermak^{1}, Chi-Ying Tsui^{2}, Farid Boussaid^{3}
{1}Hamad Bin Khalifa University / Hong Kong University of Science and Technology, Qatar; {2}Hong Kong University of Science and Technology, Hong Kong; {3}University of Western Australia, Australia

A Low-Power 10-Bit Multichannel Analyzer Chip for Radiation Detection 2811
Joseph Schmitz, Mahir Gharzai, Sina Balkir, Michael Hoffman, Mark Bauer
University of Nebraska-Lincoln, United States

A Non-Invasive Material Sensing System and its Integrated Interface Circuits..... 2815
Yang-Jing Huang^{2}, Heng-Ching Wu^{2}, Po-Sheng Chen^{2}, Hsu-Tao Shen^{1}, Sheng-Yu Peng^{2}, Chii-Wann Lin^{1}
{1}National Taiwan University, Taiwan; {2}National Taiwan University of Science and Technology, Taiwan

CMOS Luminescence Lifetime Sensor for White LED Multi-Spectral Characterization..... 2819
Guoqing Fu, Sameer Sonkusale
Tufts University, United States

Modeling and Design Tools

Time: Wednesday, May 31

Room: Grand Ballroom X

Chair(s): Filippo Neri - u-blox, Switzerland; Nuno Paulino - UNINOVA

Processes of AM-PM Distortion in Large-Signal Single-FET Amplifiers 2823
Soheil Golara^{1}, Shervin Moloudi^{2}, Asad Abidi^{3}
^{1}Qualcomm Atheros Inc., United States; ^{2}Qualcomm Inc., United States; ^{3}University of California, Los Angeles, United States

INVITED: Weighted Kirchhoff Index of a Resistance Network and Generalization of Foster's Theorem 2824
Krishnaiyan Thulasiraman, Mamta Yadav
University of Oklahoma, United States

Formal Analysis of High-Performance Stabilized Active-Input Current Mirror 2828
Mohan Julien, Serge Bernard, Fabien Soulier, Vincent Kerzérho, Guy Cathébras
Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier, France

Methodology for Automated Phase Noise Minimization in RF Circuit Interconnect Trees 2832
Dimo Martev^{2}, Sven Hampel^{1}, Ulf Schlichtmann^{2}
^{1}Intel Germany, Germany; ^{2}Technische Universität München, Germany

Analog Layout Retargeting with Process-Variation-Aware Rule-Based OPC 2836
Xuan Dong, Lihong Zhang
Memorial University of Newfoundland, Canada

Nanoelectronics I

Time: Wednesday, May 31 (15:15-16:45)

Room: Laurel AB

Chair(s): Robert Chen-Hao Chang - National Chung Hsing University/National Chi Nan University; Sorin Cotofana - Delft University of Technology

A SPICE Model of the Ta₂O₅/TaOx Bi-Layered RRAM..... 2840
Firas Hatem, Nandha Kumar, Haider Almurib
university of Nottingham Malaysia Campus, Malaysia

Record f_T , f_{max} , and GHz Amplification in 2Dimensional CVD MoS₂ Embedded Gate Fets 2841
Atresh Sanne^{2}, Saungeun Park^{2}, Rudresh Ghosh^{2}, Maruthi Nagavalli Yogeesh^{2}, Chison Liu^{2}, Deji Akinwande^{2}, Sanjay Banerjee^{2}, Leo Mathew^{1}, Rajesh Rao^{1}
^{1}Applied Novel Devices Inc., United States; ^{2}University of Texas at Austin, United States

High-Power Memristor Model and its Application..... 2845
Dongyuan Qiu, Bo Zhang, Yanfeng Chen, Yuehai Lu
South China University of Technology, China

Exploration and Evaluation of Low-Dropout Linear Voltage Regulator with FinFET, TFET and Hybrid TFET-FinFET Implementations 2849
Chia-Ning Chang, Yin-Nien Chen, Po-Tsang Huang, Pin Su, Ching-Te Chuang
National Chiao Tung University, Taiwan

A Small Area and Low Power True Random Number Generator Using Write Speed Variation of Oxide-Based RRAM for IoT Security Application 2853
Jianguo Yang, Yinyin Lin, Yarong Fu, Xiaoyong Xue, Ba Chen
Fudan University, China

Advanced Digital Techniques

Time: Wednesday, May 31 (15:15-16:45)

Room: Laurel CD

Chair(s): Izzet Kale - University of Westminster; Emre Salman - Stony Brook University

Time-Encoded Values for Highly Efficient Stochastic Circuits..... 2857
M. Hassan Najafi, Shiva Jamali-Zavareh, David Lilja, Marc Riedel, Kia Bazargan, Ramesh Harjani
University of Minnesota Twin Cities, United States

Sense Amplifier Half-Buffer (SAHB): a Low-Power High-Performance Asynchronous Logic QDI Cell Template 2858
Kwen-Siong Chong, Weng-Geng Ho, Tong Lin, Bah-Hwee Gwee, Joseph Sylvester Chang
Nanyang Technological University, Singapore

Design Methodology for Voltage-Scaled Clock Distribution Networks 2859
Can Sitik^{1}, Weicheng Liu^{2}, Baris Taskin^{1}, Emre Salman^{2}
^{1}Drexel University, United States; ^{2}Stony Brook University, United States

Optimal Single Constant Multiplication Using Ternary Adders 2860
Martin Kumm^{2}, Peter Zipf^{2}, Oscar Gustafsson^{1}, Mario Garrido^{1}
^{1}Linköping University, Sweden; ^{2}Universität Kassel, Germany

Future Technology for Circuits and Systems

Time: Wednesday, May 31 (15:15-16:45)

Room: Kent AB

Chair(s): Sorin Cotofana - Delft University of Technology; Yeong-Kang Lai - National Chung Hsing University

Energy and Delay Tradeoffs of Soft Error Masking for 16nm FinFET Logic Paths: Survey and Impact of Process Variation in Near Threshold Region..... 2861
Faris Alghareb^{2}, Ahmad Alzahrani^{2}, Ronald F. DeMara^{2}, Rizwan Ashraf^{1}
^{1}Oak Ridge National Laboratory, United States; ^{2}University of Central Florida, United States

SPICE Compact Modeling of Bipolar/Unipolar Memristor Switching Governed by Electrical Thresholds 2862
Fernando Garcia-Redondo^{1}, Marisa López-Vallejo^{1}, Robert Gowers^{3}, Liudi Jiang^{3}, Albert Crespo-Yepes^{2}
^{1}Universidad Politécnica de Madrid, Spain; ^{2}Universitat Autònoma de Barcelona, Spain; ^{3}University of Southampton, United Kingdom

Series-Parallel Charge Pump Conditioning Circuits for Electrostatic Kinetic Energy Harvesting 2863
Armine Karami^{1}, Dimitri Galayko^{1}, Philippe Basset^{2}
^{1}Laboratoire d'informatique de Paris 6 / Université Pierre et Marie Curie / Sorbonne Universités, France;
^{2}Université Paris-Est - ESIEE, France

Insights Into Tunnel FET-Based Charge-Pumps and Rectifiers for Energy Harvesting Applications..... 2864
Francesc Moll^{2}, David Cavalheiro^{2}, Stanimir Valtchev^{1}
^{1}Universidade Nova de Lisboa, Portugal; ^{2}Universitat Politècnica de Catalunya, Spain

***Benchmarking TFET from a Circuit Level Perspective: Applications and Guideline*..... 2865**
Lingyi Guo, Le Ye, Cheng Chen, Qianqian Huang, Libo Yang, Zhu Lv, Xia An, Ru Huang
Peking University, China

AUTHOR INDEX.....