

# **2016 IEEE International Symposium on Circuits and Systems (ISCAS 2016)**

**Montreal, Quebec, Canada  
22-25 May 2016**

**Pages 1-717**



**IEEE Catalog Number: CFP16ISC-POD  
ISBN: 978-1-4799-5342-4**

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IEEE Catalog Number:	CFP16ISC-POD
ISBN (Print-On-Demand):	978-1-4799-5342-4
ISBN (Online):	978-1-4799-5341-7
ISSN:	2379-4461

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### TABLE OF CONTENTS

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# 1. REGULAR TECHNICAL SESSIONS

## A1L-A : VLSI I

Time: Monday, May 23 (10:30-12:00)

Place: Salon Drummond est

Chair(s): Malgorzata Chrzanowska-Jeske - Portland State University; Emre Salman - Stony Brook University

- 10:30 A1L-A.1 : Delay-Locked Loop Based Frequency Quadrupler with Wide Operating Range and Fast Locking Characteristics.... 1  
Y. Wang, Y. Liu, M. Jiang, S. Jia, X. Zhang  
Peking University, China
- 10:48 A1L-A.2 : Total Ionizing Dose (TID) Effects on Finger Transistors in a 65nm CMOS Process...5  
J. Jiang, W. Shu, K. Chong, T. Lin, N. Lwin, J. Chang, J. Liu  
Nanyang Technological University, Singapore
- 11:06 A1L-A.3 : Coresidual Alias-Locked Loops....9  
J. Liang, D. Elliott  
University of Alberta, Canada
- 11:24 A1L-A.4 : A Compact Pico-Second in-situ Sensor Using Programmable Ring Oscillators for Advanced on Chip Variation Characterization in 28nm HKMG.... 13  
Y. Lin, X. Hu, J. Yang, X. Xue  
Fudan University, China
- 11:42 A1L-A.5 : A True Random Number Generator Using RTN noise and a Sigma Delta Converter... 17  
T. Figliolia, P. Julian, G. Tognetti, A. Andreou  
Johns Hopkins University, United States

## A1L-B : Biomedical Signal Processing

Time: Monday, May 23 (10:30-12:00)

Place: Salon Drummond centre

Chair(s): Omair Ahmad - Concordia University; Yong Lian - York University

- 10:30 A1L-B.1: Detecting Tandem Repeats in DNA Using Ramanujan Filter Bank...21  
S. Tenneti, P. Vaidyanathan  
California Institute of Technology, United States
- 10:48 A1L-B.2 : Two-Pass Beamforming for Ultrasound Imaging....25  
H. Rehouma, D. Rakhmatov, M. Albulayli  
University of Victoria, Canada
- 11:06 A1L-B.3 : A New L1-Regularized Time-Varying Autoregressive Model for Brain Connectivity Estimation: a Study Using Visual Task-Related fMRI Data...29  
L. Zhang<sup>2</sup>, Z. Fu<sup>2</sup>, S. Chan<sup>2</sup>, H. Wu<sup>2</sup>, Z. Zhang<sup>1</sup>  
<sup>1</sup>Nanyang Technological University, Singapore; <sup>2</sup>University of Hong Kong, Hong Kong
- 11:24 A1L-B.4 : Ultrasound Image Despeckling in the Contourlet Domain Using the Cauchy Prior...33  
H. Sadreazami, M. Ahmad, M. Swamy  
Concordia University, Canada

### **A1L-C : VLSI Devices**

Time: Monday, May 23 (10:30-12:00)

Place: Salon Drummond ouest

Chair(s): Shuenn-Yuh Lee - National Cheng Kung University (NCKU); Vasily Moshnyaga - Fukuoka University

- 10:30 A1L-C.1 : Power Noise in 14, 10, and 7 nm FinFET CMOS Technologies....37  
R. Patel<sup>2</sup>, E. Friedman<sup>2</sup>, P. Raghavan<sup>1</sup>  
1IMEC, Belgium; 2University of Rochester, United States
- 10:48 A1L-C.2 : Extended Exploration of Low Granularity Back Biasing Control in 28nm UTBB FD-SOI Technology....41  
R. Taco<sup>2</sup>, I. Levi<sup>1</sup>, M. Lanuzza<sup>2</sup>, A. Fish<sup>1</sup>  
<sup>1</sup>Bar-Ilan University, Israel; <sup>2</sup>Università della Calabria, Italy
- 11:06 A1L-C.3 : FinFET Cells with Different Transistor Sizing Techniques Against PVT Variations....45  
A. Lackmann Zimpeck, C. Meinhardt, G. Posser, R. Reis  
Universidade Federal do Rio Grande do Sul, Brazil
- 11:24 A1L-C.4 : Low Power and Robust FinFET SRAM Cell Using Independent Gate Control....49  
L. Bagheriye<sup>2</sup>, R. Saeidi<sup>1</sup>, S. Toofan<sup>2</sup>  
<sup>1</sup>Iran Telecommunication Research Center, Iran; <sup>2</sup>University of Zanjan, Iran

### **A1L-D : Sigma-Delta Modulators I**

Time: Monday, May 23 (10:30-12:00)

Place: Salon A

Chair(s): José M. de la Rosa - IMSE-CNM

- 10:30 A1L-D.1 : Design of a Power-Efficient Widely-Programmable Gm-LC Band-Pass Sigma-Delta Modulator for SDR....53  
A. Morgado, R. Del Río, J. de la Rosa  
Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain
- 10:48 A1L-D.2 : A 74.9 dB SNDR 1 MHz Bandwidth 0.9 mW Delta-Sigma Time-to-Digital Converter Using Charge Pump and SAR ADC....57  
A. Firdauzi, Z. Xu, M. Miyahara, A. Matsuzawa  
Tokyo Institute of Technology, Japan
- 11:06 A1L-D.3 : A Calibration-Free 96.6-dB-SNDR Non-Bootstrapped 1.8-V 7.9-mW Delta-Sigma Modulator with Class-AB Single-Stage Switched VMAs....61  
S. Sutula<sup>1</sup>, M. Dei<sup>3</sup>, L. Terés<sup>2</sup>, F. Serra-Graells<sup>2</sup>  
<sup>1</sup>Broadcom Ltd., Spain; <sup>2</sup>Consejo Superior de Investigaciones Científicas / Universitat Autònoma de Barcelona, Spain; <sup>3</sup>X-Ray Imatek S.L., Spain
- 11:24 A1L-D.4 : A 24 mW, 80 dB SNR, 50 MHz Multi-Bit Continuous Time Sigma-Delta ADC in 28 nm FD-SOI....65  
A. Chopra<sup>2</sup>, S. Chatterjee<sup>1</sup>  
<sup>1</sup>Indian Institute of Technology Delhi, India; <sup>2</sup>STMicroelectronics, India
- 11:42 A1L-D.5 : Continuous-Time Delta Sigma Modulators with Dual Switched Capacitor Resistor DACs....69  
S. Pavan  
Indian Institute of Technology Madras, India

### **A1L-E : Data Converters I**

Time: Monday, May 23 (10:30-12:00)

Place: Salon B

Chair(s): Degang Chen - Iowa State University

- 10:30 A1L-E.1 : Higher-Order DWA in Bandpass Delta-Sigma Modulators and its Implementation....73  
J. Hu<sup>1</sup>, H. Hegt<sup>1</sup>, A. Van Roermund<sup>1</sup>, S. Ouzounov<sup>2</sup>  
<sup>1</sup>Eindhoven University of Technology, Netherlands; <sup>2</sup>Philips Research, Netherlands
- 10:48 A1L-E.2 : An Incremental Analog-to-Digital Converter with Multi-Step Extended Counting for Sensor Interfaces....77  
C. Chen, Y. Zhang, T. He, G. Temes  
Oregon State University, United States
- 11:06 A1L-E.3 : An Algorithmic ADC with Greater Than Rail-to-Rail Input Range and Near-Vt Supply...81  
M. Zhang<sup>1</sup>, P. Hurst<sup>2</sup>, S. Lewis<sup>2</sup>  
<sup>1</sup>Broadcom Corporation, United States; <sup>2</sup>University of California, Davis, United States
- 11:24 A1L-E.4 : A Pipeline ADC with Latched-Based Ring Amplifiers....85  
W. Chen, Y. Shyu, C. Huang, S. Chang  
National Cheng Kung University, Taiwan
- 11:42 A1L-E.5 : A Highly Linear 4GS/s Uncalibrated Voltage-to-Time Converter with Wide Input Range....89  
P. Osheroff, G. La Rue, S. Gupta  
Washington State University, United States

### **A1L-F : Biometrics & Imaging**

Time: Monday, May 23 (10:30-12:00)

Place: Salon C

Chair(s): Herming Chiueh - National Chiao Tung University; Ibrahim Elfadil - Masdar Institute

- 10:30 A1L-F.1 : A New Anchored Normalization Technique for Score-Level Fusion in Multimodal Biometric Systems....93  
W. Kabir, M. Ahmad, M. Swamy  
Concordia University, Canada
- 10:48 A1L-F.2 : Context Based Compression of FASTQ Data....97  
R. Mallavarapu<sup>2</sup>, P. Chinnamalliah<sup>3</sup>, A. Bopardikar<sup>2</sup>, T. Ahn<sup>1</sup>  
<sup>1</sup>Samsung Advanced Institute of Technology, Korea, South; <sup>2</sup>Samsung R&D Institute India, Bangalore, India;  
<sup>3</sup>VIKI Inc, Singapore
- 11:06 A1L-F.3 : A 110 × 64 150 mW 28 Frames/s Integrated Visible/Near-Infrared CMOS Image Sensor with Dual Exposure Times for Image Guided Surgery... 101  
N. Cui<sup>2</sup>, T. York<sup>1</sup>, R. Marinov<sup>2</sup>, S. Mondal<sup>2</sup>, S. Gao<sup>2</sup>, J. Margenthaler<sup>2</sup>, S. Achilefu<sup>2</sup>, V. Gruev<sup>2</sup>  
<sup>1</sup>Southern Illinois University Edwardsville, United States; <sup>2</sup>Washington University in St. Louis, United States
- 11:24 A1L-F.4 : Differential Nuclear Magnetic Resonance Receiver: Design, Implementation and Experimental Results.... 105  
E. Ghafar-Zadeh, H. Pourmodheji, S. Magierowski  
York University, Canada
- 11:42 A1L-F.5 : 30-fps SNR Equalized Electrical Impedance Tomography IC with Fast-Settle Filter and Adaptive Current Control for Lung Monitoring.... 109  
J. Lee, U. Ha, H. Yoo  
Korea Advanced Institute of Science and Technology, Korea, South

### **A1L-G : INVITED: Machine Learning**

Time: Monday, May 23 (10:30-12:00)

Place: Salon Hémon

Chair(s): Yiran Chen - University of Pittsburgh; Mrityunjay Chakraborty - Indian institute of Technology

- 10:30 A1L-G.1 : On-Line Machine Learning Accelerator on Digital RRAM-Crossbar....113  
L. Ni, H. Huang, H. Yu  
Nanyang Technological University, Singapore
- 10:48 A1L-G.2 : High-Performance Face Detection with CPU-FPGA Acceleration....117  
A. Mohanty, N. Suda, M. Kim, S. Vrudhula, J. Seo, Y. Cao  
Arizona State University, United States
- 11:06 A1L-G.3 : Towards Memristor Based Accelerator for Sparse Matrix Vector Multiplication...121  
J. Cui, Q. Qiu  
Syracuse University, United States
- 11:24 A1L-G.4 : Heterogeneous Systems with Reconfigurable Neuromorphic Computing Accelerators....125  
S. Li<sup>2</sup>, X. Liu<sup>2</sup>, M. Mao<sup>2</sup>, H. Li<sup>2</sup>, Y. Chen<sup>2</sup>, B. Li<sup>1</sup>, Y. Wang<sup>1</sup>  
<sup>1</sup>Tsinghua University, China; <sup>2</sup>University of Pittsburgh, United States
- 11:42 A1L-G.5 : Low Power Convolutional Neural Networks on a Chip....129  
Y. Wang, L. Xia, T. Tang, B. Li, S. Yao, M. Cheng, H. Yang  
Tsinghua University, China

### **A1L-H : Education**

Time: Monday, May 23 (10:30-12:00)

Place: Salon Musset

Chair(s): Joos Vandewalle - KU Leuven

- 10:30 A1L-H.1 : An Analog Integrated Systems Course Proposal for a 2nd Cycle of Studies of the Bologna Process....133  
J. Fernandes  
Instituto de Engenharia de Sistemas e Computadores - Investigação e Desenvolvimento, Portugal
- 11:06 A1L-H.3 : Introducing IC Reliability Elements in Digital Circuits and Systems Design Education....137  
F. Campi, J. Ancill  
Simon Fraser University, Canada
- 11:24 A1L-H.4 : A Remote FPAA System for Research and Education....141  
S. Shah, J. Hasler, S. Kim, I. Lal, M. Kagle, M. Collins  
Georgia Institute of Technology, United States
- 11:42 A1L-H.5 : Construction of the Nodal Conductance Matrix of a Planar Resistive Grid and Derivation of the Analytical Expressions of its Eigenvalues and Eigenvectors Using the Kronecker Product and Sum....145  
V. Tavsanoğlu  
Işık University, Turkey

### **A1L-J : INVITED: Polar-Code Decoders**

Time: Monday, May 23 (10:30-12:00)

Place: Salon Jarry

Chair(s): Warren Gross - McGill University; Ezz El-Masry - Dalhousie University

- 10:30 A1L-J.1 : Hardware Decoders for Polar Codes: an Overview... 149  
P. Giard<sup>4</sup>, G. Sarkis<sup>4</sup>, A. Balatsoukas-Stimming<sup>2</sup>, Y. Fan<sup>3</sup>, C. Tsui<sup>3</sup>, A. Burg<sup>2</sup>, C. Thibeault<sup>1</sup>, W. Gross<sup>4</sup>  
<sup>1</sup>École de Technologie Supérieure, Canada; <sup>2</sup>École Polytechnique Fédérale de Lausanne, Switzerland;  
<sup>3</sup>Hong Kong University of Science and Technology, Hong Kong; <sup>4</sup>McGill University, Canada
- 10:48 A1L-J.2 : A High Throughput Belief Propagation Decoder Architecture for Polar Codes.... 153  
J. Lin<sup>3</sup>, J. Sha<sup>3</sup>, L. Li<sup>3</sup>, C. Xiong<sup>2</sup>, Z. Yan<sup>2</sup>, Z. Wang<sup>1</sup>  
<sup>1</sup>Broadcom Corporation, United States; <sup>2</sup>Lehigh University, United States; <sup>3</sup>Nanjing University, China
- 11:06 A1L-J.3 : Belief Propagation Decoding of Polar Codes Using Stochastic Computing.... 157  
B. Yuan<sup>1</sup>, K. Parhi<sup>2</sup>  
<sup>1</sup>City University of New York, United States; <sup>2</sup>University of Minnesota, United States
- 11:24 A1L-J.4 : Joint Detection and Decoding for MIMO Systems with Polar Codes.... 161  
J. Yang<sup>2</sup>, C. Zhang<sup>2</sup>, W. Song<sup>2</sup>, S. Xu<sup>1</sup>, X. You<sup>2</sup>  
<sup>1</sup>Intel Labs, China; <sup>2</sup>Southeast University, China
- 11:42 A1L-J.5 : Architecture and Optimization of High-Throughput Belief Propagation Decoding of Polar Codes.... 165  
S. Sun, Z. Zhang  
University of Michigan, United States

### **A1L-K : INVITED: Emerging Memory II**

Time: Monday, May 23 (10:30-12:00)

Place: Salon Joyce

Chair(s): Meng-Fan Chang - National Tsing Hua University; Hai Li - University of Pittsburgh

- 10:30 A1L-K.1 : Ultra-Low-Power, High-Density Spintronic Programmable Logic (SPL).... 169  
K. Wang, H. Lee, F. Ebrahimi, P. Khalili Amiri  
University of California, Los Angeles, United States
- 10:48 A1L-K.2 : Multi-Source in-Door Energy Harvesting for Non-Volatile Processors.... 173  
C. Ding<sup>2</sup>, S. Heidari<sup>1</sup>, Y. Wang<sup>2</sup>, Y. Liu<sup>3</sup>, J. Hu<sup>1</sup>  
<sup>1</sup>Oklahoma State University, United States; <sup>2</sup>Syracuse University, United States; <sup>3</sup>Tsinghua University, China
- 11:06 A1L-K.3 : Spiking Neuromorphic Networks with Metal-Oxide Memristors.... 177  
M. Prezioso<sup>3</sup>, Y. Zhong<sup>1</sup>, D. Gavrilo<sup>2</sup>, F. Merrikh-Bayat<sup>3</sup>, B. Hoskins<sup>3</sup>, G. Adam<sup>3</sup>, K. Likharev<sup>2</sup>, D. Strukov<sup>3</sup>  
<sup>1</sup>Huazhong University of Science and Technology, China; <sup>2</sup>Stony Brook University, United States;  
<sup>3</sup>University of California, Santa Barbara, United States
- 11:24 A1L-K.4 : Built-in Selectors Self-Assembled Into Memristors.... 181  
S. Chakraborty<sup>3</sup>, S. Joshi<sup>3</sup>, Q. Xia<sup>3</sup>, H. Li<sup>4</sup>, Y. Chen<sup>4</sup>, H. Jiang<sup>2</sup>, Q. Wu<sup>1</sup>, M. Barnell<sup>1</sup>, J. Yang<sup>3</sup>  
<sup>1</sup>Air Force Research Laboratory, United States; <sup>2</sup>San Francisco State University, United States;  
<sup>3</sup>University of Massachusetts Amherst, United States; <sup>4</sup>University of Pittsburgh, United States



### **A1L-L : Communications I**

Time: Monday, May 23 (10:30-12:00)

Place: Salon Kafka-Lamartine

Chair(s): Wael Badawy - Intelliview; Tokunbo Ogunfunmi - Santa Clara University

- 10:30 A1L-L.1 : Time-Domain PLL Modeling and RJ/DJ Jitter Decomposition....185  
K. Bidaj<sup>2</sup>, J. Begueret<sup>2</sup>, N. Houdali<sup>2</sup>, J. Deroo<sup>1</sup>, S. Rieubon<sup>1</sup>  
<sup>1</sup>STMicroelectronics, France; <sup>2</sup>University of Bordeaux, France
- 10:48 A1L-L.2 : Miniaturized UWB Offset Power Divider with Reflection Cancellation and Enhanced Isolation....189  
A. Sayed, H. Ahmed, A. Eltager  
Military Technical College, Egypt
- 11:06 A1L-L.3 : 45.2% Energy Efficiency Improvement of UWB IR Tx by Use of Differential PPM in 180nm CMOS....193  
M. Pulkkinen, T. Haapala, J. Salomaa, K. Halonen  
Aalto University, Finland
- 11:24 A1L-L.4 : DC Offset Estimation for on-Off Keying Based Ultra-Low Power Non-Coherent Receivers....197  
J. Nair, A. Gore, K. Bynam, Y. Hong, C. Park, S. Yun, M. Choudhary  
Samsung Electronics Co. Ltd., India
- 11:42 A1L-L.5 : Multi-Stage 20 Gbaud Driver in 130 nm CMOS for Segmented Mach-Zehnder Optical Modulators....201  
H. Sepehrian, L. Rusch, W. Shi  
Université Laval, Canada

### **A1L-M : DC-DC Converters**

Time: Monday, May 23 (10:30-12:00)

Place: Salon 1

Chair(s): Hiroo Sekiya - Chiba University; Lei Wang - University of Connecticut

- 10:30 A1L-M.1 : All-Digital Linear Regulators with Proactive and Reactive Gain-Boosting for Supply Droop Mitigation in Digital Load Circuits....205  
S. Nasir, A. Raychowdhury  
Georgia Institute of Technology, United States
- 10:48 A1L-M.2 : Enhancement of Ozone-Generation with Modular Expansions and Dual-Drive Systems....209  
S. Huang<sup>2</sup>, P. Chiang<sup>2</sup>, T. Lee<sup>2</sup>, W. Su<sup>1</sup>  
<sup>1</sup>Kun Shan University, Taiwan; <sup>2</sup>National Cheng Kung University, Taiwan
- 11:06 A1L-M.3 : Design of a Shared-Stage Charge Pump Circuit for Multi-Anode Microbial Fuel Cells....213  
F. Qian, R. Umaz, Y. Gong, B. Li, L. Wang  
University of Connecticut, United States
- 11:24 A1L-M.4 : Five-Level Hybrid DC-DC Converter with Enhanced Light-Load Efficiency....217  
A. Abdulslam<sup>1</sup>, F. El-Sehrawy<sup>1</sup>, Y. Ismail<sup>2</sup>  
<sup>1</sup>American University in Cairo, Egypt; <sup>2</sup>American University in Cairo / Zewail City of Science and Technology, Egypt

## **A2L-A : NoC Multicores I**

Time: Monday, May 23 (13:00-14:30)

Place: Salon Drummond est

Chair(s): Magdy Bayoumi - University of Louisiana at Lafayette; Miroslav Velev - Aries Design Automation

- 13:00 A2L-A.1: An Efficient All-Digital IR-Drop Alarmer for DVFS-Based SoC....221  
L. Yu<sup>1</sup>, X. Wang<sup>1</sup>, Y. Cheng<sup>1</sup>, X. Zhao<sup>1</sup>, P. Jiao<sup>1</sup>, A. Chen<sup>1</sup>, D. Su<sup>1</sup>, L. Winemberg<sup>2</sup>, M. Sadi<sup>3</sup>, M. Tehranipoor<sup>3</sup>  
<sup>1</sup>Beihang University, China; <sup>2</sup>Freescale Semiconductor Inc, United States; <sup>3</sup>University of Florida, United States
- 13:18 A2L-A.2 : A 1V, 1.1mW Mixed-Signal Hearing Aid SoC in 0.13 $\mu$ m CMOS Process....225  
C. Chen, L. Chen, J. Fan, Z. Yu, J. Yang, X. Hu, Y. Hei, F. Zhang  
Institute of Microelectronics of Chinese Academy of Sciences, China
- 13:36 A2L-A.3 : Linux Apps-Usage-Driven Power Dissipation-Aware Scheduler....229  
Z. Hou<sup>2</sup>, C. Jong<sup>1</sup>, A. Herkersdorf<sup>3</sup>  
<sup>1</sup>Nanyang Technological University, Singapore;  
<sup>2</sup>Nanyang Technological University / Technische Universität München/TUM, Singapore;  
<sup>3</sup>Technische Universität München, Germany
- 13:54 A2L-A.4 : Dynamic SIMD Re-Convergence with Paired-Path Comparison....233  
Y. Huang<sup>2</sup>, K. Hsu<sup>2</sup>, W. Hsieh<sup>2</sup>, C. Wang<sup>1</sup>, C. Lu<sup>1</sup>, C. Chen<sup>2</sup>  
<sup>1</sup>Industrial Technology Research Institute, Taiwan; <sup>2</sup>National Cheng-Kung University, Taiwan
- 14:12 A2L-A.5 : A Task Allocation Method for the DTTR Scheme Based on Task Scheduling of Fault Patterns....237  
H. Saito<sup>3</sup>, M. Imai<sup>1</sup>, T. Yoneda<sup>2</sup>  
<sup>1</sup>Hirosaki University, Japan; <sup>2</sup>National Institute of Informatics, Japan; <sup>3</sup>University of Aizu, Japan

## **A2L-B : Compressive & Adaptive DSP**

Time: Monday, May 23 (13:00-14:30)

Place: Salon Drummond centre

Chair(s): Wu-Sheng Lu - University of Victoria; Daniel P. K. Lun - The Hong Kong Polytechnic University

- 13:00 A2L-B.1 : Security Analysis of Rakeness-Based Compressed Sensing....241  
M. Mangia<sup>2</sup>, F. Pareschi<sup>1</sup>, R. Rovatti<sup>2</sup>, G. Setti<sup>1</sup>  
<sup>1</sup>Università degli Studi di Ferrara, Italy; <sup>2</sup>Università di Bologna, Italy
- 13:18 A2L-B.2 : A Reconfigurable Parallel FPGA Accelerator for the Adapt-Then-Combine Diffusion LMS Algorithm....245  
Q. Yu<sup>2</sup>, Y. Ma<sup>2</sup>, B. Chen<sup>2</sup>, J. Principe<sup>1</sup>, N. Zheng<sup>2</sup>, P. Ren<sup>2</sup>  
<sup>1</sup>University of Florida, United States; <sup>2</sup>Xi'an Jiaotong University, China
- 13:36 A2L-B.3 : Fast Compressive Sensing Reconstruction Algorithm on FPGA Using Orthogonal Matching Pursuit....249  
Z. Yu<sup>1</sup>, J. Su<sup>1</sup>, F. Yang<sup>1</sup>, Y. Su<sup>1</sup>, X. Zeng<sup>1</sup>, D. Zhou<sup>1</sup>, W. Shi<sup>2</sup>  
<sup>1</sup>Fudan University, China; <sup>2</sup>Texas A&M University, United States
- 13:54 A2L-B.4 : Low-Complexity Proportionate Algorithms with Sparsity-Promoting Penalties....253  
T. Ferreira<sup>2</sup>, M. Lima<sup>1</sup>, P. Diniz<sup>1</sup>, W. Martins<sup>1</sup>  
<sup>1</sup>Universidade Federal do Rio de Janeiro, Brazil; <sup>2</sup>Universidade Federal Fluminense, Brazil
- 14:12 A2L-B.5 : Implicit Notch Filtering in Compressed Sensing by Spectral Shaping of Sensing Matrix....257  
M. Mangia<sup>2</sup>, F. Pareschi<sup>1</sup>, R. Rovatti<sup>2</sup>, G. Setti<sup>1</sup>  
<sup>1</sup>Università degli Studi di Ferrara, Italy; <sup>2</sup>Università di Bologna, Italy

## **A2L-C : Integration Issues**

Time: Monday, May 23 (13:00-14:30)

Place: Salon Drummond ouest

Chair(s): Danella Zhao - University of Louisiana at Lafayette; Emre Salman - Stony Brook University

- 13:00 A2L-C.1 : Area-Efficient Partial-Clique-Energy MRF Pair Design with Ultra-Low Supply Voltage....261  
Y. Li<sup>2</sup>, J. Hu<sup>2</sup>, H. Lu<sup>2</sup>, J. Chen<sup>1</sup>  
<sup>1</sup>University of Alberta, Canada; <sup>2</sup>University of Electronic Science and Technology of China, China
- 13:18 A2L-C.2 : A Novel Low-Leakage Power-Rail ESD Clamp Circuit with Adjustable Triggering Voltage and Superior False-Triggering Immunity for Nanoscale Applications....265  
G. Lu, Y. Wang, J. Cao, S. Jia, X. Zhang  
Peking University, China
- 13:36 A2L-C.3 : RC-in-RC-Out Model Order Reduction via Node Merging....269  
M. Abdel-Galil<sup>1</sup>, H. Hegazy<sup>2</sup>, Y. Ismail<sup>1</sup>  
<sup>1</sup>American University in Cairo / Zewail City of Science and Technology, Egypt; <sup>2</sup>Mentor Graphics, Inc., Egypt
- 13:54 A2L-C.4 : Exploring Circuit Robustness to Power Supply Variation in Low-Voltage Latch and Register-Based Digital Systems....273  
A. Roy, B. Calhoun  
University of Virginia, United States
- 14:12 A2L-C.5 : A Compact Ultra-Low Power Physical Unclonable Function Based on Time-Domain Current Difference Measurement....277  
S. Lin<sup>2</sup>, Y. Cao<sup>1</sup>, X. Zhao<sup>2</sup>, X. Wang<sup>2</sup>, X. Pan<sup>2</sup>  
<sup>1</sup>Hohai University, China; <sup>2</sup>Shenzhen University, China

## **A2L-D : RF Circuits**

Time: Monday, May 23 (13:00-14:30)

Place: Salon A

Chair(s): Nathan Neihart - Iowa State University

- 13:00 A2L-D.1 : A Joint Linearity-Efficiency Model of Radio Frequency Power Amplifiers....281  
H. Enzinger<sup>2</sup>, K. Freiburger<sup>2</sup>, C. Vogel<sup>1</sup>  
<sup>1</sup>FH Joanneum - University of Applied Sciences, Austria; <sup>2</sup>Graz University of Technology, Austria
- 13:18 A2L-D.2 : Wideband Noise Cancelling Balun LNA with Feedback Biasing....285  
M. Fernandes<sup>1</sup>, L. Oliveira<sup>2</sup>, J. Goes<sup>1</sup>  
<sup>1</sup>Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal;  
<sup>2</sup>Universidade Nova de Lisboa, Portugal
- 13:36 A2L-D.3 : Ultra-Low Voltage Wideband Inductorless Balun LNA with High Gain and High IP2 for Sub-GHz Applications....289  
A. Liraneto Torres Costa, H. Klimach, S. Bampi  
Universidade Federal do Rio Grande do Sul, Brazil
- 13:54 A2L-D.4 : Linear RF Apertures Using 2-D Analog Beam Filters....293  
C. Wijenayake<sup>3</sup>, A. Madanayake<sup>1</sup>, L. Belostotski<sup>2</sup>, Y. Xu<sup>2</sup>, L. Bruton<sup>2</sup>  
<sup>1</sup>University of Akron, United States; <sup>2</sup>University of Calgary, Canada; <sup>3</sup>University of New South Wales, Australia
- 14:12 A2L-D.5 : A 4th-Order Analog Continuous-Time Filter Designed Using Standard Cells and Automatic Digital Logic Design Tools....297  
S. Newton, P. Kinget  
Columbia University, United States

## **A2L-E : Amplifiers I**

Time: Monday, May 23 (13:00-14:30)

Place: Salon B

Chair(s): Igor Filanovsky - University of Alberta

- 13:00 A2L-E.1 : A Low-Power Chopper Bandpass Amplifier for Biopotential Sensors....301  
J. Zheng, W. Ki, C. Tsui  
Hong Kong University of Science and Technology, Hong Kong
- 13:18 A2L-E.3 : An Adaptive Slew Rate and Dead Zone Ring Amplifier....305  
K. Megawer<sup>1</sup>, F. Hussien<sup>2</sup>, M. Aboudina<sup>2</sup>, A. Mohieldin<sup>2</sup>  
<sup>1</sup>Cairo University, Egypt; <sup>2</sup>Electronics and Electrical Communications Engineering, Cairo University, Egypt
- 13:36 A2L-E.4 : A High Gain Decibel-Linear Programmable Gain Amplifier of Synthetic Aperture Radar Receiver....309  
K. Tang, B. Chen, L. Lou, S. Liu, Y. Wang, Y. Zhang, Y. Zheng  
Nanyang Technological University, Singapore
- 13:54 A2L-E.5 : A Compact Spatially Configurable Differential Input Stage for a Field Programmable Interconnection Network....313  
W. Hussain<sup>1</sup>, Y. Savaria<sup>1</sup>, Y. Blaqui re<sup>2</sup>  
<sup>1</sup>Polytechnique Montr al, Canada; <sup>2</sup>Univerist  du Qu bec   Montr al, Canada

## **A2L-F : BioMEMS & Lab-on-Chip**

Time: Monday, May 23 (13:00-14:30)

Place: Salon C

Chair(s): Jennifer Blain Christen - Arizona State University; Danilo Demarchi - Politecnico di Torino

- 13:00 A2L-F.1 : Combined Optical and Chemical Asynchronous Event Pixel Array....317  
P. H fliger<sup>3</sup>, G. Nabovati<sup>1</sup>, M. Sawan<sup>1</sup>, N. Wagner<sup>2</sup>, J. Greco<sup>2</sup>, R. Birge<sup>2</sup>  
<sup>1</sup>Polytechnique Montr al, Canada; <sup>2</sup>University of Connecticut, United States; <sup>3</sup>University of Oslo, Norway
- 13:18 A2L-F.2 : Minimally Invasive Pseudo-Continuous Blood Glucose Monitoring: Results from in-Vitro and in-Vivo Testing of the E-Mosquito....321  
G. Wang, M. Poscente, S. Park, C. Andrews, O. Yadid-Pecht, M. Mintchev  
University of Calgary, Canada
- 13:36 A2L-F.3 : Epigenetic-IC: a Fully Integrated Sensing Platform for Epigenetic Reaction Monitoring....325  
A. Koutsos, M. Kalofonou, M. Sohbaty, C. Toumazou  
Imperial College London, United Kingdom
- 13:54 A2L-F.4 : An ISFET-Based Switched Current DNA Integrator....329  
D. Ma, P. Georgiou, C. Toumazou  
Imperial College London, United Kingdom
- 14:12 A2L-F.5 : Time-Resolved Reflectance Using Short Source-Detector Separation....333  
S. Saha, F. Lesage, M. Sawan  
Polytechnique Montr al, Canada

## **A2L-G : INVITED: Emerging Devices**

Time: Monday, May 23 (13:00-14:30)

Place: Salon Hémon

Chair(s): Maurizio Valle - Università degli studi di Genova; Ali Ibrahim - University of Genova & Lebanese University

- 13:00 A2L-G.1 : Autonomous Smartwatch with Flexible Sensors for Accurate and Continuous Mapping of Skin Temperature....337  
M. Magno, G. Salvatore, S. Mutter, W. Farrukh, G. Troester, L. Benini  
Eidgenössische Technische Hochschule Zürich, Switzerland
- 13:18 A2L-G.2 : Design of Energy-Efficient Discrete Cosine Transform Using Pruned Arithmetic Circuits....341  
J. Schlachter, V. Camus, C. Enz  
École Polytechnique Fédérale de Lausanne, Switzerland
- 13:36 A2L-G.3 : Towards Bendable Piezoelectric Oxide Semiconductor Field Effect Transistor Based Touch Sensor....345  
S. Gupta<sup>2</sup>, H. Heidari<sup>2</sup>, L. Lorenzelli<sup>1</sup>, R. Dahiya<sup>2</sup>  
<sup>1</sup>Fondazione Bruno Kessler, United Kingdom; <sup>2</sup>University of Glasgow, United Kingdom
- 13:54 A2L-G.4 : An Event-Driven POSFET Taxel for Sustained and Transient Sensing....349  
S. Caviglia<sup>2</sup>, L. Pinna<sup>2</sup>, M. Valle<sup>2</sup>, C. Bartolozzi<sup>1</sup>  
<sup>1</sup>Istituto Italiano di Tecnologia, Italy; <sup>2</sup>Università Degli Studi Di Genova, Italy
- 14:12 A2L-G.5 : Process-Variation Tolerant Flexible Circuit for Wearable Electronics....353  
T. Huang<sup>1</sup>, K. Cheng<sup>2</sup>, R. Beausoleil<sup>1</sup>  
<sup>1</sup>Hewlett Packard Labs, United States; <sup>2</sup>University of California, Santa Barbara, United States

## **A2L-H : Neural Net I**

Time: Monday, May 23 (13:00-14:30)

Place: Salon Musset

Chair(s): Arindam Basu - Nanyang Technological University; Jennifer O. Hasler - Georgia Institute of Technology

- 13:00 A2L-H.1 : Memory-Error Tolerance of Scalable and Highly Parallel Architecture for Restricted Boltzmann Machines in Deep Belief Network....357  
K. Ueyoshi<sup>2</sup>, T. Marukame<sup>1</sup>, T. Asai<sup>2</sup>, M. Motomura<sup>2</sup>, A. Schmid<sup>1</sup>  
<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>2</sup>Hokkaido University, Japan
- 13:18 A2L-H.2 : Liquid State Machine Based Pattern Recognition on FPGA with Firing-Activity Dependent Power Gating and Approximate Computing....361  
Q. Wang, Y. Li, P. Li  
Texas A&M University, United States
- 13:36 A2L-H.3 : Learning Spatio-Temporal Patterns in the Presence of Input Noise Using Phase-Change Memristors....365  
S. Wozniak, T. Tuma, A. Pantazi, E. Eleftheriou  
IBM Research - Zurich, Switzerland
- 13:54 A2L-H.4 : Neuromorphic Implementation of Attractor Dynamics in Decision Circuit with NMDARs....369  
H. You<sup>2</sup>, D. Wang<sup>2</sup>  
<sup>1</sup>Beijing Normal University, China; <sup>2</sup>University of Electronic Science and Technology of China, China
- 14:12 A2L-H.5 : A VLSI Implementation of a Calcium-Based Plasticity Learning Model....373  
F. Maldonado Huayaney, E. Chicca, Universität Bielefeld, Germany

### **A2L-J : INVITED: Memristors I**

Time: Monday, May 23 (13:00-14:30)

Place: Salon Jarry

Chair(s): Ronald Tetzlaff - TU Dresden; Alon Ascoli - TU Dresden

- 13:00 A2L-J.1 : Memristors as Radiofrequency Switches....377  
S. Pi, M. Ghadiri-Sadrabadi, J. Bardin, Q. Xia  
University of Massachusetts Amherst, United States
- 13:18 A2L-J.2 : Versatile Resistive Switching in Niobium Oxide....381  
T. Mikolajick<sup>2</sup>, H. Wylezich<sup>1</sup>, H. Maehne<sup>1</sup>, S. Slesazek<sup>1</sup>  
<sup>1</sup>NaMLab gGmbH, Germany; <sup>2</sup>NaMLab gGmbH and Technische Universität Dresden, Germany
- 13:36 A2L-J.3 : Resistance Impact by Long Connections on Electrical Behavior of Integrated Memristive Biosensors....385  
I. Tzouvardaki<sup>1</sup>, A. Vallero<sup>2</sup>, F. Puppo<sup>1</sup>, G. De Micheli<sup>1</sup>, S. Carrara<sup>1</sup>  
<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>2</sup>Politecnico di Torino, Italy
- 13:54 A2L-J.4 : Memristor Models for SPICE Simulation of Extremely Large Memristive Networks....389  
D. Biolek, Z. Kolka, V. Biolkova, Z. Biolek  
Brno University of Technology, Czech Rep.
- 14:12 A2L-J.5 : HfO<sub>2</sub>-Based Memristors for Neuromorphic Applications....393  
E. Covi<sup>1</sup>, S. Brivio<sup>1</sup>, A. Serb<sup>2</sup>, T. Prodromakis<sup>2</sup>, M. Fanciulli<sup>1</sup>, S. Spiga<sup>1</sup>  
<sup>1</sup>Institute for Microelectronics and Microsystems, Italy; <sup>2</sup>University of Southampton, United Kingdom

### **A2L-K : INVITED: Emerging Transistors**

Time: Monday, May 23 (13:00-14:30)

Place: Salon Joyce

Chair(s): Shimeng Yu - Arizona State University; Robert Chen-Hao Chang - National Chung Hsing University and National Chi Nan University

- 13:00 A2L-K.1 : Opportunities and Challenges of Tunnel FETs....397  
S. Datta<sup>3</sup>, R. Pandey<sup>2</sup>, S. Mookerjee<sup>1</sup>  
<sup>1</sup>Micron Technology Inc., United States; <sup>2</sup>Pennsylvania State University, United States;  
<sup>3</sup>University of Notre Dame / Pennsylvania State University, United States
- 13:18 A2L-K.2 : Impact of CNT Process Imperfection on Circuit-Level Functionality and Yield....401  
K. Sheikh<sup>2</sup>, S. Han<sup>1</sup>, L. Wei<sup>2</sup>  
<sup>1</sup>IBM Thomas J. Watson Research Center, United States; <sup>2</sup>University of Waterloo, Canada
- 13:36 A2L-K.3 : Digital, Analog and RF Design Opportunities of Three-Independent-Gate Transistors....405  
P. Gaillardon<sup>2</sup>, M. Hasan<sup>2</sup>, A. Saha<sup>2</sup>, L. Amarú<sup>1</sup>, R. Walker<sup>2</sup>, B. Sensale Rodriguez<sup>2</sup>  
<sup>1</sup>Synopsys Inc., United States; <sup>2</sup>University of Utah, United States
- 13:54 A2L-K.4 : Flexible 2D Nanoelectronics from Baseband to sub-THz transistors and Circuits....409  
W. Zhu, S. Park, H. Chang, M. Yogeesh, D. Akinwande  
University of Texas at Austin, United States

## **A2L-L : Communications II**

Time: Monday, May 23 (13:00-14:30)

Place: Salon Kafka-Lamartine

Chair(s): Ji-Hoon Kim - Seoul National University of Science and Technology; Xinmiao Zhang - Case Western Reserve University

- 13:00 A2L-L.1 : Pipelined Belief Propagation Polar Decoders....413  
J. Yang, C. Zhang, H. Zhou, X. You  
Southeast University, China
- 13:18 A2L-L.2 : A Scalable 3-Phase Polar Decoder....417  
B. Le Gal, C. Leroux, C. Jégo  
Institut polytechnique de Bordeaux / University of Bordeaux, France
- 13:36 A2L-L.3 : Stage-Combined Belief Propagation Decoding of Polar Codes....421  
J. Sha<sup>2</sup>, J. Lin<sup>2</sup>, Z. Wang<sup>1</sup>  
<sup>1</sup>Broadcom Corporation, United States; <sup>2</sup>Nanjing University, China
- 13:54 A2L-L.4 : Construction of Parallelized-Decoding LDPC Codes....425  
T. Wu, C. Lee, C. Wang  
National Chung Cheng University, Taiwan
- 14:12 A2L-L.5 : Low-Complexity Turbo Product Code for High-Speed Fiber-Optic Systems Based on Expurgated BCH Codes....429  
F. Paludi<sup>1</sup>, D. Morero<sup>2</sup>, T. Goette<sup>1</sup>, M. Schnidrig<sup>1</sup>, F. Ramos<sup>1</sup>, M. Hueda<sup>2</sup>  
<sup>1</sup>Clariphy Argentina S.A., Argentina; <sup>2</sup>Universidad Nacional de Córdoba, Conicet, Argentina

## **A2L-M : Power Converters I**

Time: Monday, May 23 (13:00-14:30)

Place: Salon 1

Chair(s): Marian Kazimierzczuk - Wright State University; Abdelali El Aroudi - Universitat Rovira i Virgili

- 13:00 A2L-M.1 : Small-Signal Analysis of Closed-Loop PWM Boost Converter in CCM with Complex Impedance Load....433  
D. Saini<sup>2</sup>, A. Ayachit<sup>2</sup>, M. Kazimierzczuk<sup>2</sup>, H. Sekiya<sup>1</sup>  
<sup>1</sup>Chiba University, Japan; <sup>2</sup>Wright State University, United States
- 13:18 A2L-M.2 : Design of Class-E Power Amplifier with Nonlinear Components by Using Extended Impedance Method....437  
J. Liang  
ShanghaiTech University, China
- 13:36 A2L-M.3 : Prediction of Subharmonic Oscillation in Switching Regulators with Integrative Feedback Loops....441  
A. El Aroudi  
Universitat Rovira i Virgili, Spain
- 13:54 A2L-M.4 : A 93.7% Peak Efficiency DC-DC Buck Converter with All-Pass Network Based Passive Level Shifter in 55nm CMOS....445  
X. Hao, F. Yang, M. He, Y. Zheng, Y. Guo, H. Liao  
Peking University, China

### **A3P-0 : Demos I**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Kea-Tiong Samuel Tang - National Tsing Hua University; Guoxing Wang - Shanghai Jiao Tong University

A3P-0.1 : Live Demonstration: Real-Time Image Classification on a Neuromorphic Computing System with Zero Off-Chip Memory Access....449

T. Shin, Y. Kang, S. Yang, S. Kim, J. Chung Incheon National University, Korea, South

A3P-0.2 : Live Demonstration: Programmable Vision Chip with Neighborhood Level Parallel Processing....450

M. Gharzai, J. Schmitz, S. Balkir, M. Hoffman University of Nebraska-Lincoln, United States

A3P-0.3 : Live Demonstration: Off-Chip Learning for Hardware Hand-Sign Recognition System....451

M. Tamaki, H. Hikawa Kansai University, Japan

A3P-0.4 : Live Demonstration: Event-Driven Deep Neural Network Hardware System for Sensor Fusion....452

I. Kiselev, D. Neil, S. Liu

Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland

A3P-0.5 : Live Demonstration: Single-Exposure HDR Image Acquisition Based on Tunable Balance Between Local and Global Adaptation....453

J. Fernández-Berni, R. Carmona-Galán, . Rodríguez-Vázquez,. Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain

A3P-0.6 : Live Demonstration: Run-Time Visualization of Kvazaar HEVC Intra Encoder....454

M. Viitanen, A. Koivula, J. Vanne, T. Hämmäläinen Tampere University of Technology, Finland

A3P-0.7 : Ultra-Low Bandwidth Video Streaming Using a Neuromorphic, Scene-Driven Image Sensor....455

L. Chotard<sup>1</sup>, X. Lagorce<sup>1</sup>, C. Posch<sup>2</sup>

<sup>1</sup>Chronocam SA, France; <sup>2</sup>Sorbonne Universités UPMC Paris 6, France

A3P-0.8 : Live Demonstration: a Dynamic Vision Sensor with Direct Logarithmic Output and Full-Frame Picture-on-Demand....456

M. Guo, R. Ding, S. Chen Nanyang Technological University, Singapore

A3P-0.9 : Live Demonstration: 150Mbps+ DCO-OFDM VLC....457

M. Figueiredo<sup>1</sup>, C. Ribeiro<sup>1</sup>, L. Alves<sup>2</sup>

<sup>1</sup>Instituto Politécnico de Leiria, Portugal; <sup>2</sup>Universidade de Aveiro, Portugal

### **A3P-P : Analog I**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Igor Filanovsky - University of Alberta

A3P-P.2 : A 1.2-V 43.2- $\mu$ W Three-Stage Amplifier with Cascode Miller-Compensation and Q-Reduction for Driving Large Capacitive Load....458

Q. Cheng<sup>3</sup>, H. Zhang<sup>1</sup>, L. Xue<sup>1</sup>, J. Guo<sup>2</sup>

<sup>1</sup>Sun Yat-sen University, China; <sup>2</sup>Sun Yat-sen University / SYSU-CMU International Joint Research Institute, China;

<sup>3</sup>Sun Yat-sen University / University of Texas at Dallas, United States

A3P-P.3 : A Wide Dynamic Range Low Power 2 $\times$  Time Amplifier Using Current Subtraction Scheme....462

H. Molaei, A. Khorami, K. Hajsadeghi

Sharif University of Technology, Iran



A3P-P.4 : A Generic Model for Constructing Three-Stage Amplifiers....	466
M. Tan, W. Ki	
Hong Kong University of Science and Technology, Hong Kong	
A3P-P.5 : An Investigation of THD of a BTL Class D Amplifier....	470
T. Ge, H. He, J. Zhou, Y. Kang, J. Chang	
Nanyang Technological University, Singapore	
A3P-P.6 : Using “Reconciliation” Model for Calculation of Harmonics in a MOS Transistor Stage Operating in Moderate Inversion....	474
I. Filanovsky <sup>2</sup> , L. Oliveira <sup>1</sup>	
<sup>1</sup> Universidade Nova de Lisboa, Portugal; <sup>2</sup> University of Alberta, Canada	
A3P-P.7 : Frequency-Encoded Integrators Applied to Filtering and Sigma-Delta Modulation....	478
L. Hernandez, E. Gutierrez, F. Cardes	
Universidad Carlos III de Madrid, Spain	
A3P-P.8 : A Power-Scalable Zero-Crossing-Based Amplifier Using Inverter-Based Zero-Crossing Detector with CMFB....	482
J. Matsuno, D. Kurose, T. Sugimoto, H. Ishii, M. Furuta, T. Itakura	
Toshiba Corporation, Japan	
A3P-P.9 : Low-Power Analog Lock-in Amplifier for High-Resolution Portable Sensing Systems....	486
P. Maya-Hernández <sup>1</sup> , M. Sanz-Pascual <sup>1</sup> , B. Calvo <sup>2</sup>	
<sup>1</sup> Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico; <sup>2</sup> Universidad de Zaragoza, Spain	
A3P-P.10 : Enhancing the Performance of Output-Capacitorless LDO Regulators by Pass-Transistor Segmentation....	490
V. Shirmohammadi <sup>2</sup> , A. Saberhari <sup>2</sup> , H. Martínez-García <sup>1</sup> , E. Alarcón <sup>1</sup>	
<sup>1</sup> Universitat Politècnica de Catalunya, Spain; <sup>2</sup> University of Guilan, Iran	
A3P-P.11 : A 200ns Settling Time Fully Integrated Low Power LDO Regulator with Comparators as Transient Enhancement....	494
M. Amayreh <sup>1</sup> , J. Leicht <sup>2</sup> , Y. Manoli <sup>1</sup>	
<sup>1</sup> Albert-Ludwigs-Universität Freiburg, Germany; <sup>2</sup> Universität Freiburg, Germany	
A3P-P.12 : 3.7μW 0.8V VCO-Integrator-Based High-Efficiency Capacitor-Free Low-Dropout Voltage Regulator....	498
Z. Dai, S. Gupta, S. Kalani, P. Kinget	
Columbia University, United States	
A3P-P.13 : A 1-V PTAT Current Reference Circuit with 0.05%/V Current Sensitivity to VDD...	502
J. De la Cruz <sup>1</sup> , A. Aita <sup>2</sup>	
<sup>1</sup> Unitec Semicondutores S.A, Brazil; <sup>2</sup> Universidade Federal de Santa Maria, Brazil	
A3P-P.14 : A High Wide Band PSRR and Fast Start-Up Current Mode Bandgap Reference in 130nm CMOS Technology....	506
A. Kamel, A. Saad, S. Lee	
Symmid Corporation, Malaysia	
A3P-P.15 : A Nano-Ampere 2nd Order Temperature-Compensated CMOS Current Reference Using Only Single Resistor for Wide-Temperature Range Applications....	510
T. Kim, T. Briant, C. Han, N. Maghari	
University of Florida, United States	

### **A3P-Q : Neural Recording**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Arindam Basu - Nanyang Technological University; Pantelis Georgiou - Imperial College

A3P-Q.1 : A Current Controlled Oscillator Based Readout Front-End for Neurochemical Sensing in 65nm CMOS Technology....514

O. Olabode, M. Kosunen, K. Halonen

Aalto University, Finland

A3P-Q.2 : A Low Power Charge Mode Compressive Acquisition of Multichannel EEG Signals....518

B. Kaliannan<sup>2</sup>, V. Pasupureddi<sup>1</sup>

<sup>1</sup>Carinthia University of Applied Sciences, Austria;

<sup>2</sup>International Institute of Information Technology, Hyderabad, India

A3P-Q.3 : Low-Power EEG Monitor Based on Compressed Sensing with Compressed Domain Noise Rejection....522

N. Bertoni<sup>1</sup>, B. Senevirathna<sup>3</sup>, F. Pareschi<sup>1</sup>, M. Mangia<sup>2</sup>, R. Rovatti<sup>2</sup>, P. Abshire<sup>3</sup>, J. Simon<sup>3</sup>, G. Setti<sup>1</sup>

<sup>1</sup>Università degli Studi di Ferrara, Italy; <sup>2</sup>Università di Bologna, Italy;

<sup>3</sup>University of Maryland, College Park, United States

A3P-Q.5 : A Multi-Channel EEG System Featuring Single-Wire Data Aggregation via FM-FDM Techniques....526

J. Warchall<sup>2</sup>, A. Balakrishnan<sup>2</sup>, O. Balkan<sup>2</sup>, P. Mercier<sup>2</sup>, H. Garudadri<sup>2</sup>, W. Hairston<sup>3</sup>, P. Theilmann<sup>1</sup>

<sup>1</sup>Maxentric Technologies, United States; <sup>2</sup>University of California, San Diego, United States;

<sup>3</sup>US Army Research Laboratory, United States

A3P-Q.6 : The Design of 8-Channel CMOS Area-Efficient Low-Power Current-Mode Analog Front-End Amplifier for EEG Signal Recording....530

Y. Sung, W. Chen, C. Wu

National Chiao Tung University, Taiwan

A3P-Q.7 : Continuous-Time Micropower Interface for Neural Recording Applications....534

M. Elia, L. Leene, T. Constandinou

Imperial College London, United Kingdom

A3P-Q.8 : Clockless Continuous-Time Neural Spike Sorting: Method, Implementation and Evaluation....538

Y. Liu<sup>1</sup>, J. Pereira<sup>2</sup>, T. Constandinou<sup>1</sup>

<sup>1</sup>Imperial College London, United Kingdom; <sup>2</sup>Universidade de Lisboa, Portugal

### **A3P-R : Communications IV**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Joseph Cavallaro - Rice University; Qiaoyan Yu - University of New Hampshire

A3P-R.2 : Charge Recovery Logic for Thermal Harvesting Applications....542

L. Filippini, B. Taskin

Drexel University, United States

A3P-R.3 : Signal, Noise and Interference Power Analysis in MRT-Based Massive MIMO Systems....546

C. Desset

IMEC, Belgium

A3P-R.5 : Architecture Design and Implementation of Key Components of an OFDM Transceiver for IEEE 802.15.4g....550

D. Alves, G. Da Silva, E. de Lima, C. Chaves, D. Urdaneta, T. Perez, M. Garcia

Eldorado Research Institute, Brazil

A3P-R.6 : Efficient Differential Fault Analysis Attacks to AES Decryption for Low Cost Sensors in IoTs....554

L. Zhu<sup>2</sup>, Y. Wang<sup>1</sup>, R. Li<sup>2</sup>

<sup>1</sup>Agency for Science, Technology and Research, Singapore; <sup>2</sup>Hunan University, China

A3P-R.7 : Low-Cost Configurable Ring Oscillator PUF with Improved Uniqueness....558

Y. Cui<sup>1</sup>, C. Wang<sup>1</sup>, W. Liu<sup>1</sup>, Y. Yu<sup>1</sup>, M. O'Neill<sup>3</sup>, F. Lombardi<sup>2</sup>

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<sup>3</sup>Queen's University Belfast, United Kingdom

A3P-R.8 : Fault Attack on FPGA Implementations of Trivium Stream Cipher....562

F. Potestad-Ordóñez, C. Jiménez-Fernández, M. Valencia-Barrero

Universidad de Sevilla, Spain

### **A3P-S : Multimedia I**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Shao-Yi Chien - National Taiwan University

A3P-S.2 : A Fast Sub-Pixel Motion Estimation Algorithm for HEVC....566

S. Jia<sup>1</sup>, W. Ding<sup>1</sup>, Y. Shi<sup>1</sup>, B. Yin<sup>2</sup>

<sup>1</sup>Beijing University of Technology, China; <sup>2</sup>Dalian University of Technology, China

A3P-S.3 : Hierarchical Temporal Dependent Rate-Distortion Optimization for Low-Delay Coding....570

Y. Gao, C. Zhu, S. Li

University of Electronic Science and Technology of China, China

A3P-S.4 : Energy-Aware Cache Assessment of HEVC Decoding....574

E. Monteiro<sup>2</sup>, M. Grellert<sup>2</sup>, S. Bampi<sup>2</sup>, B. Zatt<sup>1</sup>

<sup>1</sup>Universidade Federal de Pelotas, Brazil; <sup>2</sup>Universidade Federal do Rio Grande do Sul, Brazil

A3P-S.5 : Partially-Occluded Face Recognition Using Weighted Module Linear Regression Classification....578

Y. Chou, J. Yang

National Cheng Kung University, Taiwan

A3P-S.6 : Parallel Randomized KD-Tree Forest on GPU Cluster for Image Descriptor Matching....582

L. Hu<sup>1</sup>, S. Nooshabadi<sup>1</sup>, M. Ahmadi<sup>2</sup>

<sup>1</sup>Michigan Technological University, United States; <sup>2</sup>University of Windsor, Canada

A3P-S.7 : Pose-Invariant Face Recognition Using Feature Progressing Model....586

J. Si, W. Li

University of Science and Technology of China, China

A3P-S.8 : Multiview Emotion Recognition via Multi-Set Locality Preserving Canonical Correlation Analysis....590

N. Elmadany, Y. He, L. Guan

Ryerson University, Canada

## **A3P-T : Nanoelectronics I**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Thanos Stouraitis - Khalifa University, UAE, and University of Patras; Robert Chen-Hao Chang - National Chung Hsing University and National Chi Nan University

A3P-T.1 : Ultra-Compact SRAM Design Using TFETs for Low Power Low Voltage Applications....594

N. Gupta<sup>3</sup>, A. Makosiej<sup>1</sup>, A. Vladimirescu<sup>2</sup>, A. Amara<sup>2</sup>, C. Anghel<sup>2</sup>

<sup>1</sup>CEA-Leti, France; <sup>2</sup>Institut Superieur d'Electronique de Paris, France;

<sup>3</sup>Institut Superieur d'Electronique de Paris / CEA-Leti, France

A3P-T.2 : A Nano-Scale 2xVDD I/O Buffer with Encoded PV Compensation Technique....598

T. Tsai, Y. Teng, C. Wang

National Sun Yat-Sen University, Taiwan

A3P-T.3 : Algorithm for Fault Localization on a Digital Microfluidic Biochip

Using Particle Swarm Optimization Technique....602

S. Mukherjee<sup>3</sup>, I. Pan<sup>2</sup>, T. Samanta<sup>1</sup>

<sup>1</sup>Indian Institute of Engineering Science and Technology, Shibpur, India;

<sup>2</sup>RCC Institute of Information Technology, India;

<sup>3</sup>Techno India, Salt Lake, India

A3P-T.4 : Comparative Analysis of Robustness of Spin Transfer Torque Based Look Up Tables

Under Process Variations....606

R. Kuttappa<sup>3</sup>, H. Homayoun<sup>1</sup>, H. Salmani<sup>2</sup>, H. Mahmoodi<sup>3</sup>

<sup>1</sup>George Mason University, United States;

<sup>2</sup>Howard University, United States; <sup>3</sup>San Francisco State University, United States

A3P-T.5 : Binary Descriptor Based SIFT and Hardware Implementation....610

C. Wu, C. Chiu, Y. Hsu

National Tsing Hua University, Taiwan

A3P-T.6 : Low-Complexity SIMO Buck-Boost DC-DC Converter for Gigascale Systems....614

R. Chang, W. Chen, C. Siao, H. Wu

National Chung Hsing University, Taiwan

A3P-T.7 : 3D IC Design of a Fully Integrated Four-Phase Buck Converter....618

R. Chang, C. Siao, W. Chen, W. Hong

National Chung Hsing University, Taiwan

A3P-T.8 : Block Based Depth Map Estimation Algorithm for 2D-to-3D Conversion on FPGA....622

Y. Lai, C. Ho, B. Freiling, T. Schumann

National Chung Hsing University, Taiwan

### **A3P-U : PECAS I**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Shyh-Jier Huang - National Cheng Kung University; Xiaozhe Wang - Cornell University

- A3P-U.1 : Investigating Wind Speed-Dependent Models for Electric Power Transmission Lines....626  
S. Jagarlapudi, V. Cecchi University of North Carolina at Charlotte, United States
- A3P-U.2 : A Measurement System for Electric Car Charging Stations Utilising a FPGA Board  
for Flexibility in Configuration....630  
I. Stoychev, J. Tebbe, J. Oehm  
Ruhr-Universität Bochum, Germany
- A3P-U.3 : Towards Detection and Control of Hopf Bifurcation in Electric Power System....634  
X. Wang Massachusetts Institute of Technology, United States
- A3P-U.4 : System-Level Exploration of Hierarchical Storage Organizations for Embedded Data-Intensive Applications....638  
F. Balasa<sup>1</sup>, H. Zhu<sup>2</sup>  
<sup>1</sup>American University in Cairo, Egypt; <sup>2</sup>ARM, Inc., United States
- A3P-U.5 : On Tunable Switch-Mode Reactive Networks: a Gyrator-Based Resonator Emulation....642  
M. Saad, N. Egidios, E. Bou-Balust, E. Alarcón  
Universitat Politècnica de Catalunya, Spain
- A3P-U.6 : Design Procedure for Wireless Power Transfer System with Inductive Coupling-Coil Optimizations  
Using PSO....646  
T. Noda<sup>1</sup>, T. Nagashima<sup>1</sup>, X. Wei<sup>2</sup>, M. Kazimierczuk<sup>3</sup>, H. Sekiya<sup>1</sup>  
<sup>1</sup>Chiba University, Japan; <sup>2</sup>Nagasaki University, Japan; <sup>3</sup>Wright State University, United States
- A3P-U.7 : Energy Harvesting Using Symmetrical Electrostatic Generators....650  
A. de Queiroz Universidade Federal do Rio de Janeiro, Brazil
- A3P-U.8 : A 96.7% Efficient Boost Converter with a Stand-by Current of 420nA for Energy Harvesting Applications....654  
D. Schillinger, Y. Hu, M. Amayreh, C. Moranz, Y. Manoli  
Albert-Ludwigs-Universität Freiburg, Germany
- A3P-U.9 : Dual Band Wireless Power and Bi-Directional Data Link for Implanted Devices in 65 nm CMOS....658  
V. Talla, V. Ranganathan, B. Mahoney, J. Smith University of Washington, United States

### **A3P-V : Nonlinear CAS V**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Herbert Ho Ching lu - University of Western Australia

- A3P-V.1 : AFSEM: Advanced Frequent Subcircuit Extraction Method by Graph Mining Approach  
for Optimized Cell Library Developments....662  
B. Kim<sup>2</sup>, H. Won<sup>1</sup>, T. Han<sup>2</sup>, J. Yang<sup>2</sup>  
<sup>1</sup>Samsung Electronics Co. Ltd., Korea, South; <sup>2</sup>Sungkyunkwan University, Korea, South
- A3P-V.2 : Global Resource Capacity Algorithm with Path Splitting for Virtual Network Embedding....666  
S. Haeri, Q. Ding, Z. Li, L. Trajkovic  
Simon Fraser University, Canada
- A3P-V.4 : Some Results on Stochastic Input-to-State Stability of Stochastic Switched Nonlinear Systems....670  
G. Zong<sup>2</sup>, Z. Ai<sup>2</sup>, W. Zheng<sup>3</sup>, J. Lü<sup>1</sup>  
<sup>1</sup>Chinese Academy of Sciences, China; <sup>2</sup>Qufu Normal University, China; <sup>3</sup>Western Sydney University, Australia

A3P-V.5 : An Effective Generator-Allocating Method to Enhance the Robustness of Power Grid....674

X. Zhang, C. Tse

Hong Kong Polytechnic University, Hong Kong

A3P-V.6 : Mitigating Bad Data and Measurement Delay in Nonlinear Dynamic State Estimation....678

P. Hajiyani<sup>1</sup>, H. Lev-Ari<sup>1</sup>, A. Stankovic<sup>2</sup>

<sup>1</sup>Northeastern University, United States; <sup>2</sup>Tufts University, United States

A3P-V.8 : Switched-Current Fractional-Order Filter Designs....682

G. Tsirimokou<sup>1</sup>, C. Psychalinos<sup>1</sup>, A. Elwakil<sup>2</sup>

<sup>1</sup>University of Patras, Greece; <sup>2</sup>University of Sharjah, U.A.E.

A3P-V.9 : A Bivariate Fractal Interpolation Surface with an Individual Vertical Scaling Factor....686

H. Okazaki, S. Ueno, H. Nakano

Shonan Institute of Technology, Japan

A3P-V.10 : Modelling and Characterization of Dynamic Behavior of Coupled Memristor Circuits....690

J. Eshraghian<sup>3</sup>, H. Lu<sup>3</sup>, T. Fernando<sup>3</sup>, D. Yu<sup>2</sup>, Z. Li<sup>1</sup>

<sup>1</sup>Beijing Institute of Technology, China; <sup>2</sup>China University of Mining and Technology, China;

<sup>3</sup>University of Western Australia, Australia

#### **A3P-W : VLSI IV**

Time: Monday, May 23 (14:30-16:00)

Place: Salle de bal est

Chair(s): Meng-Fan Chang - National Tsing Hua University; Chuan Zhang - Southeast University

A3P-W.1 : A Novel Fast, Low-Power and High-Performance XOR-XNOR Cell....694

M. Amini Valashani, S. Mirzakuchaki

Iran university of science and technology, Iran

A3P-W.2 : Area-Efficient and Low Stand-by Power 1K-Byte Transmission-Gate-Based....698

Non-Imprinting High-Speed Erase (TNIHE) SRAM

W. Ho, K. Ne, N. Srinivas, K. Chong, T. Kim, B. Gwee

Nanyang Technological University, Singapore

A3P-W.3 : A Reduced Hardware Complexity Data-Weighted Averaging Algorithm with No Tonal Behavior....702

A. Celin, A. Gerosa

Università degli Studi di Padova, Italy

A3P-W.4 : Implementation of Efficient Parallel Discrete Cosine Transform Using Stochastic Logic....706

Y. Li<sup>2</sup>, J. Hu<sup>2</sup>, J. Chen<sup>1</sup>

<sup>1</sup>University of Alberta, Canada; <sup>2</sup>University of Electronic Science and Technology of China, China

A3P-W.5 : Class D CMOS Power Amplifier with On/Off Logic for a Multilevel Outphasing Transmitter....710

M. Martelius<sup>1</sup>, K. Stadius<sup>1</sup>, J. Lemberg<sup>1</sup>, T. Nieminen<sup>1</sup>, E. Roverato<sup>1</sup>, M. Kosunen<sup>1</sup>, J. Ryyänen<sup>1</sup>, L. Anttila<sup>2</sup>,

M. Valkama<sup>2</sup>

<sup>1</sup>Aalto University, Finland; <sup>2</sup>Tampere University of Technology, Finland

A3P-W.6 : Intra Mode Power Saving Methodology for CGRA-Based Reconfigurable Processor Architectures....714

N. Miniskar<sup>2</sup>, R. Patil<sup>2</sup>, R. Gadde<sup>2</sup>, Y. Cho<sup>1</sup>, S. Kim<sup>1</sup>, S. Lee<sup>1</sup>

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A3P-W.7 : A 16-Valued Logic FPGA Architecture Employing Analog Memory Circuit....718

R. Zhang, M. Kaneko

Japan Advanced Institute of Science and Technology, Japan

- A3P-W.8 : SiGe HBT X-Band and Ka-Band Switchable Dual-Band Low Noise Amplifier....722  
P. Candra, T. Xia  
University of Vermont, United States
- A3P-W.9 : An Energy-Efficient Subthreshold Level Shifter with a Wide Input Voltage Range....726  
Y. Cao<sup>1</sup>, W. Ye<sup>2</sup>, X. Zhao<sup>2</sup>, P. Deng<sup>3</sup>  
<sup>1</sup>Hohai University, China; <sup>2</sup>Shenzhen University, China; <sup>3</sup>Wuhan Institute of Technology, China
- A3P-W.10 : Design of an Optimized Reversible Bidirectional Barrel Shifter....730  
S. Nowrin, L. Jamal, H. Hasan Babu  
University of Dhaka, Bangladesh
- A3P-W.11 : Luminance-Adaptive Smart Video Storage System....734  
J. Edstrom, D. Chen, J. Wang, H. Gu, E. Alvarez Vazquez, M. McCourt, N. Gong  
North Dakota State University, United States
- A3P-W.12 : Robust Near-Threshold Inverter with Improved Performance for Ultra-Low Power Applications....738  
M. Hossain, I. Savidis  
Drexel University, United States

#### **A4L-A : Testing & Security I**

Time: Monday, May 23 (16:00-17:30)

Place: Salon Drummond est

Chair(s): Xinmiao Zhang - Case Western Reserve University; Zhiyuan Yan - Lehigh University

- 16:00 A4L-A.1 : An Efficient Framework for Configurable RO PUF....742  
Z. Chen<sup>1</sup>, Y. Cai<sup>1</sup>, Q. Zhou<sup>1</sup>, G. Qu<sup>2</sup>  
<sup>1</sup>Tsinghua University, China; <sup>2</sup>University of Maryland, College Park, United States
- 16:18 A4L-A.2 : Asynchronous Interleaved Scan Architecture for on-Line Built-in Self-Test of Null Convention Logic....746  
N. Nemati<sup>3</sup>, M. Reed<sup>3</sup>, K. Fant<sup>1</sup>, P. Beckett<sup>2</sup>  
<sup>1</sup>Karl Fant, United States; <sup>2</sup>RMIT University, Australia; <sup>3</sup>University of New South Wales, Australia
- 16:36 A4L-A.3 : Multi-Threshold Dual-Spacer Dual-Rail Delay-Insensitive Logic: an Improved IC Design Methodology for Side Channel Attack Mitigation....750  
J. Habimana, F. Sabado, J. Di  
University of Arkansas, United States
- 16:54 A4L-A.4 : Automatic Generation of Functional Coverage Models....754  
E. El Mandouh<sup>2</sup>, A. Wassal<sup>1</sup>  
<sup>1</sup>Cairo University, Egypt; <sup>2</sup>Mentor Graphics Corporate, Egypt
- 17:12 A4L-A.5 : Implementation of Pseudo Linear Feedback Shift Register Physical Unclonable Function on Silicon....758  
Y. Ogasahara, Y. Hori, H. Koike  
National Institute of Advanced Industrial Science and Technology, Japan

### **A4L-B : Audio-Signal Processing**

Time: Monday, May 23 (16:00-17:30)

Place: Salon Drummond centre

Chair(s): Tokunbo Ogunfunmi - Santa Clara University

- 16:00 A4L-B.1 : Single Channel Speech Enhancement Using Subband Iterative Kalman Filter....762  
S. Roy<sup>1</sup>, W. Zhu<sup>1</sup>, B. Champagne<sup>2</sup>  
<sup>1</sup>Concordia University, Canada; <sup>2</sup>McGill University, Canada
- 16:18 A4L-B.2 : On the Use of Discrete Wavelet Transform for Robust Scalable Speech Coding....766  
T. Ogunfunmi, K. Seto  
Santa Clara University, United States
- 16:36 A4L-B.3 : Instantaneous Pitch Estimation of Noisy Speech Signal with Multivariate SST....770  
M. Molla<sup>1</sup>, M. Qaosar<sup>1</sup>, K. Hirose<sup>2</sup>  
<sup>1</sup>University of Rajshahi, Bangladesh; <sup>2</sup>University of Tokyo, Japan
- 16:54 A4L-B.4 : MVDR Beamformer Analysis of Acoustic Vector Sensor with Single Directional Interference....774  
J. Cao, X. Lai  
Hangzhou Dianzi University, China
- 17:12 A4L-B.5 : A New Two-Stage Method for Single-Microphone Speech Dereverberation....778  
A. Baghaki<sup>2</sup>, M. Ahmad<sup>1</sup>, M. Swamy<sup>1</sup>  
<sup>1</sup>Concordia University, Canada; <sup>2</sup>McGill University, Canada

### **A4L-C : Low Power**

Time: Monday, May 23 (16:00-17:30)

Place: Salon Drummond ouest

Chair(s): Abdullah Baz - Umm Al-Qura University; Qiaoyan Yu - University of New Hampshire

- 16:00 A4L-C.1 : Multi-Bit Flip-Flop Generation Considering Multi-Corner Multi-Mode Timing Constraint....782  
T. Lee<sup>2</sup>, J. Yi<sup>1</sup>, J. Yang<sup>2</sup>  
<sup>1</sup>Samsung Electronics Co. Ltd., Korea, South; <sup>2</sup>Sungkyunkwan University, Korea, South
- 16:18 A4L-C.2 : On-Chip Hybrid Regulator Topology for Portable SoCs with Near-Threshold Operation....786  
Y. Park, E. Salman  
Stony Brook University, United State
- 16:36 A4L-C.3 : MEMS-Based Power Delivery Control for Bursty Applications....790  
H. Alrudainy<sup>1</sup>, A. Mokhov<sup>1</sup>, N. Dahir<sup>2</sup>, A. Yakovlev<sup>1</sup>  
<sup>1</sup>University of Newcastle, United Kingdom; <sup>2</sup>University of York, United Kingdom
- 16:54 A4L-C.4 : Evaluation of Multi-Level Buck Converters for Low-Power Applications....794  
A. Abdulslam<sup>1</sup>, S. Amer<sup>1</sup>, A. Emara<sup>1</sup>, Y. Ismail<sup>2</sup>  
<sup>1</sup>American University in Cairo, Egypt; <sup>2</sup>American University in Cairo / Zewail City of Science and Technology, Egypt



#### **A4L-D : Coding & Standards**

Time: Monday, May 23 (16:00-17:30)

Place: Salon A

Chair(s): Wen-Hsiao Peng - National Chiao Tung University; Jiangtao Wen - Tsinghua University

- 16:00 A4L-D.1 : OMP-Based Transform for Inter Coding in HEVC....798  
R. Song<sup>2</sup>, C. Lan<sup>1</sup>, H. Li<sup>2</sup>, J. Xu<sup>1</sup>, F. Wu<sup>2</sup>  
<sup>1</sup>Microsoft Research Asia, China; <sup>2</sup>University of Science and Technology of China, China
- 16:18 A4L-D.2 : Energy-Efficient SATD for Beyond HEVC....802  
I. Seidel<sup>2</sup>, A. Bräscher<sup>2</sup>, J. Güntzel<sup>2</sup>, L. Agostini<sup>1</sup>  
<sup>1</sup>Universidade Federal de Pelotas, Brazil; <sup>2</sup>Universidade Federal de Santa Catarina, Brazil
- 16:36 A4L-D.3 : Constrained Quantization Based Transform Domain Down-Conversion for Image Compression....806  
S. Zhu<sup>2</sup>, L. Zeng<sup>2</sup>, B. Zeng<sup>2</sup>, J. Zhou<sup>1</sup>  
<sup>1</sup>Universidade de Macau, China; <sup>1</sup>University of Electronic Science and Technology of China, China
- 16:54 A4L-D.4 : A Structure of JPEG XT Encoder Considering Effect of Quantization Error....810  
O. Watanabe<sup>1</sup>, R. Suzuki<sup>2</sup>, H. Kiya<sup>2</sup>  
<sup>1</sup>Takushoku University, Japan; <sup>2</sup>Tokyo Metropolitan University, Japan

#### **A4L-E : Analog Filters**

Time: Monday, May 23 (16:00-17:30)

Place: Salon B

Chair(s): Jorge Fernandes - Universidade de Lisboa

- 16:00 A4L-E.1 : A Cross-Coupled Substrate Integrated Waveguide Filter for 28 GHz Millimeter Wave Communications....814  
L. Ma, J. Zhuang, J. Zhou  
Southeast University, China
- 16:18 A4L-E.2 : A Switched-Capacitor Degenerated, Scalable gm - C Filter-Bank for Acoustic Front-Ends....818  
K. Badami<sup>2</sup>, V. Pamula<sup>1</sup>, M. Verhelst<sup>2</sup>  
<sup>1</sup>IMEC, Belgium; <sup>2</sup>Katholieke Universiteit Leuven, Belgium
- 16:36 A4L-E.3 : Charge Pump Optimization and Output Spur Reduction in VCO-Based OTAs for Active-RC Analog Filters....822  
S. Kalani, S. Nagam, P. Kinget  
Columbia University, United States
- 16:54 A4L-E.4 : Time Integrator for Mixed-Mode Signal Processing....826  
Y. Park, D. Jarrett-Amor, F. Yuan  
Ryerson University, Canada
- 17:12 A4L-E.5 : A 51-nW 32.7-kHz CMOS Relaxation Oscillator with Half-Period Pre-Charge Compensation Scheme for Ultra-Low Power Systems....830  
Y. Zheng, L. Zhou, F. Tian, M. He, H. Liao  
Peking University, China

#### **A4L-F : BioCAS I**

Time: Monday, May 23 (16:00-17:30)

Place: Salon C

Chair(s): Jie Chen - University of Alberta; Christos Pappavassiliou - Imperial College

- 16:00 A4L-F.1 : Simultaneous Monitoring of Anesthetics and Therapeutic Compounds with a Portable Multichannel Potentiostat....834  
F. Stradolini<sup>1</sup>, T. Elboshra<sup>2</sup>, A. Biscontini<sup>1</sup>, G. De Micheli<sup>1</sup>, S. Carrara<sup>1</sup>  
<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>2</sup>Khalifa University, U.A.E.
- 16:18 A4L-F.2 : Comparison of sEMG Bit-Stream Modulators for Cross-Correlation Based Muscle Fatigue Estimation....838  
D. Sun, E. Koutsos, P. Georgiou  
Imperial College London, United Kingdom
- 16:36 A4L-F.3 : A Tunable, Robust Pseudo-Resistor with Enhanced Linearity for Scanning Ion-Conductance Microscopy....842  
D. Djekic<sup>2</sup>, M. Ortmanns<sup>2</sup>, G. Fantner<sup>1</sup>, J. Anders<sup>2</sup>  
<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>2</sup>Universität Ulm, Germany
- 16:54 A4L-F.4 : Design of a CMOS Active Electrode IC for Wearable Electrical Impedance Tomography Systems....846  
Y. Wu<sup>2</sup>, P. Langlois<sup>2</sup>, R. Bayford<sup>1</sup>, A. Demosthenous<sup>2</sup>  
<sup>1</sup>Middlesex University London, United Kingdom; <sup>2</sup>University College London, United Kingdom
- 17:12 A4L-F.5 : A Wirelessly Tunable Low Drop-Out Regulator for Subcutaneous Muscle Prosthesis....850  
Y. Huang, L. Najafizadeh  
Rutgers University, United States

#### **A4L-G : INVITED: Printable Electronics**

Time: Monday, May 23 (16:00-17:30)

Place: Salon Hémon

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

- 16:00 A4L-G.1 : Flexible Electrical Circuits Printed on Polymers Using Graphene-Cellulose Inks....854  
G. Knopf<sup>2</sup>, D. Sinar<sup>2</sup>, A. Andrushchenko<sup>2</sup>, S. Nikumb<sup>1</sup>  
<sup>1</sup>National Research Council of Canada, Canada; <sup>2</sup>University of Western Ontario, Canada
- 16:18 A4L-G.2 : Flexible Printed Organic Photovoltaic Antennas for the Internet of Things....858  
M. Danesh  
Wibicom Inc., Canada
- 16:36 A4L-G.3 : Fully-Additive Printed Electronics: Process Development Kit....862  
J. Zhou, T. Ge, J. Chang  
Nanyang Technological University, Singapore
- 16:54 A4L-G.4 : Aerosol Jet Printing for Printed Electronics Rapid Prototyping....866  
A. Gupta<sup>2</sup>, A. Bolduc<sup>2</sup>, S. Cloutier<sup>1</sup>, R. Izquierdo<sup>2</sup>  
<sup>1</sup>École de Technologie Supérieure, Canada; <sup>2</sup>Université du Québec à Montréal, Canada
- 17:12 A4L-G.5 : Low-Cost Trimmable Manufacturing Methods for Printable Electronics....870  
A. Gordon<sup>1</sup>, G. Roberts<sup>1</sup>, C. Fayomi<sup>2</sup>  
<sup>1</sup>McGill University, Canada; <sup>2</sup>Université du Québec à Montréal, Canada

#### **A4L-H : Nonlinear CAS I**

Time: Monday, May 23 (16:00-17:30)

Place: Salon Musset

Chair(s): Chi K. Tse - Hong Kong Polytechnic University; Ljiljana Trajkovic - Simon Fraser University

- 16:00 A4L-H.1 : Virtual Network Embeddings in Data Center Networks....874  
S. Haeri, L. Trajkovic  
Simon Fraser University, Canada
- 16:18 A4L-H.2 : More or Less Controllers to Synchronize a Kuramoto-Oscillator Network via a Pacemaker?....878  
P. Rao<sup>1</sup>, X. Li<sup>1</sup>, M. Ogorzalek<sup>2</sup>  
<sup>1</sup>Fudan University, China; <sup>2</sup>Jagiellonian University, Poland
- 16:36 A4L-H.3 : A Novel Optimization Method Based on Opinion Formation in Complex Networks....882  
H. Hamed Moghadam Rafati<sup>2</sup>, M. Jalili<sup>1</sup>, X. Yu<sup>1</sup>  
<sup>1</sup>RMIT University, Australia; <sup>2</sup>Sharif University of Technology, Iran
- 16:54 A4L-H.4 : The Influence of Extortion Diversity on the Evolution of Cooperation in Scale-Free Networks....886  
Y. Mao<sup>2</sup>, Z. Rong<sup>2</sup>, X. Xu<sup>2</sup>, C. Tse<sup>1</sup>  
<sup>1</sup>Hong Kong Polytechnic University, Hong Kong; <sup>1</sup>University of Electronic Science and Technology of China, China
- 17:12 A4L-H.5 : On the Modeling of Blackouts in Power Networks....890  
Z. Galias, S. Moskwa  
AGH University of Science and Technology, Poland

#### **A4L-J : INVITED: Manufacture & Test**

Time: Monday, May 23 (16:00-17:30)

Place: Salon Jarry

Chair(s): Yiorgos Makris - University of Texas at Dallas; Haralampos Stratigopoulos - LIP6, Pierre et Marie Curie Universit

- 16:00 A4L-J.1 : Closing the Loop Between Analog Design and Test....894  
S. Sunter  
Mentor Graphics, Canada
- 16:18 A4L-J.2 : Harnessing Fabrication Process Signature for Predicting Yield Across Designs....898  
A. Ahmadi<sup>3</sup>, H. Stratigopoulos<sup>1</sup>, A. Nahar<sup>2</sup>, B. Orr<sup>2</sup>, M. Pas<sup>2</sup>, Y. Makris<sup>3</sup>  
<sup>1</sup>Sorbonne Universités UPMC Paris 6, France; <sup>2</sup>Texas Instruments Inc., United States;  
<sup>3</sup>University of Texas at Dallas, United States
- 16:36 A4L-J.3 : Real-Time Test Data Acquisition and Data Processing Enabling Closed Loop Control Systems for Adaptive Test....902  
C. Streitwieser  
ams AG, Austria
- 16:54 A4L-J.4 : High-Speed Link Verification Based on Statistical Inference....906  
X. Zeng<sup>1</sup>, C. Fang<sup>1</sup>, Q. Huang<sup>1</sup>, F. Yang<sup>1</sup>, D. Zhou<sup>1</sup>, W. Cai<sup>3</sup>, W. Shi<sup>2</sup>  
<sup>1</sup>Fudan University, China; <sup>2</sup>Texas A&M University, United States;  
<sup>3</sup>University of North Carolina at Charlotte, United States
- 17:12 A4L-J.5 : Identifying Systematic Spatial Failure Patterns Through Wafer Clustering....910  
M. Alawieh, F. Wang, X. Li  
Carnegie Mellon University, United States

### **A4L-K : INVITED: Neuromorphic Devices**

Time: Monday, May 23 (16:00-17:30)

Place: Salon Joyce

Chair(s): Arindam Basu - Nanyang Technological University; Hai Li - University of Pittsburgh

- 16:00 A4L-K.1 : A Low-Voltage, Low Power STDP Synapse Implementation Using Domain-Wall Magnets for Spiking Neural Networks....914  
G. Narasimman<sup>1</sup>, S. Roy<sup>1</sup>, X. Fong<sup>1</sup>, K. Roy<sup>2</sup>, C. Chang<sup>1</sup>, A. Basu<sup>1</sup>  
<sup>1</sup>Nanyang Technological University, Singapore; <sup>2</sup>Purdue University, United States
- 16:18 A4L-K.2 : Spin Wave Based Synapse and Neuron for Ultra Low Power Neuromorphic Computation System....918  
L. Zeng, D. Zhang, Y. Zhang, F. Gong, T. Gao, S. Tu, H. Yu, W. Zhao  
Beihang University, China
- 16:36 A4L-K.3 : Spintronic Devices for Ultra-Low Power Neuromorphic Computation....922  
A. Sengupta, K. Yogendra, K. Roy  
Purdue University, United States
- 16:54 A4L-K.4 : Beyond Spike-Timing Dependent Plasticity in Memristor Crossbar Arrays....926  
H. Mostafa<sup>3</sup>, C. Mayr<sup>2</sup>, G. Indiveri<sup>1</sup>  
<sup>1</sup>Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland; <sup>2</sup>Universität Bremen, Germany;  
<sup>3</sup>Universität Zürich, Switzerland
- 17:12 A4L-K.5 : Cyclical Sensing Integrate-and-Fire Circuit for Memristor Array Based Neuromorphic Computing....930  
H. Jiang<sup>2</sup>, W. Zhu<sup>2</sup>, F. Luo<sup>2</sup>, K. Bai<sup>2</sup>, C. Liu<sup>4</sup>, X. Zhang<sup>2</sup>, J. Yang<sup>3</sup>, Q. Xia<sup>3</sup>, Y. Chen<sup>4</sup>, Q. Wu<sup>1</sup>  
<sup>1</sup>Air Force Research Laboratory, United States; <sup>2</sup>San Francisco State University, United States;  
<sup>3</sup>University of Massachusetts Amherst, United States; <sup>4</sup>University of Pittsburgh, United States

### **A4L-L : Communications III**

Time: Monday, May 23 (16:00-17:30)

Place: Salon Kafka-Lamartine

Chair(s): Shoba Krishnan - Santa Clara University; Danella Zhao - University of Louisiana at Lafayette

- 16:00 A4L-L.1 : A 1.8 Gb/s Fully Integrated Optical Receiver for OOK Visible Light Communication in 0.35  $\mu$ m CMOS....934  
B. Fahs, A. Chowdhury, M. Hella  
Rensselaer Polytechnic Institute, United States
- 16:18 A4L-L.2 : A High Temperature Wideband Low Noise Amplifier for Downhole Applications....938  
M. Cunningham, D. Ha, K. Koh  
Virginia Polytechnic Institute and State University, United States
- 16:36 A4L-L.3 : A Close-Loop Time-Mode Temperature Sensor with Inaccuracy of  $-0.6^{\circ}\text{C}/0.5^{\circ}\text{C}$  from  $-40^{\circ}\text{C}$  to  $120^{\circ}\text{C}$ ....942  
D. Zhu, J. Wang, L. Siek  
Nanyang Technological University, Singapore
- 16:54 A4L-L.4 : A High Temperature Active GaN-HEMT Downconversion Mixer for Downhole Communications....946  
J. Salem, D. Ha  
Virginia Polytechnic Institute and State University, United States

## **A4L-M : Smart Infrastructures**

Time: Monday, May 23 (16:00-17:30)

Place: Salon 1

Chair(s): Mitra Mirhassani - University of Windsor

- 16:00 A4L-M.1 : Virtual Temperature Measurement for Smart Buildings via Bayesian Model Fusion....950  
X. Chen, X. Li  
Carnegie Mellon University, United States
- 16:18 A4L-M.2 : Learning-Based Occupancy Behavior Detection for Smart Buildings....954  
H. Zhao<sup>2</sup>, Z. Qi<sup>2</sup>, S. Wang<sup>2</sup>, K. Vafai<sup>2</sup>, H. Wang<sup>3</sup>, H. Chen<sup>1</sup>, S. Tan<sup>2</sup>  
<sup>1</sup>Shanghai Jiao Tong University, China; <sup>2</sup>University of California, Riverside, United States;  
<sup>3</sup>University of Electronic Science and Technology of China, China
- 16:36 A4L-M.3 : Co-Scheduling of Flexible Energy Loads in Building Clusters....958  
T. Wei, Q. Zhu  
University of California, Riverside, United States
- 16:54 A4L-M.4 : Frequency Domain Clutter Removal for Compressive OFDM Ground Penetrating Radar....962  
Y. Zhang, T. Xia  
University of Vermont, United States

## **B1L-A : VLSI II**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon Drummond est

Chair(s): An-Yeu Wu - National Taiwan University; Ricardo Reis - Federal University of Rio Grande do Sul

- 10:30 B1L-A.1 : Experimental Investigation Into Radiation-Hardening-by-Design (RHBD) Flip-Flop Designs in a 65nm CMOS Process....966  
T. Lin, K. Chong, W. Shu, N. Lwin, J. Jiang, J. Chang  
Nanyang Technological University, Singapore
- 10:48 B1L-A.2 : Towards Code Generation for ARM Cortex-M MCUs from SysML Activity Diagrams....970  
M. AskariHemmat<sup>1</sup>, O. Ait Mohamed<sup>1</sup>, M. Boukadoum<sup>2</sup>  
<sup>1</sup>Concordia University, Canada; <sup>2</sup>Univeristé du Québec à Montréal, Canada
- 11:06 B1L-A.3 : Embedding Low Cost Optimal Watermark During High Level Synthesis for Reusable IP Core Protection....974  
A. Sengupta<sup>1</sup>, S. Bhadauria<sup>1</sup>, S. Mohanty<sup>2</sup>  
<sup>1</sup>Indian Institute of Technology Indore, India; <sup>2</sup>University of North Texas, United States
- 11:24 B1L-A.4 : Scalable and Small-Sized Power Analyzer Design with Signal-Averaging Noise Reduction for Low-Power IoT Devices....978  
R. Kitayama<sup>2</sup>, T. Takenaka<sup>1</sup>, M. Yanagisawa<sup>2</sup>, N. Togawa<sup>2</sup>  
<sup>1</sup>NEC Corporation, Japan; <sup>2</sup>Waseda University, Japan
- 11:42 B1L-A.5 : Assertion-Based Verification of Industrial WLAN System....982  
I. Syafalni<sup>2</sup>, N. Surantha<sup>1</sup>, D. Lam<sup>1</sup>, N. Sutisna<sup>1</sup>, Y. Nagao<sup>1</sup>, K. Wakasugi<sup>2</sup>, Y. Tong Xin<sup>2</sup>, H. Ochi<sup>1</sup>, T. Tsuchiya<sup>2</sup>  
<sup>1</sup>Kyushu Institute of Technology, Japan; <sup>2</sup>Logic Research Co., Ltd., Japan

## **B1L-B : Image Processing**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon Drummond centre

Chair(s): Wei-Ping Zhu - Concordia University

- 10:30 B1L-B.1 : Weighted Residual Minimization in PCA Subspace for Visual Tracking....986  
B. Shreyamsha Kumar, M. Swamy, M. Ahmad  
Concordia University, Canada
- 10:48 B1L-B.2 : Visual Saliency Model Based on Minimum Description Length....990  
J. Liu<sup>1</sup>, X. Yang<sup>1</sup>, G. Zhai<sup>1</sup>, C. Chen<sup>2</sup>  
<sup>1</sup>Shanghai Jiao Tong University, China; <sup>2</sup>State University of New York at Buffalo, United States
- 11:06 B1L-B.3 : A Block-Based Markov Random Field Model Estimation for Contextual Classification  
Using Optimum-Path Forest....994  
D. Osaku<sup>2</sup>, A. Levada<sup>2</sup>, J. Papa<sup>1</sup>  
<sup>1</sup>Universidade Estadual Paulista Júlio de Mesquita Filho, Brazil; <sup>2</sup>Universidade Federal de São Carlos, Brazil
- 11:24 B1L-B.4 : Fast Realistic Block-Based Refocusing for Sparse Light Fields....998  
L. Huang, Y. Wang, C. Huang  
National Tsing Hua University, Taiwan
- 11:42 B1L-B.5 : A Low-Complexity MMSE Bayesian Estimator for Suppression of Speckle in SAR Images....1002  
R. Damseh, M. Ahmad  
Concordia University, Canada

## **B1L-C : Memory**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon Drummond ouest

Chair(s): Xinmiao Zhang - Case Western Reserve University; Zhiyuan Yan - Lehigh University

- 10:30 B1L-C.1 : A Process Compensated Gain Cell Embedded-DRAM for Ultra-Low-Power Variation-Aware Design....1006  
R. Giterman<sup>1</sup>, A. Teman<sup>1</sup>, P. Meinerzhagen<sup>2</sup>, A. Fish<sup>1</sup>, A. Burg<sup>2</sup>  
<sup>1</sup>Bar-Ilan University, Israel; <sup>2</sup>École Polytechnique Fédérale de Lausanne, Switzerland
- 10:48 B1L-C.2 : A 17.5 fJ/bit Energy-Efficient Analog SRAM for Mixed-Signal Processing....1010  
J. Lee, D. Shin, Y. Kim, H. Yoo  
Korea Advanced Institute of Science and Technology, Korea, South
- 11:06 B1L-C.3 : A Subthreshold SRAM with Embedded Data-Aware Write-Assist and Adaptive Data-Aware Keeper...1014  
Y. Chiu, Y. Hu, J. Zhao, S. Jou, C. Chuang  
National Chiao Tung University, Taiwan
- 11:24 B1L-C.4 : Temperature-Based Adaptive Memory Sub-System in 28nm UTBB FDSOI....1018  
A. Chhabra, M. Srivastava, P. Gupta, K. Janardan Dhori, P. Triolet, T. Di Gilio, N. Bansal, B. Sujatha  
STMicroelectronics, India
- 11:42 B1L-C.5 : WL Under-Driving Scheme with Decremental Step Voltage and Incremental Step Time  
for High-Capacity NAND Flash Memory....1022  
J. Ko<sup>2</sup>, Y. Yang<sup>2</sup>, S. Jung<sup>2</sup>, J. Kim<sup>1</sup>, C. Lee<sup>1</sup>, Y. Min<sup>1</sup>, J. Chun<sup>1</sup>, M. Kim<sup>1</sup>  
<sup>1</sup>Samsung Electronics Co. Ltd., Korea, South; <sup>2</sup>Yonsei University, Korea, South

### **B1L-D : SAR ADCs**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon A

Chair(s): George Yuan - Hong Kong University of Technology

- 10:30 B1L-D.1 : Highly Time-Interleaved Noise-Shaped SAR ADC with Reconfigurable Order....1026  
A. Waters, A. Wang, C. Shi  
University of Washington, United States
- 10:48 B1L-D.2 : A 10-Bit 2 MS/s SAR ADC Using Reverse VCM-Based Switching Scheme....1030  
Z. Fu<sup>1</sup>, X. Tang<sup>2</sup>, D. Li<sup>1</sup>, J. Wang<sup>1</sup>, D. Basak<sup>1</sup>, K. Pun<sup>1</sup>  
<sup>1</sup>Chinese University of Hong Kong, Hong Kong; <sup>2</sup>Tsinghua University, China
- 11:06 B1L-D.3 : Noise Transfer Functions and Loop Filters Especially Suited for Noise-Shaping SAR ADCs....1034  
H. Garvik, C. Wulff, T. Ytterdal  
Norwegian University of Science and Technology, Norway
- 11:24 B1L-D.4 : A 7 Bit 800MS/s SAR ADC with Background Offset Calibration....1038  
C. Wu, J. Yuan  
Hong Kong University of Science and Technology, Hong Kong
- 11:42 B1L-D.5 : A 0.4V 1.94fJ/Conversion-Step 10b 750kS/s SAR ADC with Input-Range-Adaptive Switching....1042  
P. Lee, C. Kao, C. Hsieh  
National Tsing Hua University, Taiwan

### **B1L-E : Data Converters II**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon B

Chair(s): Joao Goes - UNINOVA

- 10:30 B1L-E.1 : Digital Processing of Signals Produced by Voltage-Controlled-Oscillator-Based Continuous-Time ADCs....1046  
S. Patil, Y. Tsvividis  
Columbia University, United States
- 10:48 B1L-E.2 : A Hybrid Comparator for High Resolution SAR ADC....1050  
A. Al Marashli, J. Anders, M. Ortmanns  
Universität Ulm, Germany
- 11:06 B1L-E.3 : A Sub-nW mV-Range Programmable Threshold Comparator for Near-Zero-Energy Sensing....1054  
A. Wang, A. Waters, C. Shi  
University of Washington, United States
- 11:24 B1L-E.4 : Design of a 4th-Order Multi-Stage Feedforward Operational Amplifier  
for Continuous-Time Bandpass Delta Sigma Modulators....1058  
X. Yang, H. Lee Massachusetts Institute of Technology, United States
- 11:42 B1L-E.5 : An Asynchronous ADC with Reconfigurable Analog Pre-Processing....1062  
B. Kelly, D. Graham  
West Virginia University, United States

### **B1L-F : Bio Interface Circuits**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon C

Chair(s): Arindam Basu - Nanyang Technological University; Wouter A. Serdijn - TU Delft

- 10:30 B1L-F.1 : A 0.8V, 43.5 $\mu$ W ECG Signal Acquisition IC with a Referenceless Time-to-Digital Converter.... 1066  
S. Lin<sup>2</sup>, F. Lin<sup>2</sup>, N. Cheng<sup>1</sup>, Y. Liao<sup>2</sup>  
<sup>1</sup>Industrial Technology Research Institute, Taiwan; <sup>2</sup>National Chiao Tung University, Taiwan
- 10:48 B1L-F.2 : A 3.2 mW 0.13 $\mu$ m High Sensitivity Frequency-Domain CMOS Capacitance Interface.... 1070  
J. Gaggatur<sup>3</sup>, P. Dixena<sup>1</sup>, G. Banerjee<sup>2</sup>  
<sup>1</sup>Defence Research and Development Organisation, India; <sup>2</sup>Indian Institute of Science, India;  
<sup>3</sup>Indian Institute of Science, Bangalore, India
- 11:06 B1L-F.3 : A 2.7 $\mu$ W 10b 640kS/s Time-Based A/D Converter for Implantable Neural Recording Interface.... 1074  
A. Zjajo, S. Astigimath, R. van Leuken  
Technische Universiteit Delft, Netherlands
- 11:24 B1L-F.4 : CMOS for High-Speed Nanopore DNA Basecalling.... 1078  
Y. Huang, S. Magierowski, E. Ghafar-Zadeh  
York University, Canada
- 11:42 B1L-F.5 : A 54- $\mu$ W Fast-Settling Arterial Pulse Wave Sensor for Wrist Watch Type System.... 1082  
K. Kim, M. Kim, H. Cho, K. Lee, S. Ryu, H. Yoo  
Korea Advanced Institute of Science and Technology, Korea, South

### **B1L-G : INVITED: Bioelectronics**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon Hémon

Chair(s): Pedram Mohseni - Case Western Reserve University; Benoit Gosselin - Laval University

- 10:30 B1L-G.1 : Wearable Seizure Detection Using Convolutional Neural Networks with Transfer Learning.... 1086  
A. Page, C. Shea, T. Mohsenin  
University of Maryland, Baltimore County, United States
- 10:48 B1L-G.2 : A 1.3mA Biphasic Current Stimulator IC with Active Charge Balancing for Nerve Interfacing Applications.... 1090  
R. Erfani, F. Marefat, S. Mandal, P. Mohseni  
Case Western Reserve University, United States
- 11:06 B1L-G.3 : Towards Free-Breathing Spirometry-on-Chip: Design, Implementation and Preliminary Experimental Results.... 1094  
E. Ghafar-Zadeh<sup>3</sup>, G. Ayala-Charca<sup>3</sup>, M. Matynia<sup>3</sup>, S. Magierowski<sup>3</sup>, B. Gholamzadeh<sup>1</sup>, M. Sawan<sup>2</sup>  
<sup>1</sup>École Polytechnique de Montréal, Canada; <sup>2</sup>Polytechnique Montréal, Canada; <sup>3</sup>York University, Canada
- 11:24 B1L-G.4 : An Optimized Adaptive Spike Detector for Behavioural Experiments.... 1098  
G. Gagnon-Turcotte<sup>2</sup>, Y. Lechasseur<sup>1</sup>, C. Bories<sup>2</sup>, Y. De Koninck<sup>2</sup>, B. Gosselin<sup>2</sup>  
<sup>1</sup>Doric Lenses Inc., Canada; <sup>2</sup>Université Laval, Canada
- 11:42 B1L-G.5 : Low Cost Mobile EEG for Characterization of Cortical Auditory Responses.... 1102  
B. Senevirathna<sup>3</sup>, L. Berman<sup>3</sup>, N. Bertoni<sup>1</sup>, F. Pareschi<sup>1</sup>, M. Mangia<sup>2</sup>, R. Rovatti<sup>2</sup>, G. Setti<sup>1</sup>, J. Simon<sup>3</sup>, P. Abshire<sup>3</sup>  
<sup>1</sup>Università degli Studi di Ferrara, Italy; <sup>2</sup>Università di Bologna, Italy;  
<sup>3</sup>University of Maryland, College Park, United States



### **B1L-H : Nonlinear CAS II**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon Musset

Chair(s): Wei Xing Zheng - ; Jinhu Lu - ISS, Chinese Academy of Sciences

- 10:30 B1L-H.1 : On the Existence of Chaos in the Chua's Circuit with a Smooth Nonlinearity....1106  
Z. Galias  
AGH University of Science and Technology, Poland
- 10:48 B1L-H.2 : Bifurcation Analysis of Arcing in DC Automotive 48V Power Supply Systems....1110  
M. Prochaska, K. Rohrmann  
Ostfalia Hochschule für angewandte Wissenschaften, Germany
- 11:06 B1L-H.3 : Bit-Flipping LDPC Under Noise Conditions and its Application to Physically Unclonable Functions....1114  
T. Marukame, A. Schmid  
École Polytechnique Fédérale de Lausanne, Switzerland
- 11:24 B1L-H.4 : Performance of DCSK System with Blanking Circuit for Power-Line Communications....1118  
G. Kaddoum, N. Tadayon, E. Soujeri  
École de Technologie Supérieure, Canada

### **B1L-J : INVITED: Biomedical Big-Data**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon Jarry

Chair(s): Tinoosh Mohsenin - University of Maryland, Baltimore County; Robert Sobot - ENSEA

- 10:30 B1L-J.1 : Wearable Chemical Sensors: Opportunities and Challenges....1122  
S. Imani, P. Mercier, A. Bandodkar, J. Kim, J. Wang  
University of California, San Diego, United States
- 10:48 B1L-J.2 : Design of Energy-Efficient on-Chip EEG Classification and Recording Processors  
for Wearable Environments....1126  
M. Bin Altaf, C. Zhang, L. Radakovic, J. Yoo  
Masdar Institute of Science and Technology, U.A.E.
- 11:06 B1L-J.3 : Data Acquisition for Wearables and in-Patient Monitoring....1130  
A. Sharma, P. Aroul, T. Pande, A. Schnoor, K. Soundarapandian  
Texas Instruments Inc., United States
- 11:24 B1L-J.4 : Big Biomedical Image Processing Hardware Acceleration: a Case Study for K-means and Image Filtering....1134  
K. Neshatpour<sup>1</sup>, A. Koohi<sup>1</sup>, F. Farahmand<sup>1</sup>, R. Joshi<sup>2</sup>, S. Rafatirad<sup>1</sup>, A. Sasan<sup>1</sup>, H. Homayoun<sup>1</sup>  
<sup>1</sup>George Mason University, United States; <sup>2</sup>IBM Thomas J. Watson Research Center, United States
- 11:42 B1L-J.5 : Sketching-Based High-Performance Biomedical Big Data Processing Accelerator....1138  
A. Kulkarni, A. Jafari, C. Sagedy, T. Mohsenin  
University of Maryland, Baltimore County , United States

### **B1L-K : INVITED: Emerging Memory I**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon Joyce

Chair(s): Elisa Vianello - CEA-LETI; Jing Li - University of Wisconsin

- 10:30 B1L-K.1 : Designs of Emerging Memory Based Non-Volatile TCAM for Internet-of-Things (IoT) and Big-Data Processing: a 5T2R Universal Cell.... 1142  
M. Chang<sup>2</sup>, C. Chuang<sup>2</sup>, Y. Chiang<sup>2</sup>, S. Sheu<sup>1</sup>, C. Kuo<sup>1</sup>, H. Cheng<sup>3</sup>, J. Sampson<sup>3</sup>, M. Irwin<sup>3</sup>  
<sup>1</sup>Industrial Technology Research Institute, Taiwan; <sup>2</sup>National Tsing Hua University, Taiwan;  
<sup>3</sup>Pennsylvania State University, United States
- 10:48 B1L-K.2 : Design Considerations for Reliable OxRAM-Based Non-Volatile Flip-Flops in 28nm FD-SOI Technology.... 1146  
N. Jovanovic<sup>1</sup>, O. Thomas<sup>1</sup>, E. Vianello<sup>1</sup>, B. Nikolic<sup>3</sup>, L. Naviner<sup>2</sup>  
<sup>1</sup>CEA-Leti, France; <sup>2</sup>Télécom ParisTech, France; <sup>3</sup>University of California, Berkeley, United States
- 11:06 B1L-K.3 : Quantitative Evaluation of Reliability and Performance for STT-MRAM.... 1150  
L. Zhang<sup>2</sup>, A. Todri-Sanial<sup>2</sup>, W. Kang<sup>1</sup>, Y. Zhang<sup>1</sup>, L. Torres<sup>3</sup>, Y. Cheng<sup>1</sup>, W. Zhao<sup>1</sup>  
<sup>1</sup>Beihang University, China; <sup>2</sup>CNRS-LIRMM / University of Montpellier, France; <sup>3</sup>University of Montpellier, France
- 11:24 B1L-K.4 : Adaptive Refreshing and Read Voltage Control Scheme for FeDRAM.... 1154  
I. Bayram<sup>1</sup>, E. Eken<sup>1</sup>, X. Wang<sup>1</sup>, X. Sun<sup>2</sup>, T. Ma<sup>2</sup>, Y. Chen<sup>1</sup>  
<sup>1</sup>University of Pittsburgh, United States; <sup>2</sup>Yale University, United States
- 11:42 B1L-K.5 : On the Potential of Correlated Materials in the Design of Spin-Based Cross-Point Memories.... 1158  
S. Gupta<sup>1</sup>, A. Aziz<sup>1</sup>, N. Shukla<sup>1</sup>, S. Datta<sup>2</sup>  
<sup>1</sup>Pennsylvania State University, United States;  
<sup>2</sup>University of Notre Dame / Pennsylvania State University, United States

### **B1L-L : Cryptography & Security I**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon Kafka-Lamartine

Chair(s): Weiqiang Liu - Nanjing University of Aeronautics & Astronautics; Tokunbo Ogunfunmi - Santa Clara University, CA, USA

- 10:30 B1L-L.1 : Efficient Polynomial Multiplier Architecture for Ring-LWE Based Public Key Cryptosystems.... 1162  
C. Du, G. Bai  
Tsinghua University, China
- 10:48 B1L-L.2 : High Throughput and Resource Efficient AES Encryption/Decryption for Sans.... 1166  
Y. Wang, Y. Ha  
Agency for Science, Technology and Research, Singapore
- 11:06 B1L-L.3 : Secure Communication System Based on a Logistic Map and a Linear Feedback Shift Register.... 1170  
M. Garcia-Bosque, C. Sánchez-Azqueta, S. Celma  
Universidad de Zaragoza, Spain
- 11:24 B1L-L.4 : Efficient Multiplication Architecture Over Truncated Polynomial Ring for NTRUEncrypt System.... 1174  
B. Liu, H. Wu  
University of Windsor, Canada
- 11:42 B1L-L.5 : Towards Efficient Polynomial Multiplication for Lattice-Based Cryptography.... 1178  
C. Du, G. Bai  
Tsinghua University, China

## **B1L-M : Power Converters II**

Time: Tuesday, May 24 (10:30-12:00)

Place: Salon 1

Chair(s): Hirotaka Koizumi - Tokyo University of Science; Adrian Ioinovici - SIST, Sun Yat-sen University

- 10:30 B1L-M.1 : A Preliminary Study on Impact Analysis of Grid-Connected PV Systems Considering Additional Transformer Installations.... 1182  
S. Huang<sup>2</sup>, T. Tai<sup>2</sup>, W. Su<sup>1</sup>, X. Liu<sup>1</sup>, K. Wu<sup>2</sup>, H. Su<sup>2</sup>  
<sup>1</sup>Kun Shan University, Taiwan; <sup>2</sup>National Cheng Kung University, Taiwan
- 10:48 B1L-M.2 : Determination of Supercapacitor Metrics Using a Magnitude-Only Method.... 1186  
B. Maundy<sup>2</sup>, A. Elwakil<sup>3</sup>, T. Freeborn<sup>1</sup>, A. Allagui<sup>3</sup>  
<sup>1</sup>University of Alabama, United States; <sup>2</sup>University of Calgary, Canada; <sup>3</sup>University of Sharjah, U.A.E.
- 11:06 B1L-M.3 : A New Switched-Capacitor Based Hybrid Converter with Large Step-Up DC Gain and Low Voltage on its Semiconductors.... 1190  
M. Chen<sup>2</sup>, J. Hu<sup>2</sup>, K. Li<sup>2</sup>, A. Ioinovici<sup>1</sup>  
<sup>1</sup>Holon Institute of Technology, Israel; <sup>2</sup>Sun Yat-sen University, China
- 11:24 B1L-M.4 : Modularized Chain Structure of Switched Capacitor for Cell Voltage Equalizer with T-Connected Bi-Directional Switch.... 1194  
T. Shimizu, H. Koizumi  
Tokyo University of Science, Japan

## **B2L-A : NoC Multicores II**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon Drummond est

Chair(s): Qiaoyan Yu - University of New Hampshire; Magdy Bayoumi - University of Louisiana at Lafayette

- 13:00 B2L-A.1 : Accurate Runtime Thermal Prediction Scheme for 3D NoC Systems with Noisy Thermal Sensors.... 1198  
Y. Fu, L. Li, H. Pan, K. Wang, F. Han, J. Lin  
Nanjing University, China
- 13:18 B2L-A.2 : DMNI: a Specialized Network Interface for NoC-Based MPSoCs.... 1202  
M. Ruaro, F. Lazzarotto, C. Marcon, F. Moraes  
Pontifícia Universidade Católica do Rio Grande do Sul, Brazil
- 13:36 B2L-A.3 : A 28nm FD-SOI Standard Cell 0.6-1.2V Open-Loop Frequency Multiplier for Low Power SoC Clocking.... 1206  
M. Cochet<sup>4</sup>, S. Clerc<sup>3</sup>, M. Naceur<sup>2</sup>, P. Schamberger<sup>2</sup>, D. Croain<sup>3</sup>, J. Autran<sup>1</sup>, P. Roche<sup>3</sup>  
<sup>1</sup>Aix-Marseille University & IM2NP, France; <sup>2</sup>EASii-IC, France; <sup>3</sup>STMicroelectronics, France;  
<sup>4</sup>STMicroelectronics/IM2NP, France
- 13:54 B2L-A.4 : Energy Efficient on-Chip Power Delivery with Run-Time Voltage Regulator Clustering.... 1210  
D. Pathak<sup>1</sup>, M. Hajkazemi<sup>2</sup>, M. Tavana<sup>2</sup>, H. Homayoun<sup>2</sup>, I. Savidis<sup>1</sup>  
<sup>1</sup>Drexel University, United States; <sup>2</sup>George Mason University, United States
- 14:12 B2L-A.5 : Python Facilitates the Rapid Prototyping and Hw/Sw Verification of Processor Centric SoCs for FPGAs.... 1214  
E. Logaras<sup>2</sup>, E. Koutsouradis<sup>1</sup>, E. Manolakos<sup>3</sup>  
<sup>1</sup>National and Kapodistrian University of Athens, Greece;  
<sup>2</sup>National and Kapodistrian University of Athens / NXP Semiconductors Austria, Greece;  
<sup>3</sup>National and Kapodistrian University of Athens / Wyss Institute for Biologically Inspired Engineerin, Greece

## **B2L-B : DSP Algorithms I**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon Drummond centre

Chair(s): Takao Hinamoto - Hiroshima Institute of Technology; Hon Keung Kwan - University of Windsor, Canada

- 13:00 B2L-B.1 : Optimal Filter Design for Signal Estimation Based on Linear Time-Variant System Theory....1218  
K. Ochs<sup>2</sup>, T. Poguntke<sup>1</sup>  
<sup>1</sup>Robert Bosch GmbH, Germany; <sup>2</sup>Ruhr-Universität Bochum, Germany
- 13:18 B2L-B.2 : Biorthogonal Filter Banks Constructed from Four Halfband Filters....1222  
D. Tay<sup>1</sup>, Z. Lin<sup>2</sup>  
<sup>1</sup>LaTrobe University, Australia; <sup>2</sup>Nanyang Technological University, Singapore
- 13:36 B2L-B.3 : Critical Data Length for Period Estimation....1226  
S. Tenneti, P. Vaidyanathan  
California Institute of Technology, United States
- 13:54 B2L-B.4 : A Matrix-Based Algorithm for the CLS Design of Centrally Symmetric 2-D FIR Filters....1230  
X. Hong<sup>2</sup>, R. Zhao<sup>2</sup>, X. Lai<sup>1</sup>, J. Cao<sup>1</sup>  
<sup>1</sup>Hangzhou Dianzi University, China; <sup>2</sup>Shandong University, China
- 14:12 B2L-B.5 : A Greedy Pursuit Algorithm for Arbitrary Block Sparse Signal Recovery....1234  
E. Yang, X. Yan, K. Qin  
University of Electronic Science and Technology of China, China

## **B2L-C : Emerging VLSI**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon Drummond ouest

Chair(s): Abdullah Baz - Umm Al-Qura University; Ricardo Reis - Federal University of Rio Grande do Sul

- 13:00 B2L-C.1 : Boosted Sensing for Enhanced Read Stability in STTMRAMs....1238  
K. Trinh Quang<sup>2</sup>, S. Ruocco<sup>1</sup>, M. Alioto<sup>2</sup>  
<sup>1</sup>Agency for Science, Technology and Research, Singapore; <sup>2</sup>National University of Singapore, Singapore
- 13:18 B2L-C.2 : Memristor-Based 4:2 Compressor Cells Design....1242  
A. Amirsoleimani<sup>2</sup>, M. Ahmadi<sup>2</sup>, M. Teimoory<sup>1</sup>, A. Ahmadi<sup>2</sup>  
<sup>1</sup>Azad University, Iran; <sup>2</sup>University of Windsor, Canada
- 13:36 B2L-C.3 : Area-Optimal Sensing Circuit Designs in Deep Submicrometer STT-RAM....1246  
S. Choi<sup>2</sup>, T. Na<sup>2</sup>, S. Jung<sup>2</sup>, J. Kim<sup>1</sup>, S. Kang<sup>1</sup>  
<sup>1</sup>Qualcomm Incorporated, United States; <sup>2</sup>Yonsei University, Korea, South
- 13:54 B2L-C.4 : Design Models of Resistive Crossbar Arrays with Selector Devices....1250  
A. Ciprut, E. Friedman  
University of Rochester, United States
- 14:12 B2L-C.5 : A Design of HTM Spatial Pooler for Face Recognition Using Memristor-CMOS Hybrid Circuits....1254  
T. Ibrayev<sup>1</sup>, A. James<sup>1</sup>, C. Merkel<sup>2</sup>, D. Kudithipudi<sup>2</sup>  
<sup>1</sup>Nazarbayev University, Russia; <sup>2</sup>Rochester Institute of Technology, United States

### **B2L-D : ASP Tools**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon A

Chair(s): Joao Goes - UNINOVA

- 13:00 B2L-D.1 : Visualizing the Laplace Domain....1258  
J. Fattaruso  
Southern Methodist University, United States
- 13:18 B2L-D.2 : Advanced Nanometer Technology Analog Layout Retargeting for Lithography Friendly Design....1262  
X. Dong, L. Zhang  
Memorial University of Newfoundland, Canada
- 13:36 B2L-D.3 : Efficient ILP-Based Variant-Grid Analog Router....1266  
M. Torabi, L. Zhang  
Memorial University of Newfoundland, Canada
- 13:54 B2L-D.4 : Verilog-A Modeling of Silicon Photo-Multipliers....1270  
G. Giustolisi<sup>2</sup>, G. Palumbo<sup>2</sup>, P. Finocchiaro<sup>1</sup>, A. Pappalardo<sup>1</sup>  
<sup>1</sup>Istituto Nazionale di Fisica Nucleare, Italy; <sup>2</sup>Università degli Studi di Catania, Italy
- 14:12 B2L-D.5 : Conformal-Mapping Model for Estimating the Resistance of Polygonal Inductors....1274  
A. Shaltout, S. Gregori  
University of Guelph, Canada

### **B2L-E : Analog Techniques**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon B

Chair(s): Wouter A. Serdijn - TU Delft

- 13:00 B2L-E.1 : Passive Rectifier/Regulator Combo Circuits with Embedded Bandgap Voltage Reference....1278  
E. Lee  
Alfred Mann Foundation, United States
- 13:18 B2L-E.2 : Toward Complete Analog Fault Coverage with Minimal Observation Points Using a Fault Propagation Graph....1282  
Z. Liu, S. Chaganti, D. Chen  
Iowa State University, United States
- 13:36 B2L-E.3 : Wave Digital Filter Based Analog Circuit Emulation on FPGA....1286  
W. Wu<sup>2</sup>, Y. Chen<sup>1</sup>, Y. Ma<sup>2</sup>, C. Liu<sup>1</sup>, J. Jou<sup>1</sup>, S. Pamarti<sup>2</sup>, L. He<sup>3</sup>  
<sup>1</sup>National Central University, Taiwan; <sup>2</sup>University of California, Los Angeles, United States;  
<sup>3</sup>University of California, Los Angeles / Fudan University, United States
- 13:54 B2L-E.4 : A 14.5 pW, 31 ppm/°C Resistor-Less 5 pA Current Reference Employing a Self-Regulated Push-Pull Voltage Reference Generator....1290  
H. Wang, P. Mercier  
University of California, San Diego, United States
- 14:12 B2L-E.5 : Cross Recurrence Verification Technique for Process Variation-Resilient Analog Circuits....1294  
I. Seghaier, M. Zaki, S. Tahar  
Concordia University, Canada

## **B2L-F : Biomedical SoC**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon C

Chair(s): Tim Constandinou - Imperial College; Abbes Amira - University of the West of Scotland

- 13:00 B2L-F.1 : Battery-Less Modular Responsive Neurostimulator for Prediction and Abortion of Epileptic Seizures....1298  
H. Kassiri<sup>2</sup>, N. Soltani<sup>2</sup>, M. Salam<sup>2</sup>, J. Perez Velazquez<sup>1</sup>, R. Genov<sup>2</sup>  
<sup>1</sup>Hospital for Sick Children, Canada; <sup>2</sup>University of Toronto, Canada
- 13:18 B2L-F.2 : An Ultra-high-Density 256-Channel/25mm<sup>2</sup> Neural Sensing Microsystem  
Using TSV-Embedded Neural Probes.... 1302  
Y. Huang, P. Huang, S. Wu, Y. Hu, Y. You, J. Chen, Y. Huang, H. Chang, Y. Lin, J. Duann, T. Chiu, W. Hwang, K. Chen,  
C. Chuang, J. Chiou  
National Chiao Tung University, Taiwan
- 13:36 B2L-F.3 : A Portable Multi-Channel Potentiostat for Real-Time Amperometric Measurement  
of Multi-Electrode Sensor Arrays.... 1306  
Y. Hu, S. Sharma, J. Weatherwax, A. Cass, P. Georgiou  
Imperial College London, United Kingdom
- 13:54 B2L-F.4 : A 32-Channel MCU-Based Feature Extraction and Classification for Scalable on-Node Spike Sorting.... 1310  
D. Barsakcioglu, T. Constandinou  
Imperial College London, United Kingdom
- 14:12 B2L-F.5 : A Compact Low-Power VLSI Architecture for Real-Time Sleep Stage Classification....1314  
P. Li, H. Kassiri, R. Genov  
University of Toronto, Canada

## **B2L-G : INVITED: IoT Security**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon Hémon

Chair(s): Chip-Hong Chang - Nanyang Technological University; Wael Badawy - Intelliview

- 13:00 B2L-G.1 : Hardware Security Meets Biometrics for the Age of IoT....1318  
Z. Guo<sup>2</sup>, N. Karimian<sup>1</sup>, M. Tehranipoor<sup>2</sup>, D. Forte<sup>2</sup>  
<sup>1</sup>University of Connecticut, United States; <sup>2</sup>University of Florida, United States
- 13:18 B2L-G.2 : Online Malware Defense Using Attack Behavior Model.... 1322  
S. Das<sup>2</sup>, H. Xiao<sup>2</sup>, Y. Liu<sup>2</sup>, W. Zhang<sup>1</sup>  
<sup>1</sup>Hong Kong University of Science and Technology, Hong Kong; <sup>2</sup>Nanyang Technological University, Singapore
- 13:36 B2L-G.3 : Security of Neuromorphic Systems: Challenges and Solutions.... 1326  
B. Liu<sup>2</sup>, C. Yang<sup>2</sup>, H. Li<sup>2</sup>, Y. Chen<sup>2</sup>, Q. Wu<sup>1</sup>, M. Barnell<sup>1</sup>  
<sup>1</sup>Air Force Research Laboratory, United States; <sup>2</sup>University of Pittsburgh, United States
- 13:54 B2L-G.4 : Securing Pressure Measurements Using SensorPUFs....1330  
J. Tang<sup>1</sup>, R. Karri<sup>1</sup>, J. Rajendran<sup>2</sup>  
<sup>1</sup>New York University, United States; <sup>2</sup>University of Texas at Dallas, United States
- 14:12 B2L-G.5 : Gate-Level Netlist Reverse Engineering for Hardware Security: Control Logic Register Identification.... 1334  
T. Meade<sup>1</sup>, Y. Jin<sup>1</sup>, M. Tehranipoor<sup>2</sup>, S. Zhang<sup>1</sup>  
<sup>1</sup>University of Central Florida, United States; <sup>2</sup>University of Florida, United States

## **B2L-H : Neural Net II**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon Musset

Chair(s): Mitra Mirhassani - University of Windsor; Shantanu Chakrabarty - Washington University in St. Louis

- 13:00 B2L-H.1 : Dynamically Reconfigurable System for LVQ-Based on-Chip Learning and Recognition.... 1338  
F. An, X. Zhang, L. Chen, H. Mattausch  
Hiroshima University, Japan
- 13:18 B2L-H.2 : Binary Image Classification Using a Neurosynaptic Processor: a Trade-Off Analysis.... 1342  
W. Murphy<sup>1</sup>, M. Renz<sup>2</sup>, Q. Wu<sup>1</sup>  
<sup>1</sup>Air Force Research Laboratory, United States; <sup>2</sup>University at Buffalo, United States
- 13:36 B2L-H.3 : A Nonparametric Framework for Quantifying Generative Inference on Neuromorphic Systems.... 1346  
O. Neopane, S. Das, E. Arias-Castro, K. Kreuz-Delgado  
University of California, San Diego, United States
- 13:54 B2L-H.4 : Self-Repairing Hardware with Astrocyte-Neuron Networks.... 1350  
J. Liu, J. Harkin, L. Maguire, L. McDaid, J. Wade, M. McElholm  
University of Ulster, United Kingdom
- 14:12 B2L-H.5 : A Simple Variable-Width CMOS Bump Circuit.... 1354  
B. Minch  
Franklin W. Olin College of Engineering, United States

## **B2L-J : INVITED: Flexible Substrate**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon Jarry

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

- 13:00 B2L-J.1 : Device Modelling of Bendable MOS Transistors.... 1358  
H. Heidari, W. Navaraj, G. Toldi, R. Dahiya  
University of Glasgow, United Kingdom
- 13:18 B2L-J.2 : Fabrication, Characterization and Modeling of Flexible Electronic Components Based on CNT Networks.... 1362  
P. Lugli, A. Abdellah, A. Abdelhalim, A. Albrecht, M. Becherer, E. Cagatay, S. Colasanti, A. Falco, F. Loghin, S. El-Molla,  
J. Salmeron, A. Rivadeneyra  
Technische Universität München, Germany
- 13:36 B2L-J.3 : Wearable Mobile Sensor and Communication Platform for the in-situ Monitoring  
of Lower Limb Health in Amputees.... 1366  
N. Mathur, I. Glesk, A. Davidson, G. Paul, J. Banford, J. Irvine, A. Buis  
University of Strathclyde, United Kingdom
- 13:54 B2L-J.4 : Wireless Capsule Technology: Remotely Powered Improved High-Sensitive Barometric Endoradiosonde.... 1370  
V. Annese<sup>1</sup>, C. Martin<sup>2</sup>, D. Cumming<sup>2</sup>, D. De Venuto<sup>1</sup>  
<sup>1</sup>Politecnico di Bari, Italy; <sup>2</sup>University of Glasgow, United Kingdom
- 14:12 B2L-J.5 : Hybrid Large-Area Systems: Challenges in Interfacing.... 1374  
T. Moy, S. Wagner, W. Rieutort-Louis, Y. Hu, L. Huang, J. Sanz-Robinson, J. Sturm, N. Verma  
Princeton University, United States

## **B2L-K : INVITED: Memristors II**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon Joyce

Chair(s): Ronald Tetzlaff - TU Dresden; Alon Ascoli - TU Dresden

- 13:00 B2L-K.1 : Memristor Cellular Automata for Image Pattern Recognition and Clinical Applications.... 1378  
J. Secco, M. Farina, D. Demarchi, F. Corinto, M. Gilli  
Politecnico di Torino, Italy
- 13:18 B2L-K.2 : RRAM-Based TCAMs for Pattern Search.... 1382  
L. Zheng<sup>1</sup>, S. Shin<sup>4</sup>, S. Lloyd<sup>3</sup>, M. Gokhale<sup>3</sup>, K. Kim<sup>5</sup>, S. Kang<sup>2</sup>  
<sup>1</sup>Hewlett Packard Labs, United States; <sup>2</sup>Korea Advanced Institute of Science and Technology, Korea, South;  
<sup>3</sup>Lawrence Livermore National Laboratory, United States; <sup>4</sup>Rowan University, United States;  
<sup>5</sup>University of California, Santa Cruz, United States
- 13:36 B2L-K.3 : Neuromorphic Computing with Hybrid Memristive/CMOS Synapses for Real-Time Learning.... 1386  
D. Ielmini, S. Ambrogio, V. Milo, S. Balatti, Z. Wang  
Politecnico di Milano, Italy
- 13:54 B2L-K.4 : A Neuromorphic ASIC Design Using One-Selector-One-Memristor Crossbar.... 1390  
B. Yan<sup>3</sup>, A. Mahmoud<sup>3</sup>, J. Yang<sup>2</sup>, Q. Wu<sup>1</sup>, Y. Chen<sup>3</sup>, H. Li<sup>3</sup>  
<sup>1</sup>Air Force Research Laboratory, United States; <sup>2</sup>University of Massachusetts Amherst, United States;  
<sup>3</sup>University of Pittsburgh, United States
- 14:12 B2L-K.5 : A Fully Analog Memristor-Based Neural Network with Online Gradient Training.... 1394  
E. Rosenthal<sup>2</sup>, S. Greshnikov<sup>2</sup>, D. Soudry<sup>1</sup>, S. Kvatinsky<sup>2</sup>  
<sup>1</sup>Columbia University, United States; <sup>2</sup>Technion – Israel Institute of Technology, Israel

## **B2L-L : Low-Power Devices**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon Kafka-Lamartine

Chair(s): Lan-Da Van - National Chiao Tung University; Danella Zhao - University of Louisiana at Lafayette

- 13:00 B2L-L.1 : A Low Power 2.4/5.2GHz Concurrent Receiver Using Current-Reused Architecture.... 1398  
H. Hsu, Q. Duan, Y. Liao  
National Chiao Tung University, Taiwan
- 13:18 B2L-L.2 : An Efficient Reference-Based Adaptive Antenna Impedance Matching CMOS Circuit.... 1402  
A. Robichaud, F. Nabki, D. Deslandes  
Univeristé du Québec à Montréal, Canada
- 13:36 B2L-L.3 : A 635  $\mu$ W Non-Contact Compensation IC for Body Channel Communication.... 1406  
K. Lee, J. Jang, H. Cho, H. Yoo  
Korea Advanced Institute of Science and Technology, Korea, South
- 13:54 B2L-L.4 : Low-Power All-Analog Circuit for Rectangular-Type Analog Joint Source Channel Coding.... 1410  
X. Zhao, V. Sadhu, D. Pompili  
Rutgers University, United States
- 14:12 B2L-L.5 : An All-Digital Receiver for Low Power, Low Bit-Rate Applications  
Using Simultaneous Wireless Information and Power Transmission.... 1414  
R. Cid-Fuentes<sup>2</sup>, M. Naderi<sup>1</sup>, S. Basagni<sup>1</sup>, K. Chowdhury<sup>1</sup>, A. Cabellos-Aparicio<sup>2</sup>, E. Alarcón<sup>2</sup>  
<sup>1</sup>Northeastern University, United States; <sup>2</sup>Universitat Politècnica de Catalunya, Spain



## **B2L-M : Vision Sensors**

Time: Tuesday, May 24 (13:00-14:30)

Place: Salon 1

Chair(s): Amine Bermak - HKUST; Piotr Dudek - The University of Manchester

- 13:00 B2L-M.1 : A 43.7 mW 94 fps CMOS Image Sensor-Based Stereo Matching Accelerator with Focal-Plane Rectification and Analog Census Transformation.... 1418  
C. Kim, K. Bong, S. Choi, H. Yoo  
Korea Advanced Institute of Science and Technology, Korea, South
- 13:18 B2L-M.2 : Dynamic Resolution Event-Based Temporal Contrast Vision Sensor.... 1422  
H. Guo, J. Huang, M. Guo, S. Chen  
Nanyang Technological University, Singapore
- 13:36 B2L-M.3 : A Background Subtraction Based Column-Parallel Analog-to-Information Converter for Motion-Triggered Vision Sensor.... 1426  
X. Zhong<sup>1</sup>, B. Zhang<sup>1</sup>, A. Bermak<sup>2</sup>  
<sup>1</sup>Hong Kong University of Science and Technology, Hong Kong;  
<sup>2</sup>Hong Kong University of Science and Technology / Hamad Bin Khalifa University, Hong Kong
- 13:54 B2L-M.4 : Parallel HDR Tone Mapping and Auto-Focus on a Cellular Processor Array Vision Chip.... 1430  
J. Martel<sup>1</sup>, L. Müller<sup>1</sup>, S. Carey<sup>2</sup>, P. Dudek<sup>2</sup>  
<sup>1</sup>Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland;  
<sup>2</sup>University of Manchester, United Kingdom
- 14:12 B2L-M.5 : Retinal Ganglion Cell Software and FPGA Model Implementation for Object Detection and Tracking.... 1434  
D. Moeys<sup>1</sup>, T. Delbrück<sup>1</sup>, A. Rios-Navarro<sup>2</sup>, A. Linares-Barranco<sup>2</sup>  
<sup>1</sup>Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland; <sup>2</sup>Universidad de Sevilla, Spain

## **B3P-0 : Demos II**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Philipp Häfliger - University of Oslo; Kea-Tiong Samuel Tang - National Tsing Hua University

- B3P-0.1 : Live Demonstration: High-Level Optimization of Sigma-Delta Modulators Using Multi-Objective Evolutionary Algorithms.... 1438  
M. Velasco-Jiménez, R. Castro-López, J. de la Rosa  
Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain
- B3P-0.2 : Live Demonstration of DLD-VISU: an Elearning Platform for Digital Logic Design.... 1439  
A. Shoufan  
Khalifa University, U.A.E.
- B3P-0.3 : SoC FPAA IC, PCB, and Tool Demonstration.... 1440  
S. Kim, F. Adil, S. Koziol, S. Nease, M. Collins, S. Shah, M. Kagle, J. Hasler  
Georgia Institute of Technology, United States
- B3P-0.4 : Demonstration of a Remote FPAA System for Research and Education.... 1441  
S. Shah, J. Hasler, S. Kim, I. Lal, M. Kagle, M. Collins  
Georgia Institute of Technology, United States

- B3P-0.5 : Live Demonstration: FPAA Demonstration Controlled Through Android-Based Device.... 1442  
B. Bolte<sup>2</sup>, S. Shah<sup>1</sup>, S. Kim<sup>1</sup>, P. Hwang<sup>1</sup>, J. Hasler<sup>1</sup>  
<sup>1</sup>Georgia Institute of Technology, United States; <sup>2</sup>Georgia Institute of Technology / Emory University, United States
- B3P-0.6 : Live Demonstration: Characterization of RRAM Crossbar Arrays at a Click of a Button.... 1443  
R. Berdan<sup>1</sup>, A. Serb<sup>2</sup>, A. Khat<sup>2</sup>, C. Papavassiliou<sup>1</sup>, T. Prodromakis<sup>2</sup>  
<sup>1</sup>Imperial College London, United Kingdom; <sup>2</sup>University of Southampton, United Kingdom
- B3P-0.7 : Live Demonstrator: Challenging the Bio-Inspired Artificial Pancreas with a Mixed-Meal Model Library.... 1444  
P. Herrero, M. El-Sharkawy, P. Pesl, B. Hernández, L. Choi, O. Awara, Y. Lee, J. Lim, M. Yusof, A. Sheah, L. Yu,  
P. Georgiou  
Imperial College London, United Kingdom
- B3P-0.8 : Live Demonstration: Retinal Ganglion Cell Software and FPGA Implementation  
for Object Detection and Tracking.... 1445  
D. Moeys<sup>1</sup>, T. Delbrück<sup>1</sup>, A. Rios-Navarro<sup>2</sup>, A. Linares-Barranco<sup>2</sup>  
<sup>1</sup>Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland; <sup>2</sup>Universidad de Sevilla, Spain

#### **B3P-P : Data Converters IV**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Joao Goes - UNINOVA

- B3P-P.1 : A Pipeline ADC for Very High Conversion Rates.... 1446  
D. Muratore, E. Bonizzoni, F. Maloberti  
Università degli Studi di Pavia, Italy
- B3P-P.2 : Spatially Interleaved Architecture for High-Frequency Data Converters.... 1450  
B. Grave, A. Arbabian  
Stanford University, United States
- B3P-P.3 : A 10-Bit Asynchronous SAR ADC with Scalable Conversion Time in 0.18 $\mu$ m CMOS.... 1454  
P. Tung, D. Fan, T. Tsai  
National Chung Cheng University, Taiwan
- B3P-P.4 : An Ultra-Low Voltage, VCO-Based ADC with Digital Background Calibration.... 1458  
N. Narasimman, T. Kim  
Nanyang Technological University, Singapore
- B3P-P.5 : A PVT-Tracking Metastability Detector for Asynchronous ADCs.... 1462  
Y. Chung, C. Yen  
National Taiwan University of Science and Technology, Taiwan
- B3P-P.6 : A Low Power Low Latency Comparator for Ramp ADC in CMOS Imagers.... 1466  
A. Kaur, M. Sarkar  
Indian Institute of Technology Delhi, India
- B3P-P.7 : A Flexible Receiver Using Delta-Sigma Modulation.... 1470  
M. Nguyen<sup>1</sup>, C. Jabbour<sup>1</sup>, V. Nguyen<sup>2</sup>  
<sup>1</sup>Télécom ParisTech / Université Paris Saclay, France;  
<sup>2</sup>Télécom ParisTech / Université Paris Saclay / University of California at Berkeley, France
- B3P-P.8 : Low-Cost Dithering Generator for Accurate ADC Linearity Test.... 1474  
Y. Duan, T. Chen, D. Chen  
Iowa State University, United States

B3P-P.9 : An on-Chip Para-C Calibration Architecture for Successive Approximation ADC.... 1478

Y. Zhu, J. Yuan

Hong Kong University of Science and Technology, Hong Kong

B3P-P.10 : A 12-Bit SAR ADC with Background Self-Calibration Based on a MOSCAP-DAC with Dynamic Body-Biasing.... 1482

T. Rabuske, J. Fernandes

Instituto de Engenharia de Sistemas e Computadores - Investigação e Desenvolvimento, Portugal

B3P-P.12 : A Digital Calibration Technique for Wide-Band CT MASH Sigma-Delta ADCs with Relaxed Filter Requirements.... 1486

C. Zhang<sup>1</sup>, L. Breems<sup>2</sup>, G. Radulov<sup>1</sup>, M. Bolatkale<sup>2</sup>, H. Hegt<sup>1</sup>, A. van Roermund<sup>1</sup>

<sup>1</sup>Eindhoven University of Technology, Netherlands; <sup>2</sup>NXP Semiconductors, Netherlands

B3P-P.13 : A Novel Autocorrelation-Based Timing Mismatch Calibration Strategy in Time-Interleaved ADCs.... 1490

X. Wang, F. Li, Z. Wang

Tsinghua University, China

B3P-P.14 : High-Level Optimization of Sigma-Delta Modulators Using Multi-Objective Evolutionary Algorithms.... 1494

M. Velasco-Jiménez, R. Castro-López, J. de la Rosa

Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain

B3P-P.15 : Using [www.sigma-delta.de](http://www.sigma-delta.de) to Rapidly Obtain ELD Compensated CT Sigma-Delta Modulators.... 1498

J. Wagner, R. Ritter, M. Ortmanns

Universität Ulm, Germany

B3P-P.16 : Noise-Cancelling Sturdy MASH Delta-Sigma Modulator.... 1502

C. Han, A. Fahmy, N. Maghari

University of Florida, United States

B3P-P.17 : Multi-Stage Delta-Sigma Modulator with a Relaxed Opamp Gain Using a Back-End Digital Integrator.... 1506

C. Han, T. Kim, A. Javvaji, N. Maghari

University of Florida, United States

B3P-P.18 : Gm-Cell Nonlinearity Compensation Technique Using Single-Bit Quantiser and FIR DAC in Gm-C Based Delta-Sigma Modulators.... 1510

D. Basak, K. Pun

Chinese University of Hong Kong, Hong Kong

### **B3P-Q : BioCAS II**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Jie Chen - University of Alberta; Guoxing Wang - Shanghai Jiao Tong University

B3P-Q.1 : A High Frequency Read-Out Channel for Bio-Impedance Measurement.... 1514

M. Takhti, Y. Teng, K. Odame

Dartmouth College, United States

B3P-Q.2 : An Impedance Detection Circuit for Applications in a Portable Biosensor System.... 1518

X. Yu<sup>3</sup>, M. Esanu<sup>3</sup>, S. MacKay<sup>3</sup>, J. Chen<sup>3</sup>, M. Sawan<sup>2</sup>, D. Wishart<sup>4</sup>, W. Hiebert<sup>1</sup>

<sup>1</sup>Canadian National Research Council, Canada; <sup>2</sup>Polytechnique Montréal, Canada; <sup>3</sup>University of Alberta, Canada;

<sup>4</sup>University of Alberta / Canadian National Research, Canada

B3P-Q.3 : A 343nW Biomedical Signal Acquisition System Powered by Energy Efficient (62.8%) Power Aware RF Energy Harvesting Circuit....1522  
P. Patra, K. Yadav, N. Vamsi, A. Dutta  
Indian Institute of Technology Hyderabad, India

B3P-Q.4 : Improved Local Optimization for Adaptive Bases Non-Rigid Image Registration....1526  
T. Shen, K. Cheung  
Chu Hai College of Higher Education, Hong Kong

B3P-Q.5 : A Wearable, Multimodal, Vitals Acquisition Unit for Intelligent Field Triage....1530  
C. Beck, J. Georgiou  
University of Cyprus, Cyprus

B3P-Q.6 : A 1V, -26dBm Sensitive Auto Configurable Mixed Converter Mode RF Energy Harvesting with Wide Input Range....1534  
N. Vamsi, P. V., A. Dutta, S. Singh  
Indian Institute of Technology Hyderabad, India

B3P-Q.7 : A Low-Power Adjustable Bandwidth Biomedical Signals Acquisition SoC for Continuous Health Monitoring System....1538  
Y. Hsu, Z. Liu, M. Hella  
Rensselaer Polytechnic Institute, United States

B3P-Q.8 : On the Accuracy Improvement of Low-Power Orientation Filters Using IMU and MARG Sensor Arrays....1542  
O. Sarbishei  
Motsai Inc., Canada

**B3P-R : Communications V**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Xinming Huang - Worcester Polytechnic Institute; Ezz El-Masry - Dalhousie University

B3P-R.1 : An Efficient Prime Factor Memory-Based FFT Processor for LTE Systems....1546  
K. Xia, B. Wu, X. Zhou, T. Xiong  
Institute of Microelectronics of Chinese Academy of Sciences, China

B3P-R.2 : Phase Shift Keying Demodulator with Decision Feedback Phase-Locked Loop....1550  
J. Lee, M. Kim, J. Park, G. Hong, S. Kim  
Seoul National University, Korea, South

B3P-R.3 : A Reconfigurable IF Receiver Supporting Intra-Band Non-Contiguous Carrier Aggregation in 65 nm CMOS....1554  
Z. Chen, Z. Song, M. Wei, Z. Wang, B. Chi  
Tsinghua University, China

B3P-R.4 : A Low Power Sub-Harmonic Injection Locked 2x2 mm-Wave Beamforming Receiver Array....1558  
S. Sah<sup>1</sup>, P. Agarwal<sup>2</sup>, D. Heo<sup>2</sup>  
<sup>1</sup>Maxlinear Inc, United States; <sup>2</sup>Washington State University, United States

B3P-R.5 : Design Considerations of Ku-Band High Gain Wideband CMOS Power Amplifier for FMCW Radar Application....1562  
B. Chen<sup>2</sup>, L. Lou<sup>2</sup>, K. Tang<sup>2</sup>, S. Liu<sup>2</sup>, Y. Wang<sup>2</sup>, J. Gao<sup>1</sup>, Y. Zheng<sup>2</sup>  
<sup>1</sup>East China Normal University, China; <sup>2</sup>Nanyang Technological University, Singapore

B3P-R.6 : Phase Aligned mm-Wave Injection Locked Power Amplifier....1566  
O. El-Aassar, M. El-Nozahi, H. Ragai  
Ain Shams University, Egypt

### **B3P-S : Multimedia II**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Susanto Rahardja - Institute for Infocomm Research

B3P-S.1 : Programmable 28nm Coprocessor for HEVC/H.265 in-Loop Filters.... 1570

I. Hautala, J. Boutellier, O. Silven University of Oulu, Finland

B3P-S.2 : Scalable Rasterizer Architecture for 3D Graphics System.... 1574

Y. Lai<sup>2</sup>, Y. Chung<sup>1</sup>

<sup>1</sup>Institute for Information Industry, Taiwan; <sup>2</sup>National Chung Hsing University, Taiwan

B3P-S.3 : VLSI Architecture Design of Weighted Mode Filter for Full-HD Depth Map Upsampling at 30fps.... 1578

L. Chen, Y. Hsiao, C. Huang

National Tsing Hua University, Taiwan

B3P-S.4 : Hybrid Digital-Analog Scheme for Video Transmission Over Fading Channel.... 1582

J. Shen, L. Yu, H. Li

University of Science and Technology of China, China

B3P-S.5 : Perceptual Image Quality Assessment Combining Free-Energy Principle and Sparse Representation.... 1586

Y. Liu<sup>1</sup>, G. Zhai<sup>2</sup>, X. Liu<sup>1</sup>, D. Zhao<sup>1</sup>

<sup>1</sup>Harbin Institute of Technology, China; <sup>2</sup>Shanghai Jiao Tong University, China

### **B3P-T : Nanoelectronics II**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Danella Zhao - University of Louisiana at Lafayette; Harming Chiueh - National Chiao Tung University

B3P-T.1 : Physics Model of Memristor Devices with Varying Active Materials.... 1590

H. Abunahla, N. El Nachar, D. Homouz, B. Mohammad, M. Abi Jaoude

Khalifa University, U.A.E.

B3P-T.2 : Design of Resistive Non-Volatile Memories for Rad-Hard Applications.... 1594

N. Lupo<sup>3</sup>, C. Calligaro<sup>2</sup>, R. Gastaldi<sup>2</sup>, C. Wenger<sup>1</sup>, F. Maloberti<sup>3</sup>

<sup>1</sup>IHP-Microelectronics, Germany; <sup>2</sup>RedCat Devices srl, Italy; <sup>3</sup>Università degli Studi di Pavia, Italy

B3P-T.3 : An Ultra-Low Voltage RRAM Read-Out Technique Employing Dithering Principles.... 1598

J. Xing<sup>1</sup>, A. Serb<sup>2</sup>, T. Prodromakis<sup>2</sup>

<sup>1</sup>National University of Defense Technology, China; <sup>2</sup>University of Southampton, United Kingdom

B3P-T.4 : BiFeO<sub>3</sub> Memristor-Based Encryption of Medical Data... 1602

A. Ascoli<sup>2</sup>, V. Senger<sup>2</sup>, R. Tetzlaff<sup>2</sup>, N. Du<sup>1</sup>, O. Schmidt<sup>1</sup>, H. Schmidt<sup>1</sup>

<sup>1</sup>Technische Universität Chemnitz, Germany; <sup>2</sup>Technische Universität Dresden, Germany

## **B3P-U : PECAS II**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Herbert Ho Ching lu - University of Western Australia; Ke-Horng Chen - National Chiao Tung University

B3P-U.1 : A More Accurate Steady State Analysis of Zero-Voltage Switching Quasi-Resonant Converters.... 1606

L. Li, Y. Gao, P. Mok

Hong Kong University of Science and Technology, Hong Kong

B3P-U.3 : Mixed-Signal PI Controller in Current-Mode DC-DC Buck Converter for Automotive Applications.... 1610

Y. Moursy<sup>1</sup>, R. Khalil<sup>3</sup>, S. Lecce<sup>2</sup>, V. Poletto<sup>2</sup>, R. Iskander<sup>1</sup>, M. Louërat<sup>1</sup>

<sup>1</sup>Sorbonne Universités UPMC Paris 6, France; <sup>2</sup>STMicroelectronics, Italy;

<sup>3</sup>University of Pierre and Marie Curie, France

B3P-U.4 : A High Efficiency Single-Inductor Dual-Output Buck Converter with Adaptive Freewheel Current and Hybrid Mode Control.... 1614

J. Xu<sup>2</sup>, Z. Weng<sup>2</sup>, H. Jiang<sup>2</sup>, C. Zhang<sup>2</sup>, Z. Wang<sup>2</sup>, Q. Lin<sup>1</sup>

<sup>1</sup>Research Institute of Tsinghua University in Shenzhen, China; <sup>2</sup>Tsinghua University, China

B3P-U.5 : A Low-Cost Multi-Phase 3A Buck Converter with Improved Ripple Cancellation for Wide Supply Range.... 1618

H. KT<sup>2</sup>, A. Dutta<sup>2</sup>, S. Singh<sup>2</sup>, K. Avalur<sup>1</sup>

<sup>1</sup>ams Semiconductors India Private Limited, India; <sup>2</sup>Indian Institute of Technology Hyderabad, India

B3P-U.6 : Inductive Power Transfer System with a Rotary Transformer for Contactless Energy Transfer on Rotating Applications.... 1622

S. Ditze<sup>1</sup>, A. Endruschat<sup>1</sup>, T. Schriefer<sup>2</sup>, A. Roskopf<sup>1</sup>, T. Heckel<sup>2</sup>

<sup>1</sup>Fraunhofer-Institut für Integrierte Systeme und Bauelementetechnologie, Germany;

<sup>2</sup>Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

B3P-U.7 : Dynamic Model of on-Chip Inverting Capacitive Charge Pumps with Charge Reusing.... 1626

E. Ferro, V. Brea, P. López, D. Cabello

Universidade de Santiago de Compostela, Spain

B3P-U.8 : A 360 V High Voltage Reconfigurable Charge Pump in 0.8  $\mu\text{m}$  CMOS for Optical MEMS Applications.... 1630

P. Beaulieu, A. Alameh, M. Menard, F. Nabki

Univeristé du Québec à Montréal, Canada

B3P-U.9 : SRAM Voltage Stacking.... 1634

E. Ebrahimi, R. Trapani Possignolo, J. Renau

University of California, Santa Cruz, United States

B3P-U.10 : Converter Design for Fuel Cells Enhanced with Cooperation of Lithium Batteries and Supercapacitors.... 1638

S. Huang, P. Wen, T. Hung, Y. Lin

National Cheng Kung University, Taiwan

B3P-U.11 : Multivariable DG Impedance Modeling for the Microgrid Stability Assessment.... 1642

M. Azzouz, E. El Saadany

University of Waterloo, Canada

### **B3P-V : Oscillators & PLLs II**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Dimitri Galayko - UPMC-Sorbonne

B3P-V.1 : A Fast Locking Hybrid TDC-BB ADPLL Utilizing Proportional Derivative Digital Loop Filter and Power Gated DCO.... 1646

A. Lotfy<sup>2</sup>, M. Ghoneima<sup>1</sup>, M. Abdel-Moneum<sup>2</sup>

<sup>1</sup>American University in Cairo, Egypt; <sup>2</sup>Intel Corporation, United States

B3P-V.2 : Comparative Analysis of Differential Colpitts and Cross-Coupled VCOs in 180 nm Si-Ge HBT Technology.... 1650

V. Marotta<sup>1</sup>, G. Macera<sup>1</sup>, M. Kennedy<sup>3</sup>, E. Napoli<sup>2</sup>

<sup>1</sup>Tyndall National Institute, Italy; <sup>2</sup>Università degli Studi di Napoli Federico II, Italy;

<sup>3</sup>University College Cork and Tyndall National Institute, Ireland

B3P-V.3 : A 3.1-4.2GHz Automatic Amplitude Control Loop VCO with Constant KVCO and <10mV Amplitude Variation.... 1654

D. Yan, L. Zhang, L. Zhang, Y. Wang

Tsinghua University, China

B3P-V.4 : A Method to Quantify the Dependence of Spur Heights on Offset Current in a CP-PLL..... 1658

M. Kennedy<sup>2</sup>, H. Mo<sup>2</sup>, Z. Huang<sup>2</sup>, J. Lana<sup>1</sup>

<sup>1</sup>Universidade Federal de Minas Gerais, Brazil; <sup>2</sup>University College Cork and Tyndall National Institute, Ireland

B3P-V.5 : A Theoretical Analysis of Phase Shift in Pulse Injection-Locked Oscillators.... 1662

J. Lee, S. Kim, M. Choo, S. Cho, H. Ko, D. Jeong

Seoul National University, Korea, South

B3P-V.7 : A Novel Current Steering Charge Pump with Low Current Mismatch and Variation.... 1666

A. Amer, S. Ibrahim, H. Ragai

Ain Shams University, Egypt

### **B3P-W : VLSI V**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salle de bal est

Chair(s): Chuan Zhang - Southeast University; Meng-Fan Chang - National Tsing Hua University

B3P-W.1 : Ternary Max-Min Algebra for Representation of Reversible Logic Functions... 1670

M. Khan, J. Rice

University of Lethbridge, Canada

B3P-W.2 : Synthesis of Reversible Logic Functions Using Ternary Max-Min Algebra.... 1674

M. Khan, J. Rice

University of Lethbridge, Canada

B3P-W.4 : Automated Synthesis of Stochastic Computational Elements Using Decision Procedures.... 1678

A. Hassen, B. Chandrasekar, S. Jha

University of Central Florida, United States

B3P-W.5 : Energy-Efficient Power Trimming for Reliable Nanophotonic NoC Microring Resonators.... 1682

M. Yang, P. Ampadu

University of Rochester, United States

B3P-W.7 : An All-Digital Fast Tracking Switching Converter with a Programmable Order Loop Controller for Envelope Tracking RF Power Amplifiers....1690

N. Anabtawi<sup>2</sup>, R. Ferzli<sup>1</sup>, H. Harmanani<sup>3</sup>

<sup>1</sup>Arizona State University, United States; <sup>2</sup>Intel Corporation / Arizona State University, United States;

<sup>3</sup>Lebanese American University, Lebanon

B3P-W.8 : Real Time Low Complexity VLSI Decoder for Prefix Coded Images....1694

A. Ahangar, R. Agarwal, K. Lakhota

Samsung R&D Institute India, Bangalore, India

B3P-W.9 : A Hardware Security Solution Against Scan-Based Attacks....1698

A. Mehta, D. Saif, R. Rashidzadeh

University of Windsor, Canada

B3P-W.10 : A Self-Learning Framework to Detect the Intruded Integrated Circuits....1702

F. Lodhi<sup>2</sup>, I. Abbasi<sup>2</sup>, F. Khalid<sup>1</sup>, O. Hasan<sup>2</sup>, F. Awwad<sup>4</sup>, S. Hasan<sup>3</sup>

<sup>1</sup>Military College of Signals / National University of Sciences and Technology, Pakistan;

<sup>2</sup>National University of Sciences and Technology, Pakistan;

<sup>3</sup>Tennessee Technological University, United States; <sup>4</sup>United Arab Emirates University, U.A.E.

#### **B4L-A : Testing & Security II**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon Drummond est

Chair(s): Massimo Alioto - National University of Singapore; Fernando Moraes - Pontificia Universidade Catolica do

16:00 B4L-A.1 : AES Design Improvement Towards Information Safety....1706

L. Wu<sup>1</sup>, X. Wang<sup>1</sup>, X. Zhao<sup>1</sup>, Y. Cheng<sup>1</sup>, D. Su<sup>1</sup>, A. Chen<sup>1</sup>, Q. Shi<sup>2</sup>, M. Tehranipoor<sup>2</sup>

<sup>1</sup>Beihang University, China; <sup>2</sup>University of Florida, United States

16:18 B4L-A.2 : Is the Secure IC Camouflaging Really Secure?....1710

X. Wang<sup>1</sup>, Q. Zhou<sup>1</sup>, Y. Cai<sup>1</sup>, G. Qu<sup>2</sup>

<sup>1</sup>Tsinghua University, China; <sup>2</sup>University of Maryland, College Park, United States

16:36 B4L-A.3 : Reducing Logic Encryption Overhead Through Gate Level Key Insertion....1714

K. Juretus, I. Savidis

Drexel University, United States

16:54 B4L-A.4 : Automatic Word-Level Abstraction of Datapath....1718

C. Yu, M. Ciesielski

University of Massachusetts Amherst, United States

17:12 B4L-A.5 : A New Countermeasure Against Scan-Based Side-Channel Attacks....1722

Y. Luo<sup>2</sup>, A. Cui<sup>2</sup>, G. Qu<sup>3</sup>, H. Li<sup>1</sup>

<sup>1</sup>Chinese Academy of Sciences, China; <sup>2</sup>Harbin Institute of Technology Shenzhen Graduate School, China;

<sup>3</sup>University of Maryland, College Park, United States



### **B4L-B : DSP for Communications**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon Drummond centre

Chair(s): Wei Xing Zheng - Western Sydney University; Paulo Diniz - Universidade Federal do Rio de Janeiro

- 16:00 B4L-B.1 : An Efficient Soft Decision-Directed Algorithm for Blind Equalization of 4-QAM Systems.... 1726  
J. Li<sup>2</sup>, D. Feng<sup>2</sup>, W. Zheng<sup>1</sup>  
<sup>1</sup>Western Sydney University, Australia; <sup>2</sup>Xidian University, China
- 16:18 B4L-B.2 : Matrix Reordering for Efficient List Sphere Decoding of Polar Codes.... 1730  
S. Hashemi, C. Condo, W. Gross  
McGill University, Canada
- 16:54 B4L-B.4 : VCO-Based Integrator PLL.... N/A  
J. Liang, D. Elliott  
University of Alberta, Canada
- 17:12 B4L-B.5 : A Measure for the Missed Error Detection Probability for Optimizing the Forbidden Symbol Configuration in Joint Source-Channel Arithmetic Codes.... 1742  
H. Kourkchi, W. Lynch, M. Ahmad  
Concordia University, Canada

### **B4L-C : Programmable Arrays**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon Drummond ouest

Chair(s): Kwen-Siong Chong - Nanyang Technological University; Ricardo Reis - Federal University of Rio Grande do Sul

- 16:00 B4L-C.1 : A 101.4 GOPS/W Reconfigurable and Scalable Control-Centric Embedded Processor for Domain-Specific Applications.... 1746  
N. Ma<sup>3</sup>, Z. Zou<sup>4</sup>, Z. Lu<sup>3</sup>, L. Zheng<sup>3</sup>, Y. Huan<sup>1</sup>, S. Blixt<sup>2</sup>  
<sup>1</sup>Fudan University, China; <sup>2</sup>Imsys AB, Sweden; <sup>3</sup>KTH Royal Institute of Technology, Sweden;  
<sup>4</sup>Royal Institute of TeckTH Royal Institute of Technologyhology (KTH), Sweden
- 16:18 B4L-C.2 : SVA Checker Generator for FPGA-Based Verification Platform.... 1750  
N. Mohamad<sup>2</sup>, C. Ooi<sup>2</sup>, N. Ismail<sup>2</sup>, J. Teh<sup>1</sup>  
<sup>1</sup>Altera Corporation Technology Centre, Malaysia; <sup>2</sup>Universiti Teknologi Malaysia, Malaysia
- 16:36 B4L-C.3 : A Practical Design Method for Prototyping Self-Timed Processors Using FPGAs.... 1754  
M. Fiorentino<sup>3</sup>, Y. Savaria<sup>3</sup>, C. Thibeault<sup>1</sup>, P. Gervais<sup>2</sup>  
<sup>1</sup>École de Technologie Supérieure, Canada; <sup>2</sup>Octasic Inc., Canada; <sup>3</sup>Polytechnique Montréal, Canada
- 16:54 B4L-C.4 : An Efficient FPGA-Based Database Processor for Fast Database Analytics.... 1758  
X. Nguyen<sup>4</sup>, H. Nguyen<sup>4</sup>, T. Hoang<sup>2</sup>, K. Inoue<sup>1</sup>, O. Shimojo<sup>3</sup>, T. Murayama<sup>3</sup>, K. Tominaga<sup>3</sup>, C. Pham<sup>4</sup>  
<sup>1</sup>Advanced Original Technologies Co.,Ltd., Japan; <sup>2</sup>Ho Chi Minh City University of Science, Vietnam;  
<sup>3</sup>Nippon Computer Dynamics Co., Ltd, Japan; <sup>4</sup>University of Electro-Communications, Japan

17:12 B4L-C.5 : High Performance Low Overhead Template-Based Cell-Interleave Pipeline (TCIP) for Asynchronous-Logic QDI Circuits.... 1762  
W. Ho, N. Liu, K. Ne, K. Chong, B. Gwee, J. Chang  
Nanyang Technological University, Singapore

#### **B4L-D : Security & Systems**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon A

Chair(s): Daniel P. K. Lun - The Hong Kong Polytechnic University; Hongkai Xiong - Shanghai Jiao Tong University

- 16:00 B4L-D.1 : Benchmarking Photon-Limited Performance of Optic Flow Processing Algorithms.... 1766  
A. Berkovich<sup>2</sup>, G. Barrows<sup>1</sup>, P. Abshire<sup>2</sup>  
<sup>1</sup>Centeye, Inc., United States; <sup>2</sup>University of Maryland, College Park, United States
- 16:18 B4L-D.2 : Fast Intra Prediction Algorithm and Design for High Efficiency Video Coding.... 1770  
H. Fang, H. Chen, T. Chang  
National Chiao Tung University, Taiwan
- 16:36 B4L-D.3 : Color Space Identification from Single Images.... 1774  
H. Li<sup>2</sup>, A. Kot<sup>2</sup>, L. Li<sup>1</sup>  
<sup>1</sup>China University of Mining and Technology, China; <sup>2</sup>Nanyang Technological University, Singapore
- 16:54 B4L-D.4 : A System-on-Chip FPGA Design for Real-Time Traffic Signal Recognition System.... 1778  
Y. Zhou, Z. Chen, X. Huang  
Worcester Polytechnic Institute, United States
- 17:12 B4L-D.5 : Reconfigurable Blocker-Tolerant RF Front-End Filter with Tunable Notch for Active Cancellation of Transmitter Leakage in FDD Receivers.... 1782  
M. Hasan, Q. Gu, X. Liu  
University of California, Davis, United States

#### **B4L-E : Frequency Synthesizers**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon B

Chair(s): Thierry Taris - IMS Bordeaux

- 16:00 B4L-E.1 : Design of High-Order Type-II Delay-Locked Loops Using a Gaussian Transfer Function Approach.... 1786  
Y. Li, G. Roberts  
McGill University, Canada
- 16:18 B4L-E.2 : Time-Mode Techniques for Fast-Locking Phase-Locked Loops.... 1790  
D. Jarrett-Amor, Y. Park, F. Yuan  
Ryerson University, Canada
- 16:36 B4L-E.3 : Property of Rational Functions Related to Band-Pass Transformation.... 1794  
I. Filanovsky  
University of Alberta, Canada
- 16:54 B4L-E.4 : Analog Integrated Circuit Design Using Fixed-Length Devices.... 1798  
D. Saari<sup>1</sup>, D. Nairn<sup>2</sup>  
<sup>1</sup>Analog Devices, Inc., United States; <sup>2</sup>University of Waterloo, Canada
- 17:12 B4L-E.5 : Precise Time Mode Multiplier Using Digital Primitives and Passive Components.... 1802  
R. D'Angelo, S. Sonkusale  
Tufts University, United States

## **B4L-F : Energy Harvesters I**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon C

Chair(s): Guoxing Wang - Shanghai Jiao Tong University; Benoit Gosselin - Université Laval

- 16:00 B4L-F.1 : A 48  $\mu$ W,  $8.88 \times 10^{-3}$  W/W Batteryless Energy Harvesting BCC Identification System....1806  
J. Lee, Y. Lee, H. Cho, H. Yoo  
Korea Advanced Institute of Science and Technology, Korea, South
- 16:18 B4L-F.2 : Approaching the Limits of Piezoelectricity Driven Hot-Electron Injection for Self-Powered in Vivo Monitoring of Micro-Strain Variations....1810  
L. Zhou, A. Abraham, S. Tang, S. Chakrabarty  
Washington University in St. Louis, United States
- 16:36 B4L-F.3 : The Design of High Efficiency Energy Receiving Coil for Micro-Ball Endoscopy....1814  
Y. Yang, X. Xie, G. Li, H. Li, Y. Huang, Z. Wang  
Tsinghua University, China
- 16:54 B4L-F.4 : Automated Environment Aware nW FOCV - MPPT Controller for Self-Powered IoT Applications....1818  
M. Rajendran<sup>1</sup>, S. Kansal<sup>1</sup>, A. Mantha<sup>1</sup>, P. V.<sup>1</sup>, P. Y.B<sup>1</sup>  
<sup>1</sup>Indian Institute of Technology Hyderabad, India; <sup>2</sup>Redpine Signals.inc, India
- 17:12 B4L-F.5 : Automated Design of a 13.56 MHz Corner-Robust Efficient Differential Drive Rectifier for 10  $\mu$ A Load....1822  
P. Haddad, J. Raskin, D. Flandre  
Université catholique de Louvain, Belgium

## **B4L-G : INVITED: Brain Interfaces**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon Hémon

Chair(s): Roland Thewes - Technische Universität Berlin; Ronald Tetzlaff - TU Dresden

- 16:00 B4L-G.1 : Neural Tissue and Brain Interfacing CMOS Devices.... 1826  
R. Thewes<sup>3</sup>, G. Bertotti<sup>3</sup>, N. Dodel<sup>3</sup>, S. Keil<sup>3</sup>, S. Schröder<sup>3</sup>, K. Boven<sup>1</sup>, G. Zeck<sup>2</sup>, M. Mahmud<sup>4</sup>, S. Vassanelli<sup>4</sup>  
<sup>1</sup>MultiChannelSystems, Germany; <sup>2</sup>NMI Reutlingen, Germany; <sup>3</sup>Technische Universität Berlin, Germany;  
<sup>4</sup>Università di Padova, Italy
- 16:18 B4L-G.2 : Integrated Systems for High-Fidelity Sensing and Manipulation of Brain Neurochemistry....1830  
B. Bozorgzadeh, P. Mohseni  
Case Western Reserve University, United States
- 16:36 B4L-G.3 : Area Reduction Techniques for Deep-Brain Probes with Electronic Depth Control....1834  
M. Kuhl, Y. Manoli  
Albert-Ludwigs-Universität Freiburg, Germany
- 16:54 B4L-G.4 : Tradeoffs Between Wireless Communication and Computation in Closed-Loop Implantable Devices....1838  
T. Salam<sup>2</sup>, H. Kassiri<sup>2</sup>, N. Soltani<sup>2</sup>, H. He<sup>2</sup>, J. Perez Velazquez<sup>1</sup>, R. Genov<sup>2</sup>  
<sup>1</sup>Hospital for Sick Children, Canada; <sup>2</sup>University of Toronto, Canada
- 17:12 B4L-G.5 : Pulse-Based Feature Extraction for Hardware-Efficient Neural Recording Systems....1842  
A. Bhaduri, E. Yao, A. Basu  
Nanyang Technological University, Singapore

### **B4L-H : Nonlinear CAS III**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon Musset

Chair(s): Sergio Callegari - University of Bologna

- 16:00 B4L-H.1 : Multiobjective Path Planning on Uneven Terrains Based on NAMOA\* .... 1846  
N. Ganganath, C. Cheng, C. Tse  
Hong Kong Polytechnic University, Hong Kong
- 16:18 B4L-H.2 : True Random Number Generators as Configware  
for Mixed Mode Programmable Systems on Chip.... 1850  
S. Callegari  
Università di Bologna, Italy
- 16:36 B4L-H.3 : The Simplest Memristor in the World.... 1854  
D. Biolk<sup>1</sup>, Z. Biolk<sup>1</sup>, J. Vavra<sup>2</sup>, V. Biolkova<sup>1</sup>, Z. Kolka<sup>1</sup>  
<sup>1</sup>Brno University of Technology, Czech Rep.; <sup>2</sup>University of Defence Brno, Czech Rep.
- 16:54 B4L-H.4 : Control of Autonomous Continuous Systems Using Parametric Perturbations.... 1858  
A. Jimenez-Triana, E. Garcia-Quiroga  
Universidad Distrital Francisco Jose de Caldas, Colombia
- 17:12 B4L-H.5 : On Noise-to-State Stability of Random Nonlinear Systems with Switchings.... 1862  
T. Jiao<sup>1</sup>, W. Zheng<sup>2</sup>  
<sup>1</sup>Nanjing University of Science and Technology, China; <sup>2</sup>Western Sydney University, Australia

### **B4L-K : Emerging Circuits I**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon Joyce

Chair(s): Antonio Rubio - Universitat Politècnica de Catalunya; Costin Anghel - Institut Supérieur d'Electronique de Paris (ISEP)

- 16:00 B4L-K.1 : A Hierarchical ZnO Nanostructure Gas Sensor for Human Breath-Level Acetone Detection.... 1866  
J. Chen<sup>1</sup>, X. Pan<sup>1</sup>, F. Boussaid<sup>3</sup>, A. Bermak<sup>2</sup>, Z. Fan<sup>1</sup>  
<sup>1</sup>Hong Kong University of Science and Technology, Hong Kong;  
<sup>2</sup>Hong Kong University of Science and Technology / Hamad Bin Khalifa University, Hong Kong;  
<sup>3</sup>University of Western Australia, Australia
- 16:18 B4L-K.2 : Flow-Based Computing on Nanoscale Crossbars: Design and Implementation of Full Adders.... 1870  
Z. Alamgir<sup>1</sup>, K. Beckmann<sup>1</sup>, N. Cady<sup>1</sup>, A. Velasquez<sup>1</sup>, S. Jha<sup>1</sup>  
<sup>1</sup>SUNY Polytechnic Institute, United States; <sup>2</sup>University of Central Florida, United States
- 16:36 B4L-K.3 : Parallel Boolean Matrix Multiplication in Linear Time Using Rectifying Memristors.... 1874  
A. Velasquez, S. Jha  
University of Central Florida, United States
- 16:54 B4L-K.4 : Stochastic Behavior-Considered VLSI CAD Environment for MTJ/MOS-Hybrid Microprocessor Design.... 1878  
M. Natsui, A. Tamakoshi, A. Mochizuki, H. Koike, H. Ohno, T. Endoh, T. Hanyu  
Tohoku University, Japan
- 17:12 B4L-K.5 : A New Level Sensitive D Latch Using Ballistic Nanodevices.... 1882  
P. Marthi, N. Hossain, J. Millithaler, M. Margala  
University of Massachusetts Lowell, United States

### **B4L-L : MIMO Systems**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon Kafka-Lamartine

Chair(s): Joseph Cavallaro - Rice University; Zhiyuan Yan - Lehigh University

- 16:00 B4L-L.1 : Efficient Architecture for Soft-Output Massive MIMO Detection with Gauss-Seidel Method....1886  
Z. Wu<sup>2</sup>, C. Zhang<sup>2</sup>, Y. Xue<sup>2</sup>, S. Xu<sup>1</sup>, X. You<sup>2</sup>  
<sup>1</sup>Intel Labs, China; <sup>2</sup>Southeast University, China
- 16:18 B4L-L.2 : A Near-Optimal Detector for Spatial Modulation MIMO Systems....1890  
G. Lee, H. Yun, T. Kim  
Korea Aerospace University, Korea, South
- 16:36 B4L-L.3 : FPGA Design of a Coordinate Descent Data Detector for Large-Scale MU-MIMO....1894  
M. Wu<sup>2</sup>, C. Dick<sup>3</sup>, J. Cavallaro<sup>2</sup>, C. Studer<sup>1</sup>  
<sup>1</sup>Cornell University, United States; <sup>2</sup>Rice University, United States; <sup>3</sup>Xilinx Inc., United States
- 16:54 B4L-L.4 : VLSI Implementation of Incremental Fixed-Complexity LLL Lattice Reduction for MIMO Detection....1898  
Q. Wen, X. Ma  
Georgia Institute of Technology, United States
- 17:12 B4L-L.5 : Low-Complexity Hybrid Beam-Tracking Algorithms and Architectures for mmWave MIMO Systems....1902  
K. Hsu, C. He, Y. Huang  
National Tsing Hua University, Taiwan

### **B4L-M : Image Sensors**

Time: Tuesday, May 24 (16:00-17:30)

Place: Salon 1

Chair(s): Shoushun Chen - Nanyang Technological University; Ricardo Carmona Galán - Instituto de Microelectrónica de Sevilla

- 16:00 B4L-M.1 : In-Pixel Voltage-Controlled Ring-Oscillator for Phase Interpolation in ToF Image Sensors....1906  
I. Vornicu, R. Carmona-Galán, . Rodríguez-Vázquez  
Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain
- 16:18 B4L-M.2 : Time-of-Flight Chip in Standard CMOS Technology with in-Pixel Adaptive Number of Accumulations....1910  
J. Illade-Quinteiro, V. Brea, P. López, D. Cabello  
Universidade de Santiago de Compostela, Spain
- 16:36 B4L-M.3 : A 64×64 Image Energy Harvesting Configurable Image Sensor....1914  
W. Leon-Salas, T. Fischer, X. Fan, G. Moayeri, S. Luo  
Purdue University, United States
- 16:54 B4L-M.4 : An Integrating Wide Dynamic Range nMOS Pixel with a Logarithmic Reference Voltage Generator....1918  
M. Shaharom, S. Collins  
University of Oxford, United Kingdom
- 17:12 B4L-M.5 : A 14-Bit Differential-Ramp Single-Slope Column-Level ADC for 640×512 Uncooled Infrared Imager....1922  
D. Liu<sup>2</sup>, W. Lu<sup>2</sup>, Z. Chen<sup>2</sup>, Y. Zhang<sup>2</sup>, S. Lei<sup>1</sup>, G. Tan<sup>1</sup>  
<sup>1</sup>North GuangWei, China; <sup>2</sup>Peking University, China

### **C1L-A : 3D SoC**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon Drummond est

Chair(s): Tian-Sheuan Chang - National Chiao-Tung University; Yeong-Kang Lai - National Chung Hsing University

- 10:30 C1L-A.1 : Layer Ordering to Minimize TSVs in Heterogeneous 3-D ICs.... 1926  
B. Vaisband, E. Friedman  
University of Rochester, United States
- 10:48 C1L-A.2 : Accuracy-Improved Coupling Capacitance Model for Through-Silicon via (TSV) Arrays  
Using Dimensional Analysis.... 1930  
T. Ramadan<sup>4</sup>, E. Yahya<sup>2</sup>, M. Dessouky<sup>1</sup>, Y. Ismail<sup>3</sup>  
<sup>1</sup>Ain Shams University, Egypt; <sup>2</sup>American University in Cairo, Egypt;  
<sup>3</sup>American University in Cairo / Zewail City of Science and Technology, Egypt; <sup>4</sup>Mentor Graphics, Egypt
- 11:06 C1L-A.3 : TCG-SP: an Improved Floorplan Representation Based on an Efficient Hybrid  
of Transitive Closure Graph and Sequence Pair.... 1934  
T. Kourany<sup>1</sup>, E. Hegazi<sup>2</sup>, Y. Ismail<sup>1</sup>  
<sup>1</sup>American University in Cairo / Zewail City of Science and Technology, Egypt;  
<sup>2</sup>Integrated Circuits Lab, Ain-Shams University Cairo, Egypt
- 11:24 C1L-A.4 : Crosstalk Noise Effects of on-Chip Inductive Links on Power Delivery Networks.... 1938  
I. Papistas, V. Pavlidis  
University of Manchester, United Kingdom
- 11:42 C1L-A.5 : Power-Aware Through-Silicon-Via Minimization by Partitioning Finite State Machine with Datapath.... 1942  
A. Chin Abdullah, C. Ooi, N. Ismail, N. Mohammad  
Universiti Teknologi Malaysia, Malaysia

### **C1L-B : DSP Circuit Design**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon Drummond centre

Chair(s): Chuan Zhang - Southeast University; Bah Hwee Gwee - Nanyang Technological University

- 10:30 C1L-B.1 : A Computationally-Efficient PWM Technique for Digital Class-D Amplifiers.... 1946  
C. Chang, J. Wu  
National Chiao Tung University, Taiwan
- 10:48 C1L-B.2 : A Novel Computationally-Efficient Digital Frequency Locking Scheme for Software Defined Radio MODEM.... 1950  
A. Slaney, Y. Sun, O. Simpson  
University of Hertfordshire, United Kingdom
- 11:06 C1L-B.3 : Deep Learning Neural Networks Optimization Using Hardware Cost Penalty.... 1954  
R. Doshi<sup>2</sup>, K. Hung<sup>1</sup>, L. Liang<sup>1</sup>, K. Chiu<sup>1</sup>  
<sup>1</sup>Hong Kong Applied Science and Technology Research Institute, Hong Kong; <sup>2</sup>Princeton University, United States
- 11:24 C1L-B.4 : PVT-Aware Digital Techniques for a Power Line Energy-Harvesting Sensor Node.... 1958  
S. Sebastian, J. Hizon, L. Alarcon  
University of the Philippines Diliman, Philippines
- 11:42 C1L-B.5 : Using Template Matching and Compressed Sensing Techniques to Enhance Performance  
of Neural Spike Detection and Data Compression Systems.... 1962  
N. Li<sup>2</sup>, M. Osborn<sup>2</sup>, M. Sawan<sup>2</sup>, L. Fang<sup>1</sup>  
<sup>1</sup>National University of Defense Technology, China; <sup>2</sup>Polytechnique Montréal, Canada

### **C1L-C : Arithmetics**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon Drummond ouest

Chair(s): Fernando Moraes - Pontificia Universidade Catolica do; Kwen-Siong Chong - Nanyang Technological University

- 10:30 C1L-C.1 : A VLSI-Efficient Signed Magnitude Comparator for  $\{2n-1, 2n, 2^{n+1}-1\}$  RNS.... 1966  
S. Kumar, C. Chang  
Nanyang Technological University, Singapore
- 10:48 C1L-C.2 : Approximate Adder with Output Correction for Error Tolerant Applications and Gaussian Distributed Inputs.... 1970  
D. Esposito, G. Castellano, D. De Caro, E. Napoli, N. Petra, A. Strollo  
Università degli Studi di Napoli Federico II, Italy
- 11:06 C1L-C.3 : Design and Evaluation of an Approximate Wallace-Booth Multiplier.... 1974  
L. Qian<sup>1</sup>, C. Wang<sup>1</sup>, W. Liu<sup>1</sup>, F. Lombardi<sup>2</sup>, J. Han<sup>3</sup>  
<sup>1</sup>Nanjing University of Aeronautics and Astronautics, China; <sup>2</sup>Northeastern University, China;  
<sup>3</sup>University of Alberta, China
- 11:24 C1L-C.4 : Dynamic Delay Variation Behaviour of RNS Multiply-Add Architectures.... 1978  
K. Papachatzopoulos, I. Kouretas, V. Paliouras  
University of Patras, Greece
- 11:42 C1L-C.5 : A LUT-Based Matrix Multiplication Using Neural Networks.... 1982  
Z. Sworna, M. Haque, H. Hasan Babu  
University of Dhaka , Bangladesh

### **C1L-D : Multimedia Imaging**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon A

Chair(s): Maria Trocan - ISEP; Zicheng Liu - Microsoft Research

- 10:30 C1L-D.1 : A Novel 3D Model Recognition Approach Using Pitman-Yor Process Mixtures of Beta-Liouville Distributions.... 1986  
W. Fan<sup>2</sup>, F. Al-Osaimi<sup>3</sup>, N. Bouguila<sup>1</sup>  
<sup>1</sup>Concordia University, Canada; <sup>2</sup>Huaqiao University, China; <sup>3</sup>Umm Al-Qura University, Saudi Arabia
- 10:48 C1L-D.2 : HEVC Compressed Domain Moving Object Detection and Classification.... 1990  
L. Zhao<sup>1</sup>, D. Zhao<sup>1</sup>, X. Fan<sup>1</sup>, Z. He<sup>2</sup>  
<sup>1</sup>Harbin Institute of Technology, China; <sup>2</sup>University of Missouri, United States
- 11:06 C1L-D.3 : Fast Model Searching and Combining for Example Learning-Based Super-Resolution.... 1994  
C. Chen<sup>2</sup>, F. Hsu<sup>2</sup>, D. Yang<sup>1</sup>, J. Wang<sup>1</sup>, M. Shieh<sup>2</sup>  
<sup>1</sup>Himax Technologies, Taiwan; <sup>2</sup>National Cheng Kung University, Taiwan
- 11:24 C1L-D.4 : A Super-Fast Online Face Tracking System for Video Surveillance.... 1998  
X. Lan<sup>1</sup>, Z. Xiong<sup>2</sup>, W. Zhang<sup>3</sup>, S. Li<sup>1</sup>, H. Chang<sup>1</sup>, W. Zeng<sup>2</sup>  
<sup>1</sup>Institute of Automation, Chinese Academy of Sciences, China; <sup>2</sup>Microsoft Research Asia, China;  
<sup>3</sup>University of Waterloo, Canada

### **C1L-E : Data Converters III**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon B

Chair(s): Wouter A. Serdijn - TU Delft

- 10:30 C1L-E.1 : Power-On Digital Calibration Method for Delta-Sigma ADCs....2002  
J. Cao<sup>1</sup>, X. Meng<sup>1</sup>, G. Temes<sup>1</sup>, W. Yu<sup>2</sup>  
<sup>1</sup>Oregon State University, United States; <sup>2</sup>Silicon Labs Inc., United States
- 10:48 C1L-E.2 : Low Power DT Delta-Sigma Modulator with Ring Amplifier SC-Integrator....2006  
T. Suguro, H. Ishikuro  
Keio University, Japan
- 11:06 C1L-E.3 : A Low-Power High-Speed Comparator for Analog to Digital Converters....2010  
A. Khorami<sup>2</sup>, M. Baraani Dastjerdi<sup>1</sup>, A. Fotowat Ahmadi<sup>2</sup>  
<sup>1</sup>Columbia University, Iran; <sup>2</sup>Sharif University of Technology, Iran
- 11:24 C1L-E.4 : Comparator Common-Mode Variation Effects Analysis and its Application in SAR ADCs....2014  
L. Chen<sup>2</sup>, A. Sanyal<sup>2</sup>, J. Ma<sup>1</sup>, X. Tang<sup>2</sup>, N. Sun<sup>2</sup>  
<sup>1</sup>Qualcomm Incorporated, United States; <sup>2</sup>University of Texas at Austin, United States
- 11:42 C1L-E.5 : The Effect of Amplitude Resolution and Mismatch on a Digital-to-Analog Converter Used for Digital Harmonic-Cancelling Sine-Wave Synthesis....2018  
P. Aluthwala<sup>3</sup>, N. Weste<sup>2</sup>, A. Adams<sup>1</sup>, T. Lehmann<sup>3</sup>, S. Parameswaran<sup>3</sup>  
<sup>1</sup>Broadcom Corporation, Australia; <sup>2</sup>NHEW R&D Pty Ltd, Australia; <sup>3</sup>University of New South Wales, Australia

### **C1L-F : Bio Wireless Circuits**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon C

Chair(s): Jeremy Holleman - University of Tennessee; Bo Zhao - Tshinghua University

- 10:30 C1L-F.1 : Design of CMOS Telemetry Circuits for in-Vivo Wireless Sonomicrometry....2022  
Y. Alazzawi, S. Chakrabarty  
Washington University in St. Louis, United States
- 10:48 C1L-F.2 : An Implantable Wireless Multi-Channel Neural Prosthesis for Epidural Stimulation....2026  
D. Jiang, C. Eder, T. Perkins, A. Vanhoestenbergh, M. Schormans, F. Liu, V. Valente, N. Donaldson, A. Demosthenous  
University College London, United Kingdom
- 11:06 C1L-F.3 : Adaptive Transmitting Coil Array for Optimal Power Transfer in Deeply Implanted Medical Devices....2030  
J. Jian, M. Stanacevic  
Stony Brook University, United States
- 11:24 C1L-F.4 : A Self-Adaptive Body Channel Communication Scheme for Backward Path Loss Reduction....2034  
J. Mao<sup>1</sup>, B. Zhao<sup>1</sup>, Y. Lian<sup>2</sup>, H. Yang<sup>1</sup>  
<sup>1</sup>Tsinghua University, China; <sup>2</sup>York University, Canada
- 11:42 C1L-F.5 : A Double-Carrier Wireless Power and Data Telemetry for Implantable Biomedical Systems....2038  
M. Najjarzadegan, I. Ghotbi, S. Jafarabadi Ashtiani, O. Shoaie  
University of Tehran, Iran



### **C1L-G : INVITED: Emerging IoT**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon Hémon

Chair(s): Emre Salman - Stony Brook University; Arindam Basu - Nanyang Technological University

- 10:30 C1L-G.1 : The Ultimate IoT Application: a Cyber-Physical System for Ambient Assisted Living....2042  
D. De Venuto<sup>1</sup>, V. Annese<sup>1</sup>, A. Sangiovanni-Vincentelli<sup>2</sup>  
<sup>1</sup>Politecnico di Bari, Italy; <sup>2</sup>University of California, Berkeley, United States
- 10:48 C1L-G.2 : A New Circuit Design Framework for IoT Devices: Charge-Recycling with Wireless Power Harvesting....2046  
T. Wan, E. Salman, M. Stanacevic  
Stony Brook University, United States
- 11:06 C1L-G.3 : Hardware Security Assurance in Emerging IoT Applications....2050  
J. Dofe, J. Frey, Q. Yu  
University of New Hampshire, United States
- 11:24 C1L-G.4 : Analog Front End Design for Tags in Backscatter-Based Tag-to-Tag Communication Networks....2054  
A. Athalye, J. Jian, Y. Karimi, S. Das, P. Djuric  
Stony Brook University, United States
- 11:42 C1L-G.5 : Infrastructural Health Monitoring Using Self-Powered Internet-of-Things....2058  
K. Aono<sup>3</sup>, N. Lajnef<sup>1</sup>, F. Faridazar<sup>2</sup>, S. Chakrabarty<sup>3</sup>  
<sup>1</sup>Michigan State University, United States; <sup>2</sup>Turner Fairbanks Research Center, United States;  
<sup>3</sup>Washington University in St. Louis, United States

### **C1L-H : Nonlinear CAS IV**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon Musset

Chair(s): Marco Storace - University of Genoa

- 10:30 C1L-H.1 : A Self-Consistent Carleman Linearization Technique for the Large Signal Analysis of Nonlinear Circuits....2062  
H. Weber, W. Mathis  
Gottfried Wilhelm Leibniz Universität Hannover, Germany
- 10:48 C1L-H.2 : A Circuit Model for Open-Loop Compensation of Hysteresis....2066  
A. Oliveri, F. Stellino, M. Parodi, M. Storace  
Università di Genova, Italy
- 11:06 C1L-H.3 : A Tail-Resonance Calibration Technique for Wide Tuning Range LC VCOs....2070  
A. Bhat, N. Krishnapura  
Indian Institute of Technology Madras, India
- 11:24 C1L-H.4 : On the Temperature Dependence of Subthreshold Currents in MOS Electron Inversion Layers, Revisited....2074  
B. Degnan, J. Hasler  
Georgia Institute of Technology, United States

### **C1L-J : INVITED: Stochastic Electronics**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon Jarry

Chair(s): André van Schaik - University of Western Sydney; C. Singh Thakur - University of Western Sydney

- 10:30 C1L-J.1 : Stochastic Synaptic Plasticity with Memristor Crossbar Arrays....2078  
R. Naous<sup>2</sup>, M. Al-Shedivat<sup>1</sup>, E. Neftci<sup>3</sup>, G. Cauwenberghs<sup>4</sup>, K. Salama<sup>2</sup>  
<sup>1</sup>Carnegie Mellon University, United States; <sup>2</sup>King Abdullah University of Science and Technology, Saudi Arabia;  
<sup>3</sup>University of California, Irvine, United States; <sup>4</sup>University of California, San Diego, United States
- 10:48 C1L-J.2 : A Stochastic Approach to STDP....2082  
R. Wang, C. Singh Thakur, T. Hamilton, J. Tapson, A. van Schaik  
Western Sydney University, Australia
- 11:06 C1L-J.3 : Stochastic Image Processing and Simultaneous Dewarping for Aerial Vehicles....2086  
J. Molin, J. Rattray, R. Etienne-Cummings  
Johns Hopkins University, United States
- 11:24 C1L-J.4 : Synaptic Sampling in Hardware Spiking Neural Networks....2090  
S. Sheik<sup>2</sup>, S. Paul<sup>1</sup>, C. Augustine<sup>1</sup>, C. Kothapalli<sup>1</sup>, M. Khellah<sup>1</sup>, G. Cauwenberghs<sup>4</sup>, E. Neftci<sup>4</sup>  
<sup>1</sup>Intel Corporation, United States; <sup>2</sup>Intel Corporation / University of California, San Diego, United States;  
<sup>3</sup>University of California, Irvine, United States; <sup>4</sup>University of California, San Diego, United States
- 11:42 C1L-J.5 : Spiking Analog VLSI Neuron Assemblies as Constraint Satisfaction Problem Solvers....2094  
J. Binas, G. Indiveri, M. Pfeiffer  
Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland

### **C1L-K : Nano & Quantum Circuits**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon Joyce

Chair(s): Malgorzata Chrzanowska-Jeske - Portland State University; Hai Li - University of Pittsburgh

- 10:30 C1L-K.1 : Novel Linear Analog-Adder Using a-IGZO TFTs....2098  
P. Bahubalindrani<sup>1</sup>, V. Tavares<sup>2</sup>, E. Fortunato<sup>3</sup>, R. Martins<sup>3</sup>, P. Barquinha<sup>3</sup>  
<sup>1</sup>Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal; <sup>2</sup>Universidade do Porto, Portugal;  
<sup>3</sup>Universidade Nova de Lisboa and CEMOP-Uninova-Instituto Desenvolvimento De Novas Tecnologias, Portugal
- 10:48 C1L-K.2 : An Efficient Design Technique of a Quantum Divider Circuit....2102  
S. Dibbo, H. Hasan Babu, L. Jamal  
University of Dhaka, Bangladesh
- 11:06 C1L-K.3 : Investigation of BTI Reliability for Monolithic 3D 6T SRAM with Ultra-Thin-Body GeOI MOSFETs....2106  
V. Hu<sup>1</sup>, P. Su<sup>2</sup>, C. Chuang<sup>2</sup>  
<sup>1</sup>National Central University, Taiwan; <sup>2</sup>National Chiao Tung University, Taiwan
- 11:24 C1L-K.4 : An Accurate Phase Shift Detector Using Bulk Voltage Boosting Technique for Sensing Applications....2110  
Y. Tu, D. Wang, C. Wang  
National Sun Yat-Sen University, Taiwan
- 11:42 C1L-K.5 : A Methodology for Standard Cell Design for QCA....2114  
D. Reis<sup>2</sup>, C. Campos<sup>1</sup>, T. Soares<sup>2</sup>, O. Neto<sup>2</sup>, F. Torres<sup>2</sup>  
<sup>1</sup>Cadence Design Systems, United States; <sup>2</sup>Universidade Federal de Minas Gerais, Brazil

### **C1L-L : Wireless Mobile I**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon Kafka-Lamartine

Chair(s): Chuan Zhang - Southeast University; Wei Xing Zheng - Western Sydney University

- 10:30 C1L-L.1 : A Compact Dual-Band 5dBm RF Power Amplifier for Cellular Applications....2118  
A. Girija, S. Aniruddhan  
Indian Institute of Technology Madras, India
- 10:48 C1L-L.2 : A 4 dBm IP1dB 20.8 dBm IIP3 Wideband Complementary SF Feedback LNTA  
with Derivative Superposition Method....2122  
J. Chen, B. Guo, B. Zhang, G. Wen  
University of Electronic Science and Technology of China, China
- 11:24 C1L-L.4 : A Generalized Conflict-Free Address Scheme for Arbitrary 2k-Point Memory-Based FFT Processors....2126  
K. Xia, B. Wu, X. Zhou, T. Xiong  
Institute of Microelectronics of Chinese Academy of Sciences, China
- 11:42 C1L-L.5 : Digitally Controlled Oscillator Gain Estimation for RF-DPLLs in 4G LTE Polar Transmitters....2130  
T. Buckel<sup>2</sup>, S. Tertinek<sup>1</sup>, R. Kanumalli<sup>4</sup>, T. Mayer<sup>1</sup>, C. Wicpalek<sup>1</sup>, R. Weigel<sup>3</sup>, T. Ussmueller<sup>5</sup>  
<sup>1</sup>DMCE GmbH & Co KG, Austria;  
<sup>2</sup>DMCE GmbH & Co KG / Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany;  
<sup>3</sup>Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; <sup>4</sup>Johannes Kepler University Linz, Austria;  
<sup>5</sup>University of Innsbruck, Austria

### **C1L-M : Power-Grid Analysis**

Time: Wednesday, May 25 (10:30-12:00)

Place: Salon 1

Chair(s): Juri Jatskevich - University of British Columbia; Yu Christine Chen - University of British Columbia

- 10:30 C1L-M.1 : Steady-State Analysis for Hybrid AC/DC Microgrids....2134  
A. Hamad, E. El Saadany  
University of Waterloo, Canada
- 10:48 C1L-M.2 : Consensus-Based Distributed Droop Control of VSGs for Isolated AC Micro-Grids by ADMMs....2138  
L. Lu, C. Chu  
National Tsing Hua University, Taiwan
- 11:06 C1L-M.3 : An Analytical Fault Model for Direct Current Lines....2142  
C. Strobl<sup>1</sup>, M. Schäfer<sup>2</sup>, R. Rabenstein<sup>2</sup>  
<sup>1</sup>E-T-A GmbH, Germany; <sup>2</sup>Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
- 11:24 C1L-M.4 : Mapping Nodal Power Injections to Branch Flows in Connected LTI Electrical Networks....2146  
Y. Chen<sup>1</sup>, A. Al-Digs<sup>1</sup>, S. Dhople<sup>2</sup>  
<sup>1</sup>University of British Columbia, Canada; <sup>2</sup>University of Minnesota, United States
- 11:42 C1L-M.5 : Parametric Average-Value Modeling of Diode Rectifier Circuits in Nodal Analysis EMTP-Type Solution....2150  
H. Atighechi, S. Ebrahimi, S. Chiniforoosh, J. Jatskevich  
University of British Columbia, Canada

### **C2L-A : VLSI III**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon Drummond est

Chair(s): Vasily Moshnyaga - Fukuoka University; Mohsin M. Jamali - University of Toledo

- 13:00 C2L-A.1 : Efficient Error Detection Architectures for CORDIC Through Recomputing with Encoded Operands....2154  
M. Mozaffari Kermani, R. Ramadoss, R. Azarderakhsh  
Rochester Institute of Technology, United States
- 13:18 C2L-A.2 : A Hybrid Adaptive CORDIC in 65nm SOTB CMOS Process....2158  
X. Nguyen<sup>2</sup>, H. Nguyen<sup>2</sup>, C. Pham<sup>2</sup>, T. Hoang<sup>1</sup>, D. Le<sup>1</sup>  
<sup>1</sup>Ho Chi Minh City University of Science, Vietnam; <sup>2</sup>University of Electro-Communications, Japan
- 13:36 C2L-A.3 : Implementation of Switching Circuit Models as Transfer Functions...2162  
D. Houngninou, M. Thornton  
Southern Methodist University, United States
- 13:54 C2L-A.4 : Towards Formal Abstraction, Modeling, and Analysis of Single Event Transients at RTL....2166  
G. Bany Hamad<sup>2</sup>, O. Ait Mohamed<sup>1</sup>, Y. Savaria<sup>2</sup>  
<sup>1</sup>Concordia University, Canada; <sup>2</sup>Polytechnique Montréal, Canada
- 14:12 C2L-A.5 : A Hybrid SDC/SDF Architecture for Area and Power Minimization of Floating-Point FFT Computations....2170  
M. Wang, Z. Li  
Tsinghua University, China

### **C2L-B : Digital Filters**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon Drummond centre

Chair(s): Tapio Saramäki - Tampere University of Technology; Hakan Johansson - Linköping University

- 13:00 C2L-B.1 : A Unified Approach to the Design of Interpolated and Frequency-Response-Masking FIR Filters....2174  
W. Lu<sup>2</sup>, T. Hinamoto<sup>1</sup>  
<sup>1</sup>Hiroshima University / Hiroshima Institute of Technology, Japan; <sup>2</sup>University of Victoria, Canada
- 13:18 C2L-B.2 : Realization with Minimal Weighted Pole and Zero Sensitivity Subject to I2-Scaling Constraints  
for Recursive Digital Filters....2178  
T. Hinamoto<sup>2</sup>, A. Doi<sup>1</sup>, W. Lu<sup>3</sup>  
<sup>1</sup>Hiroshima Institute of Technology, Japan; <sup>2</sup>Hiroshima University / Hiroshima Institute of Technology, Japan;  
<sup>3</sup>University of Victoria, Canada
- 13:36 C2L-B.3 : Improved Design of Digital 1-D and 2-D Notch Filters Using General Feedback Structure....2182  
S. Pei<sup>1</sup>, B. Guo<sup>1</sup>, W. Lu<sup>1</sup>, G. Sobelman<sup>2</sup>, Y. Huang<sup>1</sup>  
<sup>1</sup>National Taiwan University, Taiwan; <sup>2</sup>University of Minnesota, United States
- 13:54 C2L-B.4 : Minimax Design and Order Estimation of FIR Filters for Extending the Bandwidth of ADCs....2186  
Y. Wang<sup>2</sup>, H. Johansson<sup>1</sup>, H. Xu<sup>2</sup>, J. Diao<sup>2</sup>  
<sup>1</sup>Linköping University, Sweden; <sup>2</sup>National University of Defense Technology, China
- 14:12 C2L-B.5 : IIR Digital Filter Design by Partial Second-Order Factorization and Iterative WLS Approach....2190  
A. Jiang<sup>2</sup>, H. Kwan<sup>3</sup>, Y. Zhu<sup>1</sup>, N. Xu<sup>2</sup>, X. Liu<sup>2</sup>  
<sup>1</sup>Changzhou University, China; <sup>2</sup>Hohai University, China; <sup>3</sup>University of Windsor, Canada

## **C2L-C : Data Processing**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon Drummond ouest

Chair(s): Chuan Zhang - Southeast University; Tae-Hyoung Kim - Nanyang Technological University

- 13:00 C2L-C.1 : Hardware-Oriented Adaptive Multi-Resolution Motion Estimation Algorithm and its VLSI Architecture....2194  
G. Xiang, H. Jia, J. Liu, Y. Li, X. Xie  
Peking University, China
- 13:18 C2L-C.2 : Auto-Adaptive Multi-Sensor Architecture....2198  
A. Isavudeen<sup>2</sup>, N. Ngan<sup>1</sup>, E. Dokladalova<sup>2</sup>, M. Akil<sup>2</sup>  
<sup>1</sup>Sagem Défense Sécurité, France;  
<sup>2</sup>Université Paris Est - École supérieure d'ingénieurs en électronique et électrotechnique, France
- 13:36 C2L-C.3 : An HEVC Multi-Size DCT Hardware with Constant Throughput and Supporting Heterogeneous CUs....2202  
J. Goebel, G. Paim, L. Agostini, B. Zatt, M. Porto  
Universidade Federal de Pelotas, Brazil
- 13:54 C2L-C.4 : Block Matching Based Real-Time Optical Flow Hardware Implementation....2206  
K. Seyid, A. Richaud, R. Capoccia, Y. Leblebici  
Ecole Polytechnique Fédérale de Lausanne, Switzerland
- 14:12 C2L-C.5 : Hardware Implementation of a Real-Time Tone Mapping Algorithm Based on a Mantissa-Exponent Representation....2210  
U. Shahnovich, A. Horé, O. Yadid-Pecht  
University of Calgary, Canada

## **C2L-D : Image Quality**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon A

Chair(s): Susanto Rahardja - Institute for Infocomm Research; Yeong-Kang Lai - National Chung Hsing University

- 13:00 C2L-D.1 : Quality Assessment of Contrast-Altered Images....2214  
M. Liu<sup>2</sup>, K. Gu<sup>1</sup>, G. Zhai<sup>2</sup>, J. Zhou<sup>3</sup>, W. Lin<sup>1</sup>  
<sup>1</sup>Nanyang Technological University, Singapore; <sup>2</sup>Shanghai Jiao Tong University, China;  
<sup>3</sup>Universidade de Macau, Macau
- 13:18 C2L-D.2 : Quality Assessment of Tone-Mapped Images Based on Sparse Representation....2218  
L. Xie, X. Zhang, S. Wang, X. Zhang, S. Ma  
Peking University, China
- 13:36 C2L-D.3 : Blindly Evaluating Stereoscopic Image Quality with Free-Energy Principle....2222  
Y. Zhu<sup>2</sup>, G. Zhai<sup>2</sup>, K. Gu<sup>1</sup>, M. Liu<sup>2</sup>  
<sup>1</sup>Nanyang Technological University, Singapore; <sup>2</sup>Shanghai Jiao Tong University, China
- 13:54 C2L-D.4 : Subset Noise Bias Compensation for Tone-Mapping and Up-Scaling of JPEG Images....2226  
M. Iwahashi<sup>1</sup>, T. Aye<sup>3</sup>, T. Yoshida<sup>1</sup>, H. Kiya<sup>2</sup>  
<sup>1</sup>Nagaoka University of Technology, Japan; <sup>2</sup>Tokyo Metropolitan University, Japan;  
<sup>3</sup>University of Computer Studies, Japan
- 14:12 C2L-D.5 : An Approach to Image Compression Using R-D Optimal OMP Selection....2230  
M. Jiang<sup>3</sup>, M. Kalluri<sup>3</sup>, N. Ling<sup>3</sup>, J. Zheng<sup>1</sup>, P. Zhang<sup>2</sup>  
<sup>1</sup>Hisilicon Technologies Co. Ltd., China; <sup>2</sup>Huawei Technologies, China, China; <sup>3</sup>Santa Clara University, United States

### **C2L-E : Interface Circuits I**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon B

Chair(s): George Yuan - Hong Kong University of Technology

- 13:00 C2L-E.1 : Design and Modeling of PLL-Based Clock and Data Recovery Circuits with Periodically Embedded Clock Encoding for Intra-Panel Interfaces....2234  
H. Liu, C. Su, C. Cheng, W. Liu  
ILI Technology Corporation, Taiwan
- 13:18 C2L-E.2 : A 83dB SNDR Low Power Readout ASIC for Piezoresistive Nanogauge Based Gyroscopes....2238  
A. Nikas, O. Leman, H. Zhou, J. Lagos, B. Vinchhi, J. Hauer  
Fraunhofer-Institut für Integrierte Schaltungen, Germany
- 13:36 C2L-E.3 : A Novel High-Voltage 5.5 V Resilient, Floating and Full-Scale 3.3 V Pulse-Triggered Level-Shifter....2242  
N. Laflamme-Mayer, M. Renaud  
Polytechnique Montréal / Dolphin Integration, Canada
- 13:54 C2L-E.4 : PAM4 Receiver with Adaptive Threshold Voltage and Adaptive Decision Feedback Equalizer....2246  
L. Tang, W. Gai, L. Shi  
Peking University, China
- 14:12 C2L-E.5 : An Amplifier-Shared Inverter-Based MASH Structure Delta Sigma Modulator for Smart Sensor Interfaces....2250  
M. Honarparvar, M. Safi-Harb, M. Sawan Polytechnique Montréal, Canada

### **C2L-G : INVITED: CMOS BioChips**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon Hémon

Chair(s): Yehya H. Ghallab - Zewail City of Science and Technology; Wael Badawy - Intelliview

- 13:00 C2L-G.1 : CMOS Capacitive Sensor Array for Continuous Adherent Cell Growth Monitoring....2254  
G. Nabovati<sup>1</sup>, E. Ghafar-Zadeh<sup>2</sup>, A. Letourneau<sup>1</sup>, M. Sawan<sup>1</sup>  
<sup>1</sup>Polytechnique Montréal, Canada; <sup>2</sup>York university, Canada
- 13:18 C2L-G.2 : An Efficient Thermal Energy Harvesting and Power Management for  $\mu$ Watt Wearable BioChips....2258  
M. Alhawari, D. Kilani, B. Mohammad, H. Saleh, M. Ismail  
Khalifa University, U.A.E.
- 13:36 C2L-G.3 : A Biomedical SoC Architecture for Predicting Ventricular Arrhythmia....2262  
T. Tekeste, H. Saleh, B. Mohammad, A. Khandoker, M. Ismail  
Khalifa University, U.A.E.
- 13:54 C2L-G.4 : Lab-on-CMOS: a Multi-Modal CMOS Sensor Platform Towards Personalized DNA Sequencing....2266  
Y. Jiang<sup>2</sup>, X. Liu<sup>2</sup>, X. Huang<sup>1</sup>, Y. Shang<sup>2</sup>, M. Yan<sup>2</sup>, H. Yu<sup>2</sup>  
<sup>1</sup>Hangzhou Dianzi University, China; <sup>2</sup>Nanyang Technological University, Singapore

### **C2L-H : Neural Net III**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon Musset

Chair(s): Shih-Chii Liu - ETHZ; Wei Xing Zheng - Western Sydney University

- 13:00 C2L-H.1 : CNN Oriented Fast HEVC Intra CU Mode Decision....2270  
Z. Liu<sup>2</sup>, X. Yu<sup>2</sup>, S. Chen<sup>1</sup>, D. Wang<sup>2</sup>  
<sup>1</sup>Huawei Technologies Co., Ltd., China; <sup>2</sup>Tsinghua University, China
- 13:18 C2L-H.2 : Dynamic Hand Gesture Recognition for Wearable Devices with Low Complexity Recurrent Neural Networks....2274  
S. Shin, W. Sung  
Seoul National University, Korea, South
- 13:36 C2L-H.3 : Associative Memory with Occurrence Statistics....2278  
M. Laiho<sup>2</sup>, E. Lehtonen<sup>2</sup>, J. Poikonen<sup>2</sup>, P. Kanerva<sup>1</sup>  
<sup>1</sup>University of California, Berkeley, United States; <sup>2</sup>University of Turku, Finland
- 13:54 C2L-H.4 : Effective Sensor Fusion with Event-Based Sensors and Deep Network Architectures....2282  
D. Neil, S. Liu  
Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland
- 14:12 C2L-H.5 : Impulsive Stabilization of Periodic Solutions of Recurrent Neural Networks with Discrete and Distributed Delays....2286  
W. Chen<sup>1</sup>, S. Luo<sup>1</sup>, W. Zheng<sup>2</sup>  
<sup>1</sup>Guangxi University, China; <sup>2</sup>Western Sydney University, Australia

### **C2L-J : INVITED: Reversible Circuits**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon Jarry

Chair(s): Robert Wille - Universität Bremen; Ravinder Dahiya - University of Glasgow

- 13:00 C2L-J.1 : An Extension of Transformation-Based Reversible and Quantum Circuit Synthesis....2290  
M. Soeken<sup>1</sup>, G. Dueck<sup>2</sup>, M. Rahman<sup>2</sup>, M. Miller<sup>3</sup>  
<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>2</sup>University of New Brunswick, Canada;  
<sup>3</sup>University of Victoria, Canada
- 13:18 C2L-J.2 : Low-Quantum Cost Circuit Constructions for Adder and Symmetric Boolean Functions....2294  
A. Chattopadhyay, A. Baksi  
Nanyang Technological University, Singapore
- 13:36 C2L-J.3 : A Pre-Optimization Technique to Generate Initial Reversible Circuits with Low Quantum Cost....2298  
N. Binti Adnan, K. Kushida, S. Yamashita  
Ritsumeikan University, Japan
- 13:54 C2L-J.4 : Improved Synthesis of Reversible Sequential Circuits....2302  
M. Khan<sup>1</sup>, J. Rice<sup>2</sup>  
<sup>1</sup>East West University, Bangladesh; <sup>2</sup>University of Lethbridge, Canada
- 14:12 C2L-J.5 : An Efficient Synthesis Method for Ternary Reversible Logic....2306  
S. Basu<sup>1</sup>, S. Mandal<sup>2</sup>, A. Chakrabarti<sup>2</sup>, S. Sur-Kolay<sup>1</sup>  
<sup>1</sup>Indian Statistical Institute, India; <sup>2</sup>University of Calcutta, India

## C2L-K : Memristor Circuits

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon Joyce

Chair(s): Shyh-Jye Jerry Jou - National Chiao-Tung University; Mohammed Ismail - Khalifa University

- 13:00 C2L-K.1 : Partition SRAM and RRAM Based Synaptic Arrays for Neuro-Inspired Computing....2310  
P. Chen, S. Yu  
Arizona State University, United States
- 13:18 C2L-K.2 : Demonstration of Spike Timing Dependent Plasticity in CBRAM Devices with Silicon Neurons....2314  
D. Mahalanabis, M. Sivaraj, W. Chen, S. Shah, H. Barnaby, M. Kozicki, J. Blain Christen, S. Vrudhula  
Arizona State University, United States
- 13:36 C2L-K.3 : Real-Time Decoding of Brain Activity by Embedded Spiking Neural Networks Using OxRAM Synapses....2318  
T. Werner<sup>1</sup>, D. Garbin<sup>1</sup>, E. Vianello<sup>1</sup>, O. Bichler<sup>2</sup>, D. Cattaert<sup>4</sup>, B. Yvert<sup>3</sup>, B. De Salvo<sup>1</sup>, L. Perniola<sup>1</sup>  
<sup>1</sup>CEA-Leti, France; <sup>2</sup>CEA-List, France; <sup>3</sup>Institut National de la Santé et de la Recherche Médicale, France;  
<sup>4</sup>Universite de Bordeaux, France
- 13:54 C2L-K.4 : Practical Operation Considerations for Memristive Integrating Sensors....2322  
I. Gupta, A. Serb, A. Khat, T. Prodromakis  
University of Southampton, United Kingdom
- 14:12 C2L-K.5 : Design of a Reliable RRAM-Based PUF for Compact Hardware Security Primitives\*....2326  
A. Shrivastava, P. Chen, Y. Cao, S. Yu, C. Chakrabarti  
Arizona State University, United States

## C2L-L : Wireline CAS

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon Kafka-Lamartine

Chair(s): Shoba Krishnan - Santa Clara University; Zhongfeng Wang - Broadcom

- 13:00 C2L-L.1 : A Scalable 7.0-Gb/s Multi-Lane NRZ Transceiver with a 1/10th-Rate Forwarded Clock in 0.13um CMOS....2330  
A. Fiedler<sup>1</sup>, S. Krishnan<sup>2</sup>  
<sup>1</sup>Microsoft Research Silicon Valley, United States; <sup>2</sup>Santa Clara University, United States
- 13:18 C2L-L.2 : A 25Gb/s 3D-Integrated Silicon Photonics Receiver in 65nm CMOS and PIC25G for 100GbE Optical Links....2334  
D. Li<sup>3</sup>, G. Minoia<sup>1</sup>, M. Repossi<sup>1</sup>, D. Baldi<sup>1</sup>, A. Ghilioni<sup>2</sup>, E. Temporiti<sup>1</sup>, F. Svelto<sup>2</sup>  
<sup>1</sup>STMicroelectronics, Italy; <sup>2</sup>Università degli Studi di Pavia, Italy; <sup>3</sup>Xi'an Jiaotong University, China
- 13:36 C2L-L.3 : An Over-Sampling Adaptive Pre-Emphasis Technique for Multi-Drop Bus Communication System....2338  
N. Matsudaira, C. Chen, S. Ohtsuka, T. Ito, H. Akita  
Denso Corporation, Japan
- 13:54 C2L-L.4 : A New Hybrid Circuit Topology for Simultaneous Bidirectional Signaling Over on-Chip Interconnects....2342  
D. Duvvuri<sup>2</sup>, S. Agarwal<sup>2</sup>, V. Pasupureddi<sup>1</sup>  
<sup>1</sup>Carinthia University of Applied Sciences, Austria;  
<sup>2</sup>International Institute of Information Technology, Hyderabad, India
- 14:12 C2L-L.5 : A 800-MB/s 0.89-pJ/b Reference-Less Optical Receiver with Pulse-Position-Modulation Scheme....2346  
H. Ju, W. Bae, G. Jeong, D. Jeong  
Seoul National University, Korea, South



## **C2L-M : Energy Harvesters II**

Time: Wednesday, May 25 (13:00-14:30)

Place: Salon 1

Chair(s): Chi-Ying Tsui - Hong Kong University of Science and Technology; Wing-Hung Ki - Hong Kong University of Science and Technology

- 13:00 C2L-M.1 : Energy Harvesting ASIC for Autonomous Sensors....2350  
J. Salomaa, M. Pulkkinen, T. Haapala, S. Chouhan, K. Halonen  
Aalto University, Finland
- 13:18 C2L-M.2 : An Indoor Solar Energy Harvesting System Using Dual Mode SIDO Converter with Fully Digital Time-Based MPPT....2354  
X. Meng<sup>2</sup>, X. Li<sup>1</sup>, C. Tsui<sup>2</sup>, W. Ki<sup>2</sup>  
<sup>1</sup>Broadcom Corporation, United States; <sup>2</sup>Hong Kong University of Science and Technology, Hong Kong
- 13:36 C2L-M.3 : An Adaptive Mesh Refinement Strategy of Substrate Modeling for Smart Power ICs....2358  
H. Zou, Y. Moursy, R. Iskander, J. Chaput, M. Louërat  
Sorbonne Universités UPMC Paris 6, France
- 13:54 C2L-M.4 : A WLAN 2.4-GHz RF Energy Harvesting System with Reconfigurable Rectifier for Wireless Sensor Network....2362  
Z. Zeng<sup>1</sup>, X. Li<sup>1</sup>, A. Bermak<sup>2</sup>, C. Tsui<sup>1</sup>, W. Ki<sup>1</sup>  
<sup>1</sup>Hong Kong University of Science and Technology, Hong Kong;  
<sup>2</sup>Hong Kong University of Science and Technology / Hamad Bin Khalifa University, Qatar
- 14:12 C2L-M.5 : A Single Switcher Combined Series Parallel Hybrid Envelope Tracking Amplifier for Wideband RF Power Amplifier Applications....2366  
N. Anabtawi<sup>2</sup>, R. Ferzli<sup>1</sup>, H. Harmanani<sup>3</sup>  
<sup>1</sup>Arizona State University, United States; <sup>2</sup>Intel Corporation / Arizona State University, United States;  
<sup>3</sup>Lebanese American University, Lebanon

## **C3P-O : Demos III**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

Chair(s): Guoxing Wang - Shanghai Jiao Tong University; Philipp Häfliger - University of Oslo

- C3P-O.1 : Live Demonstration: Smartwatch Implementation of an Advanced Insulin Bolus Calculator for Diabetes....2370  
P. Pesl, P. Herrero, M. Reddy, N. Oliver, C. Toumazou, P. Georgiou  
Imperial College London, United Kingdom
- C3P-O.2 : Live Demonstration: Wireless Sensor Network for Snail Pest Detection....2371  
D. García-Lesta, E. Ferro, V. Brea, P. López, D. Cabello, J. Iglesias, J. Castillejo  
Universidade de Santiago de Compostela, Spain
- C3P-O.3 : Live Demonstration: an Implantable Wireless Multi-Channel Neural Prosthesis for Epidural Stimulation....2372  
D. Jiang, C. Eder, T. Perkins, A. Vanhoestenbergh, M. Schormans, F. Liu, V. Valente, N. Donaldson, A. Demosthenous  
University College London, United Kingdom
- C3P-O.4 : Live Demonstration: a Portable Multi-Channel Potentiostat for Real-Time Amperometric Measurement of Multi-Electrode Sensor Arrays....2373  
Y. Hu, S. Sharma, J. Weatherwax, A. Cass, P. Georgiou  
Imperial College London, United Kingdom

- C3P-0.5 : Live Demonstration: CMOS Capacitive Sensor Array for Real-Time Analyses of Living Cells....2374  
 G. Nabovati<sup>1</sup>, E. Ghafar-Zadeh<sup>2</sup>, A. Letourneau<sup>1</sup>, M. Sawan<sup>1</sup>  
<sup>1</sup>Polytechnique Montréal, Canada; <sup>2</sup>York university, Canada
- C3P-0.6 : Live Demonstration: a Low-Power Broad-Bandwidth Noise Cancellation VLSI Circuit Design for in-Ear Headphones....2375  
 H. Vu, K. Chen  
 Feng Chia University, Taiwan
- C3P-0.7 : Live Demonstration: Screen Piracy Protection Using Saturation Laser Attack and TPVM....2376  
 F. Lan, G. Zhai, Z. Gao, X. Yang  
 Shanghai Jiao Tong University, China
- C3P-0.8 : Live Demonstration: an Automatic Evaluation Platform for Physical Unclonable Function Test....2377  
 Y. Cui<sup>1</sup>, C. Wang<sup>1</sup>, W. Liu<sup>1</sup>, M. O'Neill<sup>2</sup>  
<sup>1</sup>Nanjing University of Aeronautics and Astronautics, China; <sup>2</sup>Queen's University Belfast, United Kingdom
- C3P-0.9 : Live Demonstration: a Ku-Band FMCW Synthetic Aperture Radar Transceiver for Micro-UAVs....2378  
 Y. Wang, L. Lou, B. Chen, K. Tang, Y. Zhang, L. Qiu, S. Liu, Y. Zheng  
 Nanyang Technological University, Singapore

### **C3P-P : Analog II**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

Chair(s): Jorge Fernandes - Universidade de Lisboa; Raafat Lababidi - ENSTA Bretagne

- C3P-P.1 : Ultra Low Voltage Supply VCO with Improved Linearity....2379  
 L. Rodovalho, H. Klimach, E. Fabris  
 Universidade Federal do Rio Grande do Sul, Brazil
- C3P-P.2 : A Miniaturized Lumped Element Directional Coupler with Parasitics Compensation....2383  
 M. Wahib, A. Freundorfer  
 Queen's University, Canada
- C3P-P.3 : Implementation and Design Investigation of 40 Gbps Driver IC for Silicon Photonics Ring-Modulator in SiGe 130-nm....2387  
 A. Fatemi, H. Klar, F. Gerfers  
 Technische Universität Berlin, Germany
- C3P-P.4 : Wireless Power Transfer Through Metallic Barriers Enclosing a Harsh Environment, Feasibility and Preliminary Results....2391  
 A. Hassan, A. Trigui, U. Shafique, Y. Savaria, M. Sawan  
 Polytechnique Montréal, Canada
- C3P-P.5 : FM-UWB Transmitter for Wireless Body Area Networks: Implementation and Simulation....2395  
 M. Ali<sup>3</sup>, M. Sawan<sup>3</sup>, H. Shawkey<sup>2</sup>, A. Zekry<sup>1</sup>  
<sup>1</sup>Ain Shams University, Egypt; <sup>2</sup>Electronics Research Institute, Egypt; <sup>3</sup>Polytechnique Montréal, Canada
- C3P-P.6 : Practical Application of Transconductance-to-Drain-Current Dependent Flicker Noise Analysis....2399  
 J. Ou  
 California State University Northridge, United States
- C3P-P.7 : A Signal Conditioning Unit for High Temperature Applications....2403  
 L. Stoica<sup>1</sup>, R. Ghandi<sup>1</sup>, C. Chen<sup>1</sup>, E. Andarawis<sup>1</sup>, V. Solomko<sup>2</sup>, S. Riches<sup>3</sup>  
<sup>1</sup>GE Global Research, United States; <sup>2</sup>Infineon Technologies AG, Germany; <sup>3</sup>Self-employed, United Kingdom

C3P-P.8 : Comparison of Analytical Predictions of the Noise Floor Due to Static Charge Pump Mismatch in Fractional-N Frequency Synthesizers....2407

H. Mo, G. Hu, M. Kennedy

University College Cork and Tyndall National Institute, Ireland

C3P-P.9 : Three Learning Methods for Reasoning-Based Synthesis of Novel Analog Circuits....2411

F. Jiao, A. Doholi Stony Brook University, United States

C3P-P.11 : A Low-Noise Closed-Loop Interface for High-G Capacitive Micro-Accelerometer....2415

M. Zhao, Z. Chen, Y. Yang, Y. Niu, G. Chen, W. Lu, Y. Zhang

Peking University, China

C3P-P.12 : A 1.27mW 20Gbps 1:16 DEMUX with a Symmetrical-Edge-Delay Sense Amplifier....2419

S. Li, W. Gai, X. Xiang, L. Tang, J. Huang, T. Zhao, X. Zhi

Peking University, China

### **C3P-Q : BioCAS III**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

Chair(s): Wael Badawy - Intelliview; Jennifer Blain Christen - Arizona State University

C3P-Q.1 : Low-Power Transimpedance Amplifier for Near Infrared Spectroscopy....2423

M. Atef<sup>2</sup>, A. Atef<sup>3</sup>, M. Abbas<sup>1</sup>

<sup>1</sup>Egypt-Japan University of Science and Technology, Egypt; <sup>2</sup>Shanghai Jiao Tong University, China;

<sup>3</sup>Sohag University, Egypt

C3P-Q.2 : HV-CMOS Single-Chip Electronics Platform for Lab-on-Chip DNA Analysis....2427

D. Sloan<sup>2</sup>, B. Martin<sup>2</sup>, G. Hall<sup>3</sup>, A. Hakman<sup>2</sup>, P. Marshall<sup>2</sup>, S. Martel<sup>1</sup>, C. Backhouse<sup>3</sup>, V. Gaudet<sup>3</sup>, D. Elliott<sup>2</sup>

<sup>1</sup>Teledyne DALSA, Canada; <sup>2</sup>University of Alberta, Canada; <sup>3</sup>University of Waterloo, Canada

C3P-Q.3 : A 13.5-MHz Relaxation Oscillator with  $\pm 0.5\%$  Temperature Stability for RFID Application....2431

J. Wang, W. Goh

Nanyang Technological University, Singapore

C3P-Q.4 : A Compact, Low-Power, Fully Analog Implantable Microstimulator....2435

A. Khalifa, J. Zhang, M. Leistner, R. Etienne-Cummings

Johns Hopkins University, United States

C3P-Q.5 : An Empirical Model of UWB Large-Scale Signal Fading in Neocortical Research....2439

O. Novak, R. Brown

University of Utah, United States

C3P-Q.6 : A New Charge Balancing Scheme for Electrical Microstimulators

Based on Modulated Anodic Stimulation Pulse Width....2443

E. Maghsoudloo<sup>2</sup>, M. Rezaei<sup>2</sup>, M. Sawan<sup>1</sup>, B. Gosselin<sup>2</sup>

<sup>1</sup>Polytechnique Montréal, Canada; <sup>2</sup>Université Laval, Canada

C3P-Q.7 : An Improved Wideband CMOS Current Driver for Bioimpedance Applications....2447

N. Neshatvar, P. Langlois, A. Demosthenous

University College London, United Kingdom

C3P-Q.8 : A Novel Wireless Ring-Shaped Multi-Site Pulse Oximeter....2451

A. Avakh Kisomi<sup>3</sup>, A. Miled<sup>3</sup>, M. Boukadoum<sup>2</sup>, M. Morissette<sup>1</sup>, F. Lellouche<sup>3</sup>, B. Gosselin<sup>3</sup>

<sup>1</sup>Oxy'nov Inc., Canada; <sup>2</sup>Univeristé du Québec à Montréal, Canada; <sup>3</sup>Université Laval, Canada

C3P-Q.9 : A Low-Power Receiver for Simultaneous Electrocardiogram and Respiration Rate Detection....2455

J. Liang, S. Li, A. Nikoofard, S. Mandal

Case Western Reserve University, United States

### **C3P-R : Communications VI**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

Chair(s): Zhongfeng Wang - Broadcom; Xinmiao Zhang - Case Western Reserve University

C3P-R.1 : Low-Power Partial-Parallel Chien Search Architecture with Polynomial Degree Reduction....2459

X. Zhang, I. Dror, S. Alterman

SanDisk Corporation, United States

C3P-R.2 : Overlapped List Successive Cancellation Approach for Hardware Efficient Polar Code Decoder....2463

T. Che, J. Xu, G. Choi

Texas A&M University, United States

C3P-R.3 : Multi-User Encoding for Forward Error Correction in Passive Optical Networks....2467

B. Gopalakrishna Pillai<sup>2</sup>, N. Anthapadmanabhan<sup>1</sup>, D. Suvakovic<sup>1</sup>, H. Chow<sup>1</sup>

<sup>1</sup>Alcatel Lucent Bell Labs, United States; <sup>2</sup>University of Melbourne and Bell Labs, Australia

C3P-R.4 : A Temperature-Independent PUF with a Configurable Duty Cycle of CMOS Ring Oscillators....2471

J. Agustin, M. Lopez-Vallejo

Universidad Politecnica de Madrid, Spain

C3P-R.5 : Crosstalk Avoidance Code for Direct Pass-Through Architecture...2475

M. Kim<sup>1</sup>, S. Chae<sup>1</sup>, Y. Kim<sup>2</sup>, S. Bae<sup>2</sup>, L. Kim<sup>1</sup>

<sup>1</sup>Korea Advanced Institute of Science and Technology, Korea, South; <sup>2</sup>Samsung Electronics Co. Ltd., Korea, South

### **C3P-S : DSP Algorithms II**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

Chair(s): Mohsin M. Jamali - University of Toledo

C3P-S.1 : Design Considerations for Variable-Rate Digital Signal Processing....2479

Y. Chen, Y. Tsividis

Columbia University, United States

C3P-S.3 : A Passivity Based Stability Measure for Discrete 3-D IIR System Realizations....2483

J. Velten<sup>1</sup>, A. Kummert<sup>1</sup>, D. Wagner<sup>1</sup>, K. Galkowski<sup>2</sup>

<sup>1</sup>Bergische Universität Wuppertal, Germany; <sup>2</sup>University of Zielona Gora, Poland

C3P-S.4 : Super-Resolution Imaging with Occlusion Removal Using a Camera Array....2487

T. Li, D. Lun

Hong Kong Polytechnic University, Hong Kong

### **C3P-T : Neural Net IV**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

Chair(s): Jinhu Lu - Chinese Academy of Sciences; André van Schaik - University of Western Sydney

C3P-T.1 : Wide Dynamic Range Weights and Biologically Realistic Synaptic Dynamics for Spike-Based Learning Circuits....2491

D. Sumislawska<sup>2</sup>, N. Qiao<sup>2</sup>, M. Pfeiffer<sup>1</sup>, G. Indiveri<sup>1</sup>

<sup>1</sup>Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland; <sup>2</sup>Universität Zürich, Switzerland

C3P-T.3 : Event-Driven Deep Neural Network Hardware System for Sensor Fusion....2495

I. Kiselev, D. Neil, S. Liu Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland

C3P-T.4 : FPGA Minimal Components SKAN Model for Classical and Operant Conditioning....2499

E. Dumesnil, P. Beaulieu, M. Boukadoum Univeristé du Québec à Montréal, Canada

C3P-T.5 : The Impact of Analog Computational Error on an Analog Boolean Satisfiability Solver....2503

D. Basford, J. Smith, J. Connor, B. Maclennan, J. Holleman University of Tennessee, United State

C3P-T.6 : Floating-Gate-Based Intrinsic Plasticity with Low-Voltage Rate Control....2507

S. Nease, E. Chicca

Universität Bielefeld, Germany

C3P-T.7 : Combined Frame- and Event-Based Detection and Tracking....2511

H. Liu<sup>1</sup>, D. Moey<sup>1</sup>, G. Das<sup>2</sup>, D. Neil<sup>1</sup>, S. Liu<sup>1</sup>, T. Delbrück<sup>1</sup>

<sup>1</sup>Eidgenössische Technische Hochschule Zürich / Universität Zürich, Switzerland; <sup>2</sup>Ulster University, United Kingdom

### **C3P-U : Sensory Systems**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

Chair(s): Victor Brea - University of Santiago de Compostela; Piotr Dudek - The University of Manchester

C3P-U.1 : Ultra Low-Power Array Processor Propagation Circuit Arrangement....2515

A. Paasio

University of Turku, Finland

C3P-U.2 : A Novel Low-Power Readout Structure with 1/2 Sub-Scan Time-Delay-Integration and DLL-Based A/D for 1024×6 Infrared Focal Plane Array....2519

B. Liu, W. Lu, D. Liu, S. Yu, Y. Zhang, Z. Chen

Peking University, China

C3P-U.3 : A Low Dark Current Wide Dynamic Range CMOS Pixel....2523

A. Brunetti, B. Choubey

University of Oxford, United Kingdom

C3P-U.4 : Morphological Learning in Multicompartment Neuron Model with Binary Synapses....2527

S. Hussain, A. Basu

Nanyang Technological University, Singapore

C3P-U.5 : Characterization of Adhesive Wafer Bonded CMUTs Realized from BCB Based Sealed Cavity....2531

R. Manwar, S. Chowdhury

University of Windsor, Canada

### **C3P-V : Visual DSP**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

Chair(s): Zhibo Chen - University of Science and Technology of China; Chris Lee - National Cheng Kung University

C3P-V.1 : Adaptive Perceptual Preprocessing for Video Coding....2535

G. Xiang, H. Jia, J. Liu, B. Cai, Y. Li, X. Xie

Peking University, China

C3P-V.2 : Fast H.264/AVC to HEVC Transcoder Based on Data Mining and Decision Trees....2539

G. Correa<sup>2</sup>, L. Agostini<sup>2</sup>, L. da Silva Cruz<sup>1</sup>

<sup>1</sup>Universidade de Coimbra, / Instituto de Telecomunicacoes, Portugal; <sup>2</sup>Universidade Federal de Pelotas, Brazil

C3P-V.3 : Optimum SPT Allocation for Multipliers of Minimum Lifting 2D Wavelet Transform....2543

M. Iwahashi<sup>1</sup>, T. Orachon<sup>1</sup>, T. Aye<sup>3</sup>, T. Yoshida<sup>1</sup>, H. Kiya<sup>2</sup>

<sup>1</sup>Nagaoka University of Technology, Japan; <sup>2</sup>Tokyo Metropolitan University, Japan;

<sup>3</sup>University of Computer Studies, Japan

C3P-V.4 : Visual Saliency Based Perceptual Video Coding in HEVC....2547

H. Wei, X. Zhou, W. Zhou, C. Yan, Z. Duan, N. Shan

Northwestern Polytechnical University, China

C3P-V.5 : Parallel Palette Mode Decoding for HEVC SCC....2551

S. Ye<sup>2</sup>, Z. Chen<sup>2</sup>, W. Zhang<sup>1</sup>, L. Xu<sup>1</sup>

<sup>1</sup>Intel Corporation, China; <sup>2</sup>University of Science and Technology of China, China

C3P-V.6 : Algorithm Derivation and its Embedded System Realization of Speed Limit Detection for Multiple Countries....2555

Y. Lin, T. Chou, V. Malligere Shivanna, J. Guo

National Chiao Tung University, Taiwan

C3P-V.7 : Allowable Depth Distortion Based Depth Filtering for 3D High Efficiency Video Coding....2559

Y. Zhang<sup>2</sup>, L. Zhu<sup>2</sup>, X. Liu<sup>2</sup>, G. Jiang<sup>1</sup>

<sup>1</sup>Ningbo University, China; <sup>2</sup>Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China

C3P-V.8 : Visual Enhancement Using Sparsity-Based Image Decomposition for Low Backlight Displays....2563

C. Shen<sup>1</sup>, Z. Lu<sup>2</sup>, Y. Hung<sup>1</sup>, S. Pei<sup>1</sup>

<sup>1</sup>National Taiwan University, Taiwan; <sup>2</sup>Tsinghua University, China

C3P-V.9 : A SVR Based Quality Metric for Depth Quality Assessment....2567

Y. Zhang, X. Jin, Q. Dai

Tsinghua University, China

C3P-V.10 : A System-Level Design for Foreground and Background Identification in 3D Scenes....2571

A. Safaei, Q. Wu

University of Windsor, Canada

C3P-V.11 : Off-Chip Learning for Hardware Hand-Sign Recognition System....2575

M. Tamaki, H. Hikawa

Kansai University, Japan

C3P-V.12 : Fast and Robust Homotopy Path Planning Method for Mobile Robotics....2579

G. Diaz-Arango<sup>1</sup>, L. Hernandez-Martinez<sup>2</sup>, A. Sarmiento-Reyes<sup>1</sup>, H. Vazquez-Leal<sup>3</sup>

<sup>1</sup>Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico;

<sup>2</sup>National Institute of Astrophysics, Optics and Electronics, Mexico; <sup>3</sup>Universidad Veracruzana, Mexico

### **C3P-W : VLSI VI**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salle de bal est

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

C3P-W.1 : Generating Voltage Drop Aware Current Budgets for RC Power Grids....2583

Z. Moudallal, F. Najm

University of Toronto, Canada

C3P-W.3 : Crosslink Insertion for Minimizing OCV Clock Skew....2587

K. Yoon, S. Shim, Y. Shin

Korea Advanced Institute of Science and Technology, Korea, South

C3P-W.4 : Top-Level Activity-Driven Clock Tree Synthesis with Clock Skew Variation Considered....2591

T. Wang<sup>1</sup>, S. Huang<sup>1</sup>, W. Cheng<sup>1</sup>, Y. Chou<sup>2</sup>

<sup>1</sup>Chung Yuan Christian University, Taiwan; <sup>2</sup>Global Unichip Corporation, Taiwan

C3P-W.5 : Exploiting Useful Skew in Gated Low Voltage Clock Trees....2595

W. Liu<sup>2</sup>, E. Salman<sup>2</sup>, C. Sitik<sup>1</sup>, B. Taskin<sup>1</sup>

<sup>1</sup>Drexel University, United States; <sup>2</sup>Stony Brook University, United States

C3P-W.6 : Efficient Traffic Balancing for NoC Routing Latency Minimization....2599

J. Ferreira<sup>3</sup>, J. Silveira<sup>3</sup>, J. Silveira<sup>3</sup>, R. Cataldo<sup>1</sup>, T. Webber<sup>2</sup>, F. Moraes<sup>1</sup>, C. Marcon<sup>1</sup>

<sup>1</sup>Pontificia Universidade Católica do Rio Grande do Sul, Brazil; <sup>2</sup>Universidade de Santa Cruz do Sul, Brazil;

<sup>3</sup>Universidade Federal do Ceará, Brazil

C3P-W.7 : Temperature-Aware Task Scheduling Heuristics on Network-on-Chips....2603

S. Cao<sup>1</sup>, Z. Salcic<sup>3</sup>, Y. Ding<sup>1</sup>, Z. Li<sup>2</sup>, S. Wei<sup>2</sup>, X. Zhao<sup>1</sup>

<sup>1</sup>Beijing Institute of Technology, China; <sup>2</sup>Tsinghua University, China; <sup>3</sup>University of Auckland, New Zealand

C3P-W.8 : High Performance 3D CMP Design with Stacked Hybrid Memory Architecture

in the Dark Silicon Era Using a Convex Optimization Model....2607

S. Onori<sup>1</sup>, A. Asad<sup>2</sup>, K. Raahemifar<sup>3</sup>, M. Fathy<sup>2</sup>

<sup>1</sup>Bilkent University, Turkey; <sup>2</sup>Iran University of Science and Technology, Iran; <sup>3</sup>Ryerson University, Canada

C3P-W.9 : Towards Efficient and Concurrent FFTs Implementation on Intel Xeon/Mic Clusters for LTE and HPC....2611

M. Khelifi<sup>2</sup>, D. Massicotte<sup>2</sup>, Y. Savaria<sup>1</sup>

<sup>1</sup>Polytechnique Montréal, Canada; <sup>2</sup>Université du Québec à Trois-Rivières, Canada

C3P-W.10 : Synchronously Triggered GALS Design Templates Leveraging QDI Asynchronous Interfaces....2615

W. Gul<sup>1</sup>, S. Hasan<sup>1</sup>, O. Hasan<sup>1</sup>, F. Lodhi<sup>1</sup>, F. Awwad<sup>3</sup>

<sup>1</sup>National University of Sciences and Technology, Pakistan; <sup>2</sup>Tennessee Technological University, United States;

<sup>3</sup>United Arab Emirates University, U.A.E.

### **C4L-A : Testing & Security III**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon Drummond est

Chair(s): Danella Zhao - University of Louisiana at Lafayette; Qiaoyan Yu - University of New Hampshire

16:00 C4L-A.1 : Physically Unclonable Function Using RTN-Induced Delay Fluctuation in Ring Oscillators....2619

M. Yoshinaga, H. Awano, M. Hiromoto, T. Sato

Kyoto University, Japan

16:18 C4L-A.2 : A Fast and Accurate Approach for Common Path Pessimism Removal in Static Timing Analysis....2623

B. Jin, G. Luo, W. Zhang

Peking University, China

- 16:36 C4L-A.3 : Reverse Engineering Resistant ROM Design Using Transformable Via-Programming Structure....2627  
S. Chen, L. Wang  
University of Connecticut, United States
- 16:54 C4L-A.4 : An Improved Test Power Optimization Method by Insertion of Linear Functions....2631  
L. He<sup>1</sup>, A. Cui<sup>1</sup>, M. Li<sup>1</sup>, A. Ivanov<sup>2</sup>  
<sup>1</sup>Harbin Institute of Technology Shenzhen Graduate School, China; <sup>2</sup>University of British Columbia, Canada
- 17:12 C4L-A.5 : Analog Cellular Neural Network for Application in Physical Unclonable Functions....2635  
H. Takalo<sup>1</sup>, A. Ahmadi<sup>2</sup>, M. Mirhassani<sup>2</sup>, M. Ahmadi<sup>2</sup>  
<sup>1</sup>Razi University, Iran; <sup>2</sup>University of Windsor, Canada

#### **C4L-B : Statistical DSP**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon Drummond centre

Chair(s): Mrityunjy Chakraborty - Indian institute of Technology

- 16:00 C4L-B.1 : Coprime Coarray Interpolation for DOA Estimation via Nuclear Norm Minimization....2639  
C. Liu<sup>1</sup>, P. Vaidyanathan<sup>1</sup>, P. Pal<sup>2</sup>  
<sup>1</sup>California Institute of Technology, United States; <sup>2</sup>University of Maryland, College Park, United States
- 16:18 C4L-B.2 : A Variable Forgetting Factor QRD-Based RLS Algorithm with Bias Compensation  
for System Identification with Input Noise....2643  
H. Tan, S. Chan, L. Zhang  
University of Hong Kong, Hong Kong
- 16:36 C4L-B.3 : Real-Time Moving Object Tracking Using Phase-Difference Compensation  
and Nonuniform Pulse Transmission....2647  
K. Ichige<sup>2</sup>, N. Arakawa<sup>2</sup>, O. Shibata<sup>1</sup>  
<sup>1</sup>Murata Manufacturing Co. Ltd., Japan; <sup>2</sup>Yokohama National University, Japan
- 16:54 C4L-B.4 : A New Diffusion Sparse RLS Algorithm with Improved Convergence Characteristics....2651  
B. Das, M. Chakraborty  
Indian Institute of Technology Kharagpur, India

#### **C4L-C : VLSI for Communications**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon Drummond ouest

Chair(s): Mohsin M. Jamali - University of Toledo; Malgorzata Chrzanowska-Jeske - Portland State University

- 16:00 C4L-C.1 : A Memory Access Reordering Polyphase Network for 60 GHz FBMC-OQAM Baseband Receiver....2655  
C. Liu, M. Sie, E. Leong, Y. Yao, C. Jen, S. Jou  
National Chiao Tung University, Taiwan
- 16:18 C4L-C.2 : FPGA Design of Approximate Semidefinite Relaxation for Data Detection in Large MIMO Wireless Systems....2659  
O. Castañeda<sup>2</sup>, T. Goldstein<sup>3</sup>, C. Studer<sup>1</sup>  
<sup>1</sup>Cornell University, United States; <sup>2</sup>Universidad del Valle de Guatemala, Guatemala;  
<sup>3</sup>University of Maryland, College Park, United States
- 16:36 C4L-C.3 : A Low Latency Asynchronous Jenkins Hash Engine for IP Lookup....2663  
P. Dabholkar, R. Sovani, P. Beckett  
RMIT University, Australia



- 16:54 C4L-C.4 : A Low-Power Correlator for Wakeup Receivers with Algorithm Pruning Through Early Termination....2667  
R. Ghanaatian Jahromi<sup>1</sup>, P. Whatmough<sup>2</sup>, J. Constantin<sup>1</sup>, A. Teman<sup>1</sup>, A. Burg<sup>1</sup>  
<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>2</sup>Harvard University, United States
- 17:12 C4L-C.5 : A High-Parallelism Memory-Based FFT Processor with High SQNR and Novel Addressing Scheme....2671  
S. Huang<sup>2</sup>, S. Chen<sup>1</sup>  
<sup>1</sup>National Chiao Tung University, Taiwan; <sup>2</sup>Novatek Microelectronics Corp., Taiwan

#### **C4L-D : Compression & Coding I**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon A

Chair(s): Shao-Yi Chien - National Taiwan University; Maria Trocan - ISEP

- 16:00 C4L-D.1 : Fast Exclusion of Angular Intra Prediction Modes in HEVC Using Reference Sample Variance....2675  
A. Heindel, A. Kaup  
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
- 16:18 C4L-D.2 : Perceptual HEVC/H.265 System with Local Just-Noticeable-Difference Model....2679  
W. Chao, Y. Chen, S. Chien  
National Taiwan University, Taiwan
- 16:36 C4L-D.3 : Fixed-Length Golomb-Rice Coding by Quantization Level Estimation....2683  
M. Kim<sup>1</sup>, S. Kim<sup>1</sup>, J. Kim<sup>2</sup>, H. Lee<sup>1</sup>  
<sup>1</sup>Seoul National University, Korea, South; <sup>2</sup>Sun Moon University, Korea, South
- 16:54 C4L-D.4 : GPU Based Sample Adaptive Offset Parameter Decision and Perceptual Optimization for HEVC....2687  
F. Luo<sup>2</sup>, S. Wang<sup>3</sup>, N. Zhang<sup>1</sup>, S. Ma<sup>3</sup>, W. Gao<sup>3</sup>  
<sup>1</sup>Capital Medical University, China; <sup>2</sup>Institute of Computing Technology, Chinese Academy of Sciences, China;  
<sup>3</sup>Peking University, China
- 17:12 C4L-D.5 : A Study on Compression Rate Bounds in Distributed Video Coding Based on Correlation Noise Models....2691  
Y. Mohammad Taheri, M. Ahmad, M. Swamy  
Concordia University, Canada

#### **C4L-E : Regulators**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon B

Chair(s): Ayman Fayed - Ohio State University

- 16:18 C4L-E.2 : An Enhanced Light-Load Efficiency Step Down Regulator with Fine Step Frequency Scaling....2695  
N. Anabtawi<sup>2</sup>, R. Ferzli<sup>1</sup>, H. Harmanani<sup>3</sup>  
<sup>1</sup>Arizona State University, United States; <sup>2</sup>Intel Corporation / Arizona State University, United States;  
<sup>3</sup>Lebanese American University, Lebanon
- 16:36 C4L-E.3 : An Output-Capacitor-Free Adaptively Biased LDO Regulator with Robust Frequency Compensation in 0.13 $\mu$ m CMOS for SoC Application....2699  
X. Han, T. Burger, Q. Huang  
Eidgenössische Technische Hochschule Zürich, Switzerland
- 16:54 C4L-E.4 : A 0.035mm<sup>2</sup> 150mA Fast-Response Low-Dropout Regulator Based on Matching-Enhanced Error Amplifier and Multi-Threshold-Controlled Unity-Gain Buffer in 0.13- $\mu$ m CMOS....2703  
C. Zhan<sup>2</sup>, W. Ki<sup>1</sup>, J. Zheng<sup>1</sup>, Y. Liu<sup>1</sup>  
<sup>1</sup>Hong Kong University of Science and Technology, Hong Kong;  
<sup>2</sup>Southern University of Science and Technology, China

## **C4L-F : Analysis & Recognition**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon C

Chair(s): Zhihai He - University of Missouri; Jianfei Cai - Nanyang Technological University

- 16:00 C4L-F.1 : Approximation of Feature Pyramids in the DCT Domain and its Application to Pedestrian Detection....2711  
M. Naei, M. Ahmad, M. Swamy  
Concordia University, Canada
- 16:18 C4L-F.2 : Layer-Wise Supervised Neural Network for Face Alignment with Multi-Task Regularization....2715  
S. Ni, B. Wang, H. Xiong  
Shanghai Jiao Tong University, China
- 16:36 C4L-F.3 : Superpixel-Based Salient Region Detection Using the Wavelet Transform....2719  
M. Rezaei Abkenar, M. Ahmad  
Concordia University, Canada
- 16:54 C4L-F.4 : Efficient Nuclei Segmentation Based on Spectral Graph Partitioning....2723  
G. Lee<sup>2</sup>, S. Hung<sup>2</sup>, T. Wang<sup>1</sup>, C. Chen<sup>2</sup>, C. Sun<sup>3</sup>, Y. Liao<sup>4</sup>  
<sup>1</sup>Advanced Semiconductor Engineering Inc., Taiwan; <sup>2</sup>National Cheng Kung University, Taiwan;  
<sup>3</sup>National Taiwan University, Taiwan;  
<sup>4</sup>National Taiwan University Hospital and National Taiwan University College of Medicine, Taiwan
- 17:12 C4L-F.5 : Wide Dynamic Range PSD Algorithms and Their Implementation for Compressive Imaging....2727  
B. Zhang<sup>1</sup>, X. Zhong<sup>1</sup>, B. Wang<sup>1</sup>, P. Sander<sup>1</sup>, A. Bermak<sup>2</sup>  
<sup>1</sup>Hong Kong University of Science and Technology, Hong Kong;  
<sup>2</sup>Hong Kong University of Science and Technology / Hamad Bin Khalifa University, Hong Kong

## **C4L-G : INVITED: Implantable Telemetry**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon Hémon

Chair(s): Robert Sobot - ENSEA; Joseph Cavallaro - Rice University

- 16:00 C4L-G.1 : Versatile Smart Hip Implant Technology Using 3D Metal Printing....2731  
J. van Gaalen<sup>2</sup>, A. Trejos<sup>2</sup>, H. Nikolov<sup>1</sup>, T. Ivanov<sup>1</sup>, S. Pollman<sup>1</sup>, D. Holdsworth<sup>1</sup>  
<sup>1</sup>Robarts Research Institute, Canada; <sup>2</sup>Western University, Canada
- 16:18 C4L-G.2 : Embedded RF Switch for Implantable Telemetry Systems Designed in 130nm CMOS....2735  
M. Cai<sup>2</sup>, K. Fricke<sup>2</sup>, R. Sobot<sup>1</sup>  
<sup>1</sup>École Nationale Supérieure de l'Électronique et de ses Applications, France; <sup>2</sup>Western University, Canada
- 16:36 C4L-G.3 : Transmission Mechanisms with Variable Tissue Properties in a Paired Electrode System for Transcutaneous Power....2739  
K. Bocan, E. Sejdic  
University of Pittsburgh, United States
- 16:54 C4L-G.4 : A Bidirectional Neural Interface IC with High Voltage Compliance and Spectral Separation....2743  
M. Haas<sup>2</sup>, U. Bihl<sup>1</sup>, J. Anders<sup>2</sup>, M. Ortmanns<sup>2</sup>  
<sup>1</sup>Carl Zeiss SMT GmbH, Germany; <sup>2</sup>Universität Ulm, Germany

- 17:12 C4L-G.5 : Optimization of the Data Rate of an OOK CMOS Medical Transmitter Based on LC Oscillators....2747  
K. Ture<sup>1</sup>, G. Yilmaz<sup>1</sup>, F. Maloberti<sup>2</sup>, C. Dehollain<sup>1</sup>  
<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>2</sup>Università degli studi di Pavia, Italy

#### **C4L-H : Oscillators & PLLs I**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon Musset

Chair(s): Elena Blokhina - University College Dublin

- 16:00 C4L-H.1 : A Novel Low-Power and High-Speed Dual-Modulus Prescaler Based on Extended True Single-Phase Clock Logic....2751  
S. Jia, Z. Wang, Z. Li, Y. Wang  
Peking University, China
- 16:18 C4L-H.2 : A Power Efficient PLL with in-Loop-Bandwidth Spread-Spectrum Modulation Scheme Using a Charge-Based Discrete-Time Loop Filter....2755  
H. Sun<sup>2</sup>, K. Sobue<sup>1</sup>, K. Hamashita<sup>1</sup>, U. Moon<sup>2</sup>  
<sup>1</sup>Asahi Kasei Microdevices, Japan; <sup>2</sup>Oregon State University, United States
- 16:36 C4L-H.3 : A High-Q Spiral Inductor with Dual-Layer Patterned Floating Shield in a Class-B VCO Achieving a 190.5-dBc/Hz FoM....2759  
C. Lim<sup>2</sup>, H. Ramiah<sup>2</sup>, J. Yin<sup>1</sup>, P. Mak<sup>1</sup>, R. Martins<sup>1</sup>  
<sup>1</sup>Universidade de Macau, Macau; <sup>2</sup>Universiti Malaya, Malaysia
- 16:54 C4L-H.4 : Sub-Picosecond-Jitter Clock Generation for Interleaved ADC with Delay-Locked-Loop in 28nm CMOS....2763  
J. Gong, S. Li, J. McNeill Worcester Polytechnic Institute, United States
- 17:12 C4L-H.5 : A 24GHz Digitally Controlled Oscillator for Automotive Radar in 65nm CMOS....2767  
I. Taha, M. Mirhassani  
University of Windsor, Canada

#### **C4L-J : INVITED: RF Design & Simulation**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon Jarry

Chair(s): Marvin Onabajo - Northeastern University; Jose Silva-Martinez - Texas A&M University

- 16:00 C4L-J.1 : Analysis and Synthesis of Passive Coupled-Switched-Capacitor-Resonator-Based RF Filters....2771  
R. Chen, H. Hashemi  
University of Southern California, United States
- 16:18 C4L-J.2 : Post-Production Adaptation of RF Circuits for Application-Specific Performance Metrics....2775  
D. Chang, J. Kitchen, S. Ozev  
Arizona State University, United States
- 16:36 C4L-J.3 : Challenges and Approaches to Software Defined Duplexing Radio....2779  
A. Apsel, A. Molnar, D. Yang, H. Yuksel, T. Tappen, E. Enroth, M. Mohiuddin, Z. Boynton  
Cornell University, United States
- 16:54 C4L-J.4 : RF Circuit and System Innovations for a New Generation of Wireless Terminals....2783  
R. Yazicigil<sup>1</sup>, T. Haque<sup>2</sup>, J. Zhu<sup>1</sup>, Y. Xu<sup>1</sup>, P. Kinget<sup>1</sup>  
<sup>1</sup>Columbia University, United States; <sup>2</sup>Columbia University / InterDigital Communications, United States
- 17:12 C4L-J.5 : An 11.5 nW Broadband Wake-Up RF Receiver with -60 dBm Sensitivity at 50 MHz....2787  
A. Nikoofard, S. Mandal  
Case Western Reserve University, United States

## **C4L-K : Emerging Circuits II**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon Joyce

Chair(s): Sorin Cotofana - Delft University of Technology; Mona Zaghoul - The George Washington University

- 16:00 C4L-K.1 : STT-MRAM Write Energy Minimization via Area Optimization Under Dynamic Voltage Scaling....2791  
K. Trinh Quang<sup>2</sup>, S. Ruocco<sup>1</sup>, M. Alioto<sup>2</sup>  
<sup>1</sup>Agency for Science, Technology and Research, Singapore; <sup>2</sup>National University of Singapore, Singapore
- 16:18 C4L-K.2 : Electromigration Aware Circuits by Using Special Signal Non-Default Routing Rules....2795  
L. de Paris, G. Posser, R. Reis  
Universidade Federal do Rio Grande do Sul, Brazil
- 16:36 C4L-K.3 : Low Overhead in Situ Aging Monitoring and Proactive Aging Management....2799  
C. Niemann<sup>2</sup>, T. Wegner<sup>2</sup>, D. Timmermann<sup>2</sup>, F. Sill Torres<sup>1</sup>  
<sup>1</sup>Universidade Federal de Minas Gerais, Brazil; <sup>2</sup>Universität Rostock, Germany
- 16:54 C4L-K.4 : A Low Store Energy and Robust ReRAM-Based Flip-Flop for Normally Off Microprocessors....2803  
T. Chien<sup>2</sup>, L. Chiou<sup>3</sup>, Y. Chuang<sup>3</sup>, S. Sheu<sup>1</sup>, H. Li<sup>1</sup>, P. Wang<sup>1</sup>, T. Ku<sup>1</sup>, M. Tsai<sup>1</sup>, C. Wu<sup>1</sup>  
<sup>1</sup>Industrial Technology Research Institute, Taiwan;  
<sup>2</sup>Industrial Technology Research Institute / National Cheng Kung University, Taiwan;  
<sup>3</sup>National Cheng Kung University, Taiwan
- 17:12 C4L-K.5 : Novel 3D Horizontal RRAM Architecture with Isolation Cell Structure for Sneak Current Depression....2807  
Y. Zhao<sup>1</sup>, J. Xu<sup>1</sup>, J. Yang<sup>1</sup>, X. Xue<sup>1</sup>, Y. Lin<sup>1</sup>, J. Sim<sup>2</sup>  
<sup>1</sup>Fudan University, China; <sup>2</sup>Samsung Electronics Co. Ltd., Korea, South

## **C4L-L : INVITED: Light Communication**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon Kafka-Lamartine

Chair(s): Amara Amara - ISEP; Xun Zhang - ISEP

- 16:00 C4L-L.1 : Golden-Light Code for Optical  $2 \times 2$  MIMO Free Space Intensity Communications....2811  
L. Mroueh  
Institut Supérieur d'Electronique de Paris, France
- 16:18 C4L-L.2 : A Cost-Effective Approach for Ubiquitous Broadband Access Based on Hybrid PLC-VLC System....2815  
J. Song<sup>2</sup>, S. Liu<sup>2</sup>, G. Zhou<sup>2</sup>, B. Yu<sup>2</sup>, W. Ding<sup>2</sup>, F. Yang<sup>2</sup>, H. Zhang<sup>2</sup>, X. Zhang<sup>1</sup>, A. Amara<sup>1</sup>  
<sup>1</sup>Institut supérieur d'électronique de Paris, France; <sup>2</sup>Tsinghua University, China
- 16:36 C4L-L.3 : Subcarrier Allocation in Hybrid Visible Light and Power Line Communication System....2819  
H. Ma<sup>2</sup>, L. Lampe<sup>2</sup>, S. Hranilovic<sup>1</sup>  
<sup>1</sup>McMaster University, Canada; <sup>2</sup>University of British Columbia, Canada
- 16:54 C4L-L.4 : Capacity Bounds for the 2-User Gaussian IM-DD Optical Multiple-Access Channel....2823  
O. Al-Ebraheemy<sup>2</sup>, A. Chaaban<sup>1</sup>, T. Al-Naffouri<sup>1</sup>, M. Alouini<sup>1</sup>  
<sup>1</sup>King Abdullah University of Science and Technology, Saudi Arabia;  
<sup>2</sup>King Fahd University of Petroleum and Minerals, Saudi Arabia



## **C4L-M : Sensors & Circuits**

Time: Wednesday, May 25 (16:00-17:30)

Place: Salon 1

Chair(s): Tim Constandinou - Imperial College; Shantanu Chakrabarty - Washington University in St. Louis

- 16:00 C4L-M.1 : Linear Current-Mode ISFET Arrays....2827  
N. Miscourides, P. Georgiou  
Imperial College London, United Kingdom
- 16:18 C4L-M.2 : Detection of Biochemical Molecules Using CMOSFET Based Biosensor....2831  
E. Ashenafi, A. Es-Sakhi, M. Chowdhury  
University of Missouri Kansas-City, United States
- 16:36 C4L-M.3 : Bio-Inspired pH Sensing Using Ion Sensitive Field Effect Transistors....2835  
G. Lallement, N. Moser, P. Georgiou  
Imperial College London, United Kingdom
- 16:54 C4L-M.4 : Self-Powered Sensing and Time-Stamping of Rare Events Using CMOS Fowler-Nordheim Tunneling Timers....2839  
L. Zhou, S. Chakrabarty Washington University in St. Louis, United States
- 17:12 C4L-M.5 : A Quasi-Digital Pressure/Touch Sensor Prototype for Orbital Targets Contact Event Monitoring....2843  
M. Stoppa<sup>1</sup>, P. Motto Ros<sup>1</sup>, M. Crepaldi<sup>1</sup>, A. Chiolerio<sup>1</sup>, D. Demarchi<sup>2</sup>  
<sup>1</sup>Istituto Italiano di Tecnologia, Italy; <sup>2</sup>Politecnico di Torino, Italy

## 2. LATE BREAKING NEWS

### A3L-D : LATE NEWS: Emerging Technologies and Low Power Subsystems

Time: Monday, May 23 (14:30-16:00)

Place: Salon A

Chair(s): Eduard Alarcon - Universitat Politècnica de Catalunya; Alyssa Apsel - Cornell University

- 14:30 A3L-D.1 : A Coupled Memcapacitor Emulator Based Relaxation Oscillator....2895  
D. Yu<sup>1</sup>, Z. Zhou<sup>1</sup>, H. lu<sup>2</sup>, T. Fernando<sup>2</sup>  
<sup>1</sup>China University of Mining and Technology, China; <sup>2</sup>University of Western Australia, Australia
- 14:45 A3L-D.2 : The First Ever Real Bistable Memristor....2896  
A. Ascoli<sup>1</sup>, R. Tetzlaff<sup>1</sup>, L. Chua<sup>2</sup>  
<sup>1</sup>Technische Universität Dresden, Germany; <sup>2</sup>University of California, Berkeley, United States
- 15:00 A3L-D.3 : Enabling Quasi-Adiabatic Logic Arrays for Silicon and Beyond-Silicon Technologies....2897  
V. Tenace, A. Calimera, E. Macii, M. Poncino  
Politecnico di Torino, Italy
- 15:15 A3L-D.4 : An 8-Bit 900MS/S Two-Step SAR ADC....2898  
P. Huang, Y. Hu, H. Tai, H. Chen  
National Taiwan University, Taiwan
- 15:30 A3L-D.5 : A 0.3V 0.705fJ/Conversion-Step 10-Bit SAR ADC with Shifted Monotonic Switching Scheme in 90nm CMOS....2899  
S. Hsieh, C. Hsieh  
National Tsing Hua University, Taiwan
- 15:45 A3L-D.6 : Design and Analysis of Rectifying and Regulating Rectifier with PWM and PFM Modes....2900  
V. Talla, J. Smith University of Washington, United States

### B3L-D : LATE NEWS: Signal Processing Strategies, Design, and Applications

Time: Tuesday, May 24 (14:30-16:00)

Place: Salon A

Chair(s): Chai Wah Wu - IBM; Eduard Alarcon - Universitat Politècnica de Catalunya

- 14:30 B3L-D.1 : New Strategies in Removing Non-Coherency from Signals with Large Distortion to Noise Ratios....2901  
Y. Zhuang, D. Chen  
Iowa State University, United States
- 14:45 B3L-D.2 : A 28.8MHz 21.1dBm-IIP3 3.2mW Sallen-Key 4th-Order Filter with Out-of-Band Zeros Cancellation....2902  
M. De Matteis<sup>1</sup>, F. Resta<sup>1</sup>, A. Pipino<sup>1</sup>, S. D'Amico<sup>2</sup>, A. Baschirotto<sup>1</sup>  
<sup>1</sup>Università degli Studi di Milano-Bicocca, Italy; <sup>2</sup>Università del Salento, Italy
- 15:00 B3L-D.3 : A Novel Efficient and Accurate Analytical Method for Determining the Swing of Internal Nodes in Digital Filters....2903  
M. Najjarzadegan<sup>1</sup>, G. Pasandi<sup>1</sup>, S. Beig Mohammadi<sup>2</sup>, S. Fakhræi<sup>1</sup>  
<sup>1</sup>University of Tehran, Iran; <sup>2</sup>University of Ttehran, Iran
- 15:15 B3L-D.4 : Area-Efficient Scaling-Free DFT/FFT Design Using Stochastic Computing....2904  
B. Yuan<sup>2</sup>, Y. Wang<sup>3</sup>, Z. Wang<sup>1</sup>  
<sup>1</sup>Broadcom Corporation, United States; <sup>2</sup>City University of New York, City College, United States;  
<sup>3</sup>Syracuse University, United States

15:30 B3L-D.5 : A Fully-Digital Spectrum Shaping Signaling for Serial-Data Transceiver with Crosstalk and ISI Reduction Property in Multi-Drop Memory Interfaces....2905

K. Gharibdoust<sup>1</sup>, G. Kim<sup>1</sup>, A. Tajalli<sup>2</sup>, Y. Leblebici<sup>1</sup>

<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland;

<sup>2</sup>Kandou Bus / École Polytechnique Fédérale de Lausanne, Switzerland

15:45 B3L-D.6 : A Fully Integrated 1-pJ/Bit 10-Gb/S/ch Forwarded-Clock Transmitter with a Resistive Feedback Inverter Based Driver in 65-nm CMOS....2906

W. Bae, G. Jeong, D. Jeong

Seoul National University, Korea, South

### **C3L-D : LATE NEWS: Sensors and Sensory Information Processing**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salon A

Chair(s): Alyssa Apse - Cornell University; Chai Wah Wu - IBM

14:30 C3L-D.1 : A 6.5 $\mu$ W/MHz Charge Buffer with 7fF Input Capacitance in 65nm CMOS for Non-Contact Electropotential Sensing....2907

S. Joshi, C. Kim, G. Cauwenberghs

University of California, San Diego, United States

14:45 C3L-D.2 : An ECG-on-Chip with Joint QRS Detection & Data Compression for Wearable Sensors....2908

C. Deepu<sup>2</sup>, X. Zhang<sup>1</sup>, D. Wong<sup>2</sup>, Y. Lian<sup>1</sup>

<sup>1</sup>Apple Inc., Canada; <sup>2</sup>National University of Singapore, Singapore

15:00 C3L-D.3 : A Circuit Model of Human Whole Blood in a Microfluidic Dielectric Sensor....2909

M. Suster, N. Vitale, D. Maji, P. Mohseni

Case Western Reserve University, United States

15:15 C3L-D.4 : A Heterogeneous Multi-Core System-on-Chip for Energy Efficient Brain Inspired Vision....2910

A. Pullini<sup>1</sup>, F. Conti<sup>1</sup>, D. Rossi<sup>2</sup>, I. Loi<sup>2</sup>, M. Gautschi<sup>1</sup>, L. Benini<sup>1</sup>

<sup>1</sup>Eidgenössische Technische Hochschule Zürich, Switzerland; <sup>2</sup>Università di Bologna, Italy

15:30 C3L-D.5 : Real-Time Sensory Information Processing Using the TrueNorth Neurosynaptic System....2911

A. Andreou<sup>2</sup>, A. Dykman<sup>2</sup>, K. Fischl<sup>2</sup>, G. Garreau<sup>2</sup>, D. Mendat<sup>2</sup>, G. Orchard<sup>3</sup>, A. Cassidy<sup>1</sup>, P. Merolla<sup>1</sup>,

J. Arthur<sup>1</sup>, R. Alvarez-Icaza<sup>1</sup>, B. Jackson<sup>1</sup>, D. Modha<sup>1</sup>

<sup>1</sup>IBM Almaden Research Center, United States; <sup>2</sup>Johns Hopkins University, United States;

<sup>3</sup>University of Singapore, United States

15:45 C3L-D.6 : A Fault Tolerant Cache System of Automotive Vision Processor Complying with ISO26262....2912

J. Han<sup>2</sup>, Y. Kwon<sup>1</sup>, K. Byun<sup>1</sup>, H. Yoo<sup>2</sup>

<sup>1</sup>Electronics and Telecommunications Research Institute, Korea, South;

<sup>2</sup>Korea Advanced Institute of Science and Technology, Korea, South







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## CASFEST



### **D1L-A : Amperometric Lab on CMOS Systems**

Time: Thursday, May 26 (10:00-11:00)

Place: L-3816, Pavillon Lassonde, Polytechnique Montréal

Chair(s): Pamela Abshire - University of Maryland College Park; Jennifer Blain Christen - Arizona State University

- 10:00 D1L-A.1 : An Ion Imaging ISFET Array for Potassium and Sodium Detection....2847  
N. Moser, C. Leong, Y. Hu, M. Boutelle, P. Georgiou  
Imperial College London, United Kingdom
- 10:20 D1L-A.2 : Compact CMOS Amperometric Readout for Nanopore Arrays in High Throughput Lab-on-CMOS....2851  
S. Parsnejad, H. Li, A. Mason  
Michigan State University, United States
- 10:40 D1L-A.3 : A Novel Multifunctional Integrated Biosensor Array for Simultaneous Monitoring of Cell Growth and Acidification Rate....2855  
G. Nabovati<sup>1</sup>, E. Ghafarzadeh<sup>2</sup>, M. Sawan<sup>1</sup>  
<sup>1</sup>polytechnique montreal, Canada; <sup>2</sup>York university, Canada

### **D2L-A : Magnetic, Capacitive, and Optical Lab on CMOS Systems**

Time: Thursday, May 26 (11:15-12:15)

Place: L-3816, Pavillon Lassonde, Polytechnique Montréal

Chair(s): Jennifer Blain Christen - Arizona State University; Pedram Mohseni - Case Western Reserve University

- 11:15 D2L-A.1 : Design and Optimization of a CMOS Front-End for Magnetoresistive Sensor Based Biomolecular Recognition Detection....2859  
T. Costa<sup>1</sup>, J. Germano<sup>1</sup>, M. Piedade<sup>1</sup>, F. A. Cardoso<sup>2</sup>, P. P. Freitas<sup>2</sup>  
<sup>1</sup>INESC-ID, Portugal; <sup>2</sup>INESC-MN, Portugal
- 11:35 D2L-A.2 : Lab-on-CMOS Capacitance Sensor Array for Real-Time Cell Viability Measurements with I2C Readout....2863  
B. Senevirathna<sup>2</sup>, A. Castro<sup>2</sup>, M. Dandin<sup>1</sup>, E. Smela<sup>2</sup>, P. Abshire<sup>2</sup>  
<sup>1</sup>Kiskeya Microsystems, United States; <sup>2</sup>University of Maryland, United States
- 11:55 D2L-A.3 : On-Chip Fluorescence Detection System with High Density Microchamber Array Based on CMOS Image Sensor....2867  
J. Ohta, H. Takehara, H. Takehara, T. Noda, K. Sasagawa, T. Tokuda  
Nara Institute of Science and Technology, Japan

### **D3P-B : Lab on CMOS Posters**

Time: Thursday, May 26 (12:15-14:15)

Place: Atrium du Pavillon Lassonde, Polytechnique Montréal

Chair(s): Pedram Mohseni - Case Western Reserve University; Pamela Abshire - University of Maryland College Park

- D3P-B.1 : Design of a Micro-Electrode Cell for Programmable Lab-on-CMOS Platform....2871  
Y. Ho<sup>2</sup>, G. Wang<sup>1</sup>, K. Lai<sup>1</sup>, Y. Lu<sup>1</sup>, K. Liu<sup>2</sup>, Y. Wang<sup>1</sup>, C. Lee<sup>1</sup>  
<sup>1</sup>National Chiao Tung University, Taiwan; <sup>2</sup>National Dong-Hwa University, Taiwan
- D3P-B.2 : An Integrated Platform for Differential Electrochemical and ISFET Sensing....2875  
S. Ghoreishizadeh<sup>2</sup>, P. Georgiou<sup>2</sup>, S. Carrara<sup>1</sup>, G. De Micheli<sup>1</sup>  
<sup>1</sup>Ecole polytechnique federale de Lausanne (EPFL), Switzerland; <sup>2</sup>Imperial College London, United Kingdom
- D3P-B.3 : Integration of Carbon Nanostructures on CMOS for Lab-on-a-Chip Sensing....2879  
K. Mamun<sup>2</sup>, J. Gu<sup>2</sup>, D. Hensley<sup>1</sup>, S. Islam<sup>2</sup>, N. McFarlane<sup>2</sup>



<sup>1</sup>Center for nanophase material science, Oak Ridge National Laboratory, United States;

<sup>2</sup>University of Tennessee, Knoxville, United States

D3P-B.4 : Multi-analyte Paper-Analytical-Devices (Pad) with CMOS Integration for Point-of-Care Diagnostics....2883

M. Punjiya, C. Moon, S. Sonkusale

Tufts University, United States

D3P-B.5 : Screen-Printed Planar Metallization for Lab-on-CMOS with Epoxy Carrier....2887

H. Yin, L. Li, A. Mason

Michigan State University, United States

D3P-B.6 : A Portable Impedance-Based Electrochemical Measurement Device....2891

T. Luo, L. Li, V. Ghorband, Y. Zhan, H. Song, J. Blain Christen

Arizona State University, United States





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### TCAS SPECIAL

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### **A3L-A : TCAS Special: Circuits and Systems for Communications**

Time: Monday, May 23 (14:30-16:00)

Place: Salon Drummond est

Chair(s): Lian Yong - York University; Gianluca Setti - University of Ferrara

- 14:30 A3L-A.1 : A Configurable Transmitter Architecture for IEEE 802.11ac and 802.11ad Standards....N/A  
F. Gebreyohannes, A. Frappé, A. Kaiser  
Institut Supérieur de l'Electronique et du Numérique, France
- 14:48 A3L-A.2 : A 1.3 mW Low-IF, Current-Reuse, and Current-Bleeding RF Front-End  
for the Mics Band with Sensitivity of -97 dBm....N/A  
H. Cruz<sup>1</sup>, H. Huang<sup>3</sup>, S. Lee<sup>1</sup>, C. Luo<sup>2</sup>  
<sup>1</sup>National Cheng Kung University, Taiwan;  
<sup>2</sup>National Cheng Kung University, National Sun Yat-sen University, Taiwan; <sup>3</sup>National Taipei University, Taiwan
- 15:06 A3L-A.3 : A 3.0 Gb/S Throughput Hardware-Efficient Decoder for Cyclically-Coupled QC-LDPC Codes....N/A  
Q. Lu, J. Fan, C. Sham, W. Tam, F. Lau  
Hong Kong Polytechnic University, Hong Kong

### **A3L-B : TCAS Special: Analog Circuits**

Time: Monday, May 23 (14:30-16:00)

Place: Salon Drummond centre

Chair(s): Gianluca Setti - University of Ferrara; Lian Yong - York University

- 14:30 A3L-B.1 : Derivative Level-Crossing Sampling....N/A  
P. Martinez-Nuevo<sup>2</sup>, S. Patil<sup>1</sup>, Y. Tsividis<sup>1</sup>  
<sup>1</sup>Columbia University, United States; <sup>2</sup>Massachusetts Institute of Technology, United States
- 14:48 A3L-B.2 : A Simplified Model for Passive Switched-Capacitor Filters with Complex Poles....N/A  
S. Lulec, D. Johns, A. Liscidini University of Toronto, Canada
- 15:06 A3L-B.3 : A Low Power Trainable Neuromorphic Integrated Circuit That Is Tolerant to Device Mismatch....N/A  
C. Thakur, R. Wang, T. Hamilton, J. Tapson, A. van Schaik  
Western Sydney University, Australia
- 15:24 A3L-B.4 : Influence of Jitter on Limit Cycles in Bang-Bang Clock and Data Recovery Circuits....N/A  
M. Verbeke<sup>2</sup>, P. Rombouts<sup>1</sup>, A. Vyncke<sup>2</sup>, G. Torfs<sup>2</sup>  
<sup>1</sup>Ghent University, Belgium; <sup>2</sup>Ghent University-iMinds-imec, Belgium

### **B3L-A : TCAS Special: Cryptography & Security II**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salon Drummond est

Chair(s): Lian Yong - York University; Gianluca Setti - University of Ferrara

- 14:30 B3L-A.1 : Scalable Elliptic Curve Cryptosystem FPGA Processor for NIST Prime Curves....N/A  
K. Loi, S. Ko  
University of Saskatchewan, Canada

- 14:48 B3L-A.2 : Data-Dependent Delays As a Barrier Against Power Attacks....N/A  
I. Levi, O. Keren, A. Fish  
Bar-Ilan University, Israel
- 15:06 B3L-A.3 : Randomized Multi-Topology Logic Against Differential Power Analysis....N/A  
M. Avital, H. Dagan, O. Keren, A. Fish  
Bar-Ilan University, Israel
- 15:24 B3L-A.4 : DPA-Secured Quasi-Adiabatic Logic (SQAL) for Low-Power Passive RFID Tags Employing S-Boxes....N/A  
M. Avital, H. Dagan, I. Levi, O. Keren, A. Fish  
Bar-Ilan University, Israel
- 15:42 B3L-A.5 : Design and Arm-Embedded Implementation  
of a Chaotic Map-Based Real-Time Secure Video Communication System....N/A  
Z. Lin<sup>3</sup>, S. Yu<sup>3</sup>, J. Lu<sup>1</sup>, S. Cai<sup>3</sup>, G. Chen<sup>2</sup>  
<sup>1</sup>Academy of Mathematics and Systems Sciences, Chinese Academy of Sciences, China;  
<sup>2</sup>City University of Hong Kong, China; <sup>3</sup>Guangdong University of Technology, China

### **B3L-B : TCAS Special: Energy Efficient Circuits & Systems**

Time: Tuesday, May 24 (14:30-16:00)

Place: Salon Drummond centre

Chair(s): Gianluca Setti - University of Ferrara; Lian Yong - York University

- 14:30 B3L-B.1 : Capacitive Energy Conversion with Circuits Implementing a Rectangular Charge-Voltage Cycle Part 1:  
Analysis of the Electrical Domain....N/A  
D. Galayko<sup>2</sup>, A. Dudka<sup>2</sup>, A. Karami<sup>2</sup>, E. O'Riordan<sup>3</sup>, E. Blokhina<sup>3</sup>, O. Feely<sup>3</sup>, P. Basset<sup>1</sup>  
<sup>1</sup>ESIEE Paris / ESYCOM, France; <sup>2</sup>LIP6 / Université Pierre-et-Marie-Curie, France; <sup>3</sup>University College Dublin, Ireland
- 14:48 B3L-B.2 : Capacitive Energy Conversion with Circuits Implementing a Rectangular Charge-Voltage Cycle Part 2:  
Electromechanical and Nonlinear Analysis....N/A  
E. O'Riordan<sup>3</sup>, A. Dudka<sup>2</sup>, D. Galayko<sup>2</sup>, P. Basset<sup>1</sup>, O. Feely<sup>3</sup>, E. Blokhina<sup>3</sup>  
<sup>1</sup>ESIEE Paris / ESYCOM, France; <sup>2</sup>LIP6 / Université Pierre-et-Marie-Curie, France; <sup>3</sup>University College Dublin, Ireland
- 15:06 B3L-B.3 : A Remotely Powered Implantable Biomedical System with Location Detector....N/A  
E. Kilinc<sup>3</sup>, M. Ghanad<sup>1</sup>, F. Maloberti<sup>2</sup>, C. Dehollain<sup>1</sup>  
<sup>1</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>2</sup>Università degli Studi di Pavia, Italy;  
<sup>3</sup>University of Toronto, Canada
- 15:24 B3L-B.4 : A Low-Voltage Radiation-Hardened 13T SRAM bitcell for Ultra-Low Power Space Applications....N/A  
L. Atias, A. Teman, R. Giterman, P. Meinerzhagen, A. Fish  
Bar-Ilan University, Israel
- 15:42 B3L-B.5 : Single-Supply 3T Gain-Cell for Low-Voltage Low-Power Applications....N/A  
R. Giterman<sup>1</sup>, A. Teman<sup>1</sup>, P. Meinerzhagen<sup>1</sup>, L. Atias<sup>1</sup>, A. Burg<sup>2</sup>, A. Fish<sup>1</sup>  
<sup>1</sup>Bar-Ilan University, Israel; <sup>2</sup>École Polytechnique Fédérale de Lausanne, Switzerland

### **C3L-A : TCAS Special: Digital Circuits**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salon Drummond est

Chair(s): Lian Yong - York University; Gianluca Setti - University of Ferrara

- 14:30 C3L-A.1 : Floating-Point Butterfly Architecture Based on Binary Signed-Digit Representation....N/A  
A. Kaivani, S. Ko  
University of Saskatchewan, Canada
- 14:48 C3L-A.2 : Normalized Subband Adaptive Filtering Algorithm with Reduced Computational Complexity....N/A  
M. Petraglia<sup>2</sup>, D. Haddad<sup>1</sup>, E. Marques<sup>2</sup>  
<sup>1</sup>Centro Federal de Educação Tecnológica Celso Suckow da Fonseca, Brazil;  
<sup>2</sup>Universidade Federal do Rio de Janeiro, Brazil
- 15:06 C3L-A.3 : Experimental Analysis of Thermal Coupling in 3-D Integrated Circuits....N/A  
I. Savidis<sup>1</sup>, B. Vaisband<sup>2</sup>, E. Friedman<sup>2</sup>  
<sup>1</sup>Drexel University, United States; <sup>2</sup>University of Rochester, United States
- 15:24 C3L-A.4 : Threshold Logic Computing: Memristive-CMOS Circuits for Fast Fourier Transform and Vedic Multiplication....N/A  
D. Kumar<sup>2</sup>, A. Arun<sup>1</sup>  
<sup>1</sup>Enview R&D, India; <sup>2</sup>Tata Elxsi, India
- 15:42 C3L-A.5 : Bayesian Inference with Muller C-Elements....N/A  
J. Friedman<sup>1</sup>, L. Calvet<sup>1</sup>, P. Bessière<sup>2</sup>, J. Droulez<sup>2</sup>, D. Querioz<sup>2</sup>  
<sup>1</sup>CNRS, Univ. Paris-Sud, Université Paris-Saclay, France; <sup>2</sup>CNRS, Univ. Pierre et Marie Curie, France

### **C3L-B : TCAS Special: Circuits and Systems for Multimedia**

Time: Wednesday, May 25 (14:30-16:00)

Place: Salon Drummond centre

Chair(s): Gianluca Setti - University of Ferrara; Lian Yong - York University

- 14:30 C3L-B.1 : A Frame-Parallel 2 Gpixel/S Video Decoder Chip for UHD TV and 3-DTV/FTV Applications....N/A  
J. Zhou, D. Zhou, J. Zhu, S. Goto  
Waseda University, Japan
- 14:48 C3L-B.2 : VLSI Implementation of HEVC Motion Compensation with Distance Biased Direct Cache Mapping for 8K UHD TV Applications....N/A  
S. Wang, D. Zhou, J. Zhou, T. Yoshimura, S. Goto  
Waseda University, Japan
- 15:06 C3L-B.3 : Codebook Calibration Method for Vector Quantizers Implemented at the Focal Plane of CMOS Imagers....N/A  
R. Filho, J. Gomes, A. Petraglia  
Universidade Federal do Rio de Janeiro, Brazil
- 15:24 C3L-B.4 : Memristive Threshold Logic Circuit Design of Fast Moving Object Detection....N/A  
A. Maan<sup>1</sup>, D. Kumar<sup>3</sup>, S. Sugathan<sup>2</sup>  
<sup>1</sup>Griffith University, Australia; <sup>2</sup>Siemens Healthcare, India; <sup>3</sup>Tata Elxsi, India

### **Additional Paper**

Performance Comparison of Energy and Cyclostationary Spectrum Detection in Cooperative Cognitive Radios Network....1734

Z. Liu<sup>1</sup>, R. Ali<sup>1</sup>, I. Khan<sup>2</sup>, I. A. Khan<sup>2</sup>, A. A. Shah<sup>2</sup>

<sup>1</sup>Beijing Institute of Technology, Beijing;

<sup>2</sup>University of Engineering and Technology, Peshawar