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

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

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

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

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

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

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{1}Huazhong University of Science and Technology, China; {2}University of Rochester, United States

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Room: Grand Ballroom VIII

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

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NetraDyne, United States

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{1}Purdue University, United States; {2}Texas Southern University, United State

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{1}Intel Corporation, United States; {2}National Chiao Tung University, Taiwan; {3}National Taiwan University, Taiwan

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{1}Eidgenössische Technische Hochschule Zürich, Switzerland; {2}Fraunhofer Institute for Biomedical Engineering, Germany

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

***Seven-Bit 700-MS/s Four-Way Time-Interleaved SAR ADC with Partial Vcm-Based Switching* N/A**
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{1}Fudan University, China; {2}University of Macau, China; {2}University of Macau, Portugal

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Room: Kent AB

Chair(s): Saeid Nooshabadi - Michigan Technological University; Lu Yu - Zhejiang University

A Dual-Clock VLSI Design of H.265 Sample Adaptive Offset Estimation for 8K Ultra-HD TV Encoding N/A

Jianbin Zhou, Dajiang Zhou, Shihao Wang, Shuping Zhang, Takeshi Yoshimura, Satoshi Goto
Waseda University, Japan

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

Room: Essex AB

Chair(s): Alyssa Apsel - Cornell University

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Robert Giterman{1}, Adam Teman{1}, Pascal Meinerzhagen{2}
{1}Bar-Ilan University, Israel; {2}Intel Research Labs, United States

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{1}Chungbuk National University, Korea, South; {2}iDataMap Corporation, Australia; {3}Korea Advanced Institute of Science and Technology, Korea, South; {4}University of Western Australia, Australia

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Gain Kim{1}, Chen Cao{1}, Kiarash Gharibdoust{2}, Yusuf Leblebici{1}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Kandou Bus, Switzerland

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Kien Trinh Quang{2}, Sergio Ruocco{1}, Massimo Alioto{2}
{1}Agency for Science, Technology and Research, Singapore; {2}National University of Singapore, Singapore

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{1}Democritus University of Thrace, Greece; {2}Pontificia Universidad Católica de Chile, Chile; {3}Universitat
Autònoma de Barcelona, Spain; {4}Universitat Politècnica de Catalunya, Spain

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

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{1}Hamad Bin Khalifa University / Hong Kong University of Science and Technology, Hong Kong; {2}Hong Kong
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{1}Secure Mission Solutions, United States; {2}U.S. Army Research Laboratory, United States

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{1}Massachusetts Institute of Technology, United States; {2}Massachusetts Institute of Technology / Nvidia Corporation, United States

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{1}U.S. Army Research Laboratory, United States; {2}University of Maryland, Baltimore County, United States

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{1}DCS Corporation, United States; {2}U.S. Army Research Laboratory, United States

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Paul Theilmann{1}, Julian Warchall{2}, Patrick Mercier{2}, Harinath Garudadri{2}
{1}Maxentric Technologies LLC, United States; {2}University of California, San Diego, United States

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

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Rohie Kaushik, Shouri Chatterjee, G. S. Visweswaran
Indian Institute of Technology Delhi, India

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{1}Aspinity Inc., United States; {2}West Virginia University, United States

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

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

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Xin Kang{2}, David Narrow{2}, Devin O'Brien Coon{1}
{1}Johns Hopkins University, United States; {2}Sonavex, Inc., United States

INVITED: Perceptual Signal Processing for Audio-Visual Beamforming with the Eigenmike Microphone Array and an Omni-Camera NA

Daniel R. Mendat, James E. West, Sudarshan Ramenahalli, Ernst Niebur, Andreas G. Andreou
Johns Hopkins University, United States

Advanced Beamforming Methods for Ultrasound and Photoacoustic Imaging NA

Muyinatu A. Lediju Bell
Johns Hopkins University, United States

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

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{1}University of Illinois at Urbana-Champaign, United States; {2}Washington University in St. Louis, United States

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{1}Fraunhofer Institute for Microelectronic Circuits and Systems, Germany; {2}Universität Duisburg-Essen, Germany

Energy-Efficient & Secure IoT

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

Room: Grand Ballroom VIII

Chair(s): Emre Salman - Stony Brook University; Milutin Stanecevic - Stony Brook University

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Texas Instruments Inc., United States

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{1}American University in Cairo, Egypt; {2}American University in Cairo / Zewail City of Science and Technology, Egypt; {3}American University in Cairo / Zewail City of Science and Technology / Banha University, Egypt

Wireless & Implantable/Injectable Technology Circuits & Systems I

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

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

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

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National Technical University of Athens, Greece

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{1}University of Electronic Science and Technology of China, China; {2}University of Pittsburgh, United States

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{1}Broadcom Ltd., United States; {2}University of California, Irvine, United States

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{1}Graphic Era University, India; {2}Nanyang Technological University, Singapore***Complexity Reduction by Modified Scale-Space Construction in Sift Generation Optimized for a Mobile GPU N/A***Chulhee Lee{2}, Hyuk-Jae Lee{2}, Chae Eun Rhee{1}
{1}Inha University, Korea, South; {2}Seoul National University, Korea, South***Low-Lighting Video Enhancement Using Constrained Spatial-Temporal Model for Real-Time Mobile Communication 595***Xinwei Gao, Haibo Deng, Yaoyao Guo, Chenchen Gu, Yongfang Shi, Anlin Gao, Licai Guo, Xunan Mao, Jing Lv
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{1}North Carolina State University, United States; {2}Universidade Federal do Rio de Janeiro, Brazil***Subpixel Rendering Without Color Distortions for Diamond-Shaped PenTile Displays 603***Jae-Han Lee, Kyung-Rae Kim, Chang-Su Kim
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ULP Circuits for Implantables & Wearables

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

Room: Essex AB

Chair(s): Alyssa Apsel - Cornell University

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

Jiawei Zheng, Wing-Hung Ki, Langyu Hu, Chi-Ying Tsui

Hong Kong University of Science and Technology, Hong Kong

***Self-Sustainable Smart Ring for Long Term Monitoring of Blood Oxygenation*..... N/A**

Petar Jokic, Giovanni Antonio Salvatore, Michele Magno, Lars Bütke, Gerhard Tröster, Luca Benini

Eidgenössische Technische Hochschule Zürich, Switzerland

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

Jun-Eun Park, Young-Ha Hwang, Deog-Kyoon Jeong

Seoul National University, Korea, South

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

..... N/A

Robin Bolt{1}, Michele Magno{1}, Thomas Burger{1}, Aldo Romani{2}, Luca Benini{1}

{1}Eidgenössische Technische Hochschule Zürich, Switzerland; {2}Università di Bologna, Italy

***Dual-Band Wireless Power Transfer System Using Circular Defected Ground Structure Resonators for Biomedical Applications* N/A**

Fairus Tahar, Adel Barakat, Redzuan Saad, Kuniaki Yoshitomi, Ramesh Pokharel

Kyushu University, Japan

cass student design competition – monday, may 29th

CASS Student Design Competition

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

Room: Atlantic

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

INDEPENDENT CLEANING ROBOT USING THE OPEN-HARDWARE PLATFORM ARDUINO NA

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

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

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

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

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

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

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

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

Live DEMonstrations – monday, may 29th

Demonstration Session I

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

Room: Harborside Ballroom

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

Diogo Brito, Joao Santos, Jorge Fernandes, Gonalo Tavares
Universidade Tcnica de Lisboa / Instituto de Engenharia de Sistemas e Computadores - Investigao , Portugal

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

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Kodai Ueyoshi{2}, Takao Marukame{3}, Tetsuya Asai{2}, Masato Motomura{2}, Alexandre Schmid{1}
{1}cole Polytechnique Fdrale de Lausanne, Switzerland; {2}Hokkaido University, Japan; {3}Toshiba Corporation, Japan

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Iulia-Alexandra Lungu, Federico Corradi, Tobi Delbruck
Universitt Zrich / Eidgenssische Technische Hochschule Zrich, Switzerland

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

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

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

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

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

Poster session – monday, may 29th

Sensory Systems

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

Room: Harborside Ballroom

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

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Ion Vornicu, Ricardo Carmona-Galán, Ángel Rodríguez-Vázquez

Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain

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Michele Dei, Roger Figueras, Josep Maria Margarit, Lluís Terés, Francisco Serra-Graells

Consejo Superior de Investigaciones Científicas, Spain

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Diederik Paul Moeys{3}, Chenghan Li{3}, Julien N.P. Martel{3}, Simeon Bamford{2}, Luca Longinotti{2}, Vasyi Motsnyi{1}, David San Segundo Bello{1}, Tobi Delbruck{3}

{1}IMEC, Belgium; {2}iniLabs GmbH, Switzerland; {3}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland

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Mahir Gharzai, Dingyi Hong, Joseph Schmitz, Michael Hoffman, Sina Balkir

University of Nebraska-Lincoln, United States

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Andrew Berkovich{3}, Alexander Castro{3}, Mohammad Islam{2}, Fow-Sen Choa{2}, Geoffrey Barrows{1}, Pamela Abshire{3}

{1}Centeye, Inc., United States; {2}University of Maryland, Baltimore County, United States; {3}University of Maryland, College Park, United States

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Case Western Reserve University, United States

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Yong Wang{2}, Yan Hong{2}, Wang Ling Goh{2}, Kevin Chai{1}, Xin Lou{3}, Wenbin Ye{4}

{1}Agency for Science, Technology and Research / Nanyang Technological University, Singapore; {2}Nanyang Technological University, Singapore; {3}ShanghaiTech University, China; {4}Shenzhen University, China

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Sining Pan, Kofi Makinwa

Technische Universiteit Delft, Netherlands

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Room: Harborside Ballroom

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Khawaja Taimoor Tanweer{1}, Syed Rafay Hasan{2}, Awais Mehmood Kamboh{1}

{1}National University of Sciences and Technology, Pakistan; {2}Tennessee Technological University, United States

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Saman Abeysekera

Nanyang Technological University, Singapore

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Zhuo Li, Xingtong Liu, Xiang Xie, Guolin Li, Songping Mai, Zhihua Wang

Tsinghua University, China

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Shervin Minaee, Yao Wang

New York University, United States

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Chang Gao, Sara Ghoreishizadeh, Yan Liu, Timothy Constandinou

Imperial College London, United Kingdom

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Krupa Bhavsar, Hen-Geul Yeh, Perla Ayala

California State University, Long Beach, United States

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Salim Lahmiri{1}, Mounir Boukadoum{2}

{1}École de Technologie Supérieure, Canada; {2}Université du Québec à Montréal, Canada

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Sylmarie Dávila-Montero{2}, Deren Barsakcioglu{1}, Andrew Jackson{3}, Timothy Constandinou{1}, Andrew J. Mason{2}

{1}Imperial College London, United Kingdom; {2}Michigan State University, United States; {3}University of Newcastle, United Kingdom

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Maryam Shafiee, Sule Ozev

Arizona State University, United States

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Byung Su Kim{2}, Hyo Sig Won{3}, Tae Hee Han{1}, Joon-Sung Yang{3} {1}Samsung Electronics, Korea, South; {2}Samsung Electronics / Sungkyunkwan University, Korea, South; {3}Sungkyunkwan University, Korea, South	
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Ye Zhang{1}, Fan Yang{1}, Dian Zhou{1,3}, Xuan Zeng{1} and Xiangdong Hu{2} {1}State Key Lab of ASIC & System, School of Microelectronics, Fudan University, China; {2}Shanghai High-Performance Integrated-Circuit Design Center, China; {3}University of Texas at Dallas, USA	
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Mehdi Sadi{2}, Sukeshwar Kannan{1}, Luke England{1}, Mark Tehranipoor{2} {1}GLOBALFOUNDRIES US Inc., United States; {2}University of Florida, United States	
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{1}Universidade Federal de Santa Maria, Brazil; {2}Universidade Federal do Rio Grande do Sul, Brazil

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Pavan Kumar Javvaji, Spyros Tragoudas
Southern Illinois University Carbondale, United States

Q-49 - A Low Cost Technique for Scan Chain Diagnosis 750

Satyadev Ahlawat, Darshit Vaghani, Rohini Gulve, Virendra Singh
Indian Institute of Technology Bombay, India

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Alexandra Lackmann Zimpeck{2}, Ygor Aguiar{2}, Cristina Meinhardt{1}, Ricardo Reis{2}
{1}Universidade Federal do Rio Grande, Brazil; {2}Universidade Federal do Rio Grande do Sul, Brazil

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Adam Watkins, Spyros Tragoudas
Southern Illinois University Carbondale, United States

Communication Methods

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

Room: Harborside Ballroom

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

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Xiangdong Jia, Glenn Cowan
Concordia University, Canada

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Sungkyunkwan University, Korea, South

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Laura Fick{2}, Dennis Sylvester{2}, John Poulton{1}, John Wilson{1}, Tom Gray{1}
{1}Nvidia Corporation, United States; {2}University of Michigan, United States

R-55 - Secure Authentication and Access Mechanism for IoT Wireless Sensors 774

Mahzad Azarmehr, Arash Ahmadi, Rashid Rashidzadeh
University of Windsor, Canada

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Scott Block, Xiaonan Jiang, Brad Harris, Can Cui, Jeronimo Segovia Fernandez, Rajeevan Amirtharajah, Dave Horsley, Hooman Rashtian, Xiaoguang Liu
University of California, Davis, United States

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Virginia Polytechnic Institute and State University, United States

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Yanshu Guo, Songping Mai, Zhaoyang Weng, Heng Liu, Hanjun Jiang, Zhihua Wang
Tsinghua University, China

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Cyro Hemsí, Cristiano Panazio
Universidade de São Paulo, Brazil

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Video Signal Processing & Coding Algorithms

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

Room: Harborside Ballroom

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

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

Complex Networks & Models**Time:** Monday, May 29 (15:30-17:00)**Room:** Harborside Ballroom**Chair(s):** Yoshifumi Nishio - Tokushima University; Federico Bizzarri - Politecnico di Milano

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Tokushima University, Japan
- T-74 - Multiobjective Transshipment Point Assignment in China Express Delivery Network..... 850**
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City University of Hong Kong, Hong Kong
- T-75 - Optimal Design of Coupling Preferences to Mitigate Traffic Congestion in Interconnected Networks 854**
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Sun Yat-sen University, China
- T-76 - A Unifying Perspective on Phase Noise and Injection Locking 858**
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- T-77 - Efficient Spectral Graph Sparsification via Krylov-Subspace Based Spectral Perturbation Analysis 862**
Shuhan Zhang{1}, Fan Yang{1}, Xuan Zeng{1}, Dian Zhou{4}, Shun Li{2}, Xiangdong Hu{3}
{1}Fudan University, China; {2}Microsystem & Terahertz Research Center, China; {3}Shanghai High-Performance Integrated-Circuit Design Center, China; {4}University of Texas at Dallas, United States
- T-78 - On Network-Based Leader-Following Consensus of Linear Multi-Agent Systems 866**
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- T-79 - A Heuristics-Based VM Allocation Mechanism for Cloud Data Centers 870**
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Hong Kong Polytechnic University, Hong Kong
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Hong Kong Polytechnic University, Hong Kong

Data Converters II**Time:** Monday, May 29 (15:30-17:00)**Room:** Harborside Ballroom**Chair(s):** Shahriar Mirabbasi - University of British Columbia; George Yuan - Hong Kong University of Science and Technology

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^{1}National University of Singapore, Singapore; ^{2}York University, Canada**U-84 - Piecewise BJT Process Spread Compensation Exploiting Base Recombination Current 890**Dapeng Sun^{2}, Man-Kay Law^{2}, Bo Wang^{1}, Pui-In Mak^{2}, Rui Paulo Martins^{2}
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Universidade de Brasília, Brazil**U-88 - A Design-Oriented Approach for Modeling Integrators Non-Idealities in Discrete-Time Sigma-Delta Modulators 906**Anthony Baltolu^{2}, Jean-Baptiste Begueret^{1}, Dominique Dallet^{1}, Frederic Chalet^{2}
^{1}IMS Laboratory, France; ^{2}NXP Semiconductors N.V., France**U-89 - Designing CT Bandpass $\Sigma\Delta$ Modulators with Arbitrary STF Shapes 910**Johannes Wagner, Jiazuo Chi, Maurits Ortmanns
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^{1}National Cheng Kung University, Taiwan; ^{2}National Taipei University, Taiwan

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Nanyang Technological University, Singapore

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{1}Auburn University, United States; {2}Tsinghua University, China
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{1}Indraprastha Institute of Information Technology Delhi, India; {2}Universidade Nova de Lisboa / CTS-UNINNOVA, Portugal
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Chair(s): Xiaozhe Wang - McGill University; Zbigniew Galias - AGH University of Science and Technology

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{1}E-T-A Elektrotechnische Apparate GmbH, Germany; {2}Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
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- W-120 - Dimensioning and Comparison of Common Compensation Topologies for IPT Systems**..... 1034
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- W-121 - Analysis of Coexisting Solutions and Control of Their Bifurcations in a Parallel LC Resonant Inverter**..... 1038
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{1}Universidad de Sevilla, Spain; {2}Universitat Politècnica de Catalunya, Spain; {3}Universitat Rovira i Virgili, Spain
- W-122 - Stability Conditions for Hybrid Supply Modulators** 1042
Min Tan{2}, Wing-Hung Ki{1}
{1}Hong Kong University of Science and Technology, Hong Kong; {2}Huazhong University of Science and Technology, China
- W-123 - Dynamic ADC-Quantization for Oscillation-Free Performance of Digitally Controlled Converters** 1046
Asif Syed{2}, Amit Patra{1}
{1}Indian Institute of Technology Kharagpur, India; {2}SiWays Microelectronics, India
- W-124 - Improving EDP in Multi-Core Embedded Systems Through Multidimensional Frequency Scaling** 1050
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{1}Instituto Federal de Educação, Ciência e Tecnologia Farroupilha, Brazil; {2}Universidade Federal de Santa Maria, Brazil; {3}Universidade Federal do Rio Grande do Sul, Brazil
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Blanca Areli Martínez-Treviño, Abdelali El Aroudi, Luis Martínez-Salamero
Universitat Rovira i Virgili, Spain

Education Tools

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

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

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

Abdulhadi Shoufan, Abdulla Alnaqbi

Khalifa University, U.A.E.

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

Aishwarya Natarajan, Jennifer Hasler

Georgia Institute of Technology, United States

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

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

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

Pioneers of CAS – monday, may 29th

Pioneers of Circuits and Systems I
Time: Monday, May 29 (17:00-18:00)
Room: Grand Ballroom V-VI
Chair(s): Pamela Abshire - University of Maryland

***Distributed Circuit Theory: Reminiscences* 1070**
Omar Wing
Columbia University, United States

***Present at the Beginning*..... NA**
Bede Liu
Princeton University, United States

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Robert Newcomb
University of Maryland, College Park, United States

FutureCAS panel – monday, may 29th

FutureCAS Panel

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

Room: Grand Ballroom V-VI

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

Moderator: Jennifer Blain Christen

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

Technical Sessions – tuesday, May 30th

Radar Circuits and Systems

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

Room: Dover A

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

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

N/A

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

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

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

N/A

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

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

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

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

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

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

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

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

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

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

Technische Universität Dresden, Germany

IoVT Panel

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

Room: Dover BC

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

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

NA

Panelists:

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

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

Dr. Shipeng Li, Cogobuy/IngDan, China

Prof. Yung-Hsiang Lu, Purdue University, USA

Prof. Tokunbo Ogunfunmi, Santa Clara University, USA

Hardware Accelerators for Deep Learning & Cognitive Systems**Time:** Tuesday, May 30 (8:00-9:30)**Room:** Grand Ballroom I**Chair(s):** Ralph Etienne-Cummings - Johns Hopkins University; Chetan Thakur - Johns Hopkins University***Fast Classification Using Sparsely Active Spiking Networks..... 1087***

Hesham Mostafa, Bruno Pedroni, Sadique Sheik, Gert Cauwenberghs

University of California, San Diego, United States

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

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

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

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

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

Pattern Representation and Recognition with Accelerated Analog Neuromorphic Systems 1099

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

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

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

Compressive Sensing**Time:** Tuesday, May 30 (8:00-9:30)**Room:** Grand Ballroom II**Chair(s):** Wei-Ping Zhu - Concordia University; Yun Chen - Fudan University***Countering the False Myth of Democracy: Boosting Compressed Sensing Performance with Maximum-Energy Approach 1107***

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

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

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

Shervin Minaee, Yao Wang

New York University, United States

Scaled Linearized Bregman Iterations for Fixed Point Implementation 1115

Michael Lunglmayr, Bernhard Hiptmair, Mario Huemer

Johannes Kepler Universität Linz, Austria

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

Jeevan Pant, Sridhar Krishnan

Ryerson University, Canada

Approximate-DCT-Derived Measurement Matrices for Compressed Sensing 1123
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Waseda University, Japan

Circuits for Power Management & Voltage References

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

Room: Grand Ballroom III

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

A Power-Efficient Reconfigurable Output-Capacitor-Less Low-Drop-Out Regulator for Low Power Analog Sensing Front-End N/A

Sheng-Yu Peng, Li-Han Liu, Pei-Ke Chang, Tzu-Yun Wang, Hao-Yu Li
National Taiwan University of Science and Technology, Taiwan

An All-MOSFET Sub-1 V Voltage Reference with a - 51 dB PSR Up to 60 MHz N/A

Nashiru Alhassan{1}, Edgar Sánchez-Sinencio{1}, Zekun Zhou{2}
{1}Texas A&M University, United States; {2}Texas A&M University / University of Electronic Science and Technology of China, United States

An All-MOSFET Voltage Reference with -50dB PSR @ 80 MHz for Low Power SoC Design N/A

Nashiru Alhassan{1}, Edgar Sánchez-Sinencio{1}, Zekun Zhou{2}
{1}Texas A&M University, United States; {2}Texas A&M University / University of Electronic Science and Technology of China, United States

A Simple LDO with Adaptable Bias for Internet of Things Applications 1130

Igor Filanovsky{4}, Luis Bica Oliveira{3}, Nikolay Tchamov{1}, Vadim Ivanov{2}
{1}Tampere University of Technology, Finland; {2}Texas Instruments Inc., United States; {3}Universidade Nova de Lisboa, Portugal; {4}University of Alberta, Canada

Hardware Security

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

Room: Grand Ballroom IV

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

A Voltage Regulator-Assisted Lightweight AES Implementation Against DPA Attacks N/A

Weize Yu, Selcuk Köse
University of South Florida, United States

CPA Secured Data-Dependent Delay-Assignment Methodology N/A

Itamar Levi, Osnat Keren, Alexander Fish
Bar-Ilan University, Israel

CMOS Based Gates for Blurring Power Information N/A

Moshe Avital, Itamar Levi, Osnat Keren, Alexander Fish
Bar-Ilan University, Israel

Charge-Withheld Converter-Reshuffling (CoRe): a Countermeasure Against Power Analysis Attacks N/A

Weize Yu, Selcuk Köse
University of South Florida, United States

Vision Sensors**Time:** Tuesday, May 30 (8:00-9:30)**Room:** Grand Ballroom VII**Chair(s):** Piotr Dudek - The University of Manchester; Ricardo Carmona Galán - Instituto of Microelectrónica of Sevilla

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

Venkat Rangan

Qualcomm Inc., United States

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

Yi Luo

University of British Columbia., Canada

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

Jing Huang, Menghan Guo, Shoushun Chen

Nanyang Technological University, Singapore

Impact of Fixed Pattern Noise on Embedded Image Compression Techniques 1146

William Guicquero, Laurent Alacoque

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

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

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

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

Digitally Intensive Frequency Synthesis for Internet of Things Applications**Time:** Tuesday, May 30 (8:00-8:30)**Room:** Grand Ballroom VIII**Chair(s):** Paul Sotiriadis - University of California, San Diego; Peter Kennedy - University College Cork

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

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

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

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

Liming Xiu

BOE Technology Group CO., LTD., China

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Ioannis Syllaos

Cypress Semiconductor, United States

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

Paul Peter Sotiriadis, Charis Basetas

National Technical University of Athens, Greece

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

Michael Peter Kennedy, Hongjia Mo, Dawei Mai

University College Cork, Ireland

Wireless & Implantable/Injectable Technology Circuits & Systems II**Time:** Tuesday, May 30 (8:00-9:30)**Room:** Grand Ballroom IX**Chair(s):** Shantanu Chakrabartty - Washington University in St. Louis; Benoit Gosselin - Université Laval***A CMOS Automatic Tuning System to Maximize Remote Powering Efficiency*..... 1174**

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

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

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Brittany Scheid, Shantanu Chakrabartty

Washington University in St. Louis, United States

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

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

Adam Khalifa{1}, Yasha Karimi{3}, Qihong Wang{1}, Elliot Greenwald{1}, Sherry Chiu{1}, Milutin Stanačević{3},

Nitish Thakor{2}, Ralph Etienne-Cummings{1}

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

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

Rutgers University, United States

ADCs for Wireless Communication**Time:** Tuesday, May 30 (8:00-9:30)**Room:** Grand Ballroom X**Chair(s):** Thierry Taris - Laboratoire de l'Intégration du Matériau au Système; Joseph Chang - Nanyang

Technological University

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

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

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

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

Husheng Liu, Hui Xu

National University of Defense Technology, China

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

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

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

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

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

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

Tsinghua University, China

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

Cognitive Radio & Security Systems

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

Room: Laurel AB

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

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Mathias Wagner
NXP Semiconductors N.V., United States

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Shuske Narieda
National Institute of Technology, Akashi College, Japan

***A 3DES Implementation Especially for CBC Feedback Loop Mode* 1209**
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Tsinghua University, China

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

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

Arithmetic & Logic Circuits

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

Room: Laurel CD

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

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

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

***Post-Processing of Supergate Networks Aiming Cell Layout Optimization* 1229**
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^{1}Pontifícia Universidade Católica do Rio Grande do Sul, Brazil; ^{2}Universidade Federal de Pelotas, Brazil

***Integration of Level Shifting in a TSPC Flip-Flop for Low-Power Robust Timing Closure in Dual-VDD ULV Circuits* 1233**
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Collaborative Wireless Freeview Video Streaming with Network Coding N/A

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

{1}Hong Kong University of Science and Technology, Hong Kong; {2}National Institute of Informatics, Japan;

{3}Waseda University, Japan; {4}Zhengzhou University, China

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Fanyi Duanmu, Eymen Kurdoglu, Yong Liu, Yao Wang

New York University, United States

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

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

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

Arijit Sinharay

Innovation Lab, Kolkata, India

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A Matter of Trust NAKerry Bernstein, Program Manager, Microsystems Technology Office, DARPA

Nonlinear Dynamics in CAS**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Dover A**Chair(s):** Marco Storace - Università di Genova; Dimitri Galayco - Université Pierre-et-Marie-Curie

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Kuntal Mandal{3}, Abdullah Abusorrah{2}, Mohammed M. Al-Hindawi{2}, Yusuf Al-Turki{2}, Abdelali El Aroudi{4},

Damian Giaouris{5}, Soumitro Banerjee{1}

{1}Indian Institute of Science Education and Research, Kolkata, India; {2}King Abdulaziz University, Saudi Arabia;

{3}National Institute of Technology Sikkim, India; {4}Universitat Rovira i Virgili, Spain; {5}University of Newcastle,

United Kingdom

A Modified CCM Approach for Simulating Hierarchical Interconnected Dynamical Systems 1262

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Gottfried Wilhelm Leibniz Universität Hannover, Germany

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{1}Georgia State University, United States; {2}Università di Genova, Italy

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{1}Politecnico di Milano, Italy; {2}Università di Bologna, Italy

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

Power Converters I

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

Room: Dover BC

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

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University of Alberta, Canada

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A Class-D Output Bridge with Dynamic Dead-Time, Small Delay and Reduced EMI 1286
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National Taiwan University, Taiwan

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

Pattern Recognition & Learning Systems I**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Grand Ballroom I**Chair(s):** Ibrahim Elfadel - Masdar Institute; Jeremy Holleman - University of North Carolina at Charlotte**INVITED: Using Machine Learning to Separate Signals NA**

Peder Olsen

IBM Research, United States

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University of Maryland, Baltimore County, United States

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

Jussi Poikonen, Mika Laiho

University of Turku, Finland

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Rheinisch-Westfälische Technische Hochschule Aachen, Germany

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Statistical Signal Processing**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Grand Ballroom II**Chair(s):** Wei Xing Zheng - Western Sydney University; Tokunbo Ogunfunmi - Santa Clara University**Efficient Data Structures for Density Estimation for Large High-Dimensional Data 1314**

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Michigan Technological University, United States

Integer Frequency Offset Detection with Reduced Complexity in OFDM Systems 1318

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

Concordia University, Canada

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

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

University of Hong Kong, Hong Kong

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

Mengdi Jiang, Wei Liu, Yi Li

University of Sheffield, United Kingdom

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

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

Concordia University, Canada

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Università degli Studi di Pavia, Italy

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

Robert Bieg, Martin Schmidt, Markus Grözing, Manfred Berroth

Universität Stuttgart, Germany

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

Byron Montgomery, Yifei Li, Nathan Neihart

Iowa State University, United States

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

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

Toshiba Corporation, Japan

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

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

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

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

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

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

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

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Theodore Wood{2}, Marc Dandin{1}

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

Practical IP Watermarking and Fingerprinting Methods for ASIC Designs 1359

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

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

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

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

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

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

Sensing Circuits**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Grand Ballroom VII**Chair(s):** Meng-Fan Chang - National Tsing Hua University; Joseph Friedman - University of Texas at Dallas

From “MISSION: IMPOSSIBLE” to Mission Possible: Fully Flexible Intelligent Contact Lens for Image Classification with Analog-to-Information Processing..... 1371Qin Li{2}, Zheyu Liu{2}, Fei Qiao{2}, Xing Wu{1}, Chaolun Wang{1}, Qi Wei{2}, Huazhong Yang{2}
{1}East China Normal University, China; {2}Tsinghua University, China***FPGA-Based Neural Probe Positioning to Improve Spike Sorting with OSort Algorithm 1375***László Schaffer{3}, Zoltán Nagy{2}, Zoltán Kincses{3}, Richárd Fiáth{1}
{1}Hungarian Academy of Sciences, Hungary; {2}Pázmány Peter Catholic University, Hungary; {3}University of Szeged, Hungary***A Novel ISFET Sensor Architecture Using Through-Silicon Vias for DNA Sequencing 1379***Wei Xiao, Nicholas Miscoirides, Pantelis Georgiou
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Washington University in St. Louis, United States***A Modular Wireless Sensor Platform and its Applications 1387***Chun-Ming Huang, Yi-Jie Hsieh, Wei-Lin Lai, Yi-Jun Liu, Chun-Ying Juan, Ssu-Ying Chen, Chun-Yu Chen, Jin-Ju Chue, Chih-Chyau Yang, Chien-Ming Wu
National Applied Research Laboratories, Taiwan

Flexible-Hybrid & Printable Electronics Systems**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Grand Ballroom VIII**Chair(s):** Fayomi Christian - Université du Québec à Montréal; Gordon Roberts - McGill University

Printed Electronics: Effects of Bending and a Self-Compensation Means N/AJia Zhou, Tong Ge, Joseph Sylvester Chang
Nanyang Technological University, Singapore***Flexible Hydrogel Actuated Graphene-Cellulose Biosensor for Monitoring Ph 1392***George Knopf, Dogan Sinar
University of Western Ontario, Canada***Review: a Fully-Additive Printed Electronics Process with Very-Low Process Variations (Bent and Unbent Substrates) and PDK 1396***Tong Ge, Jia Zhou, Yang Kang, Joseph Sylvester Chang
Nanyang Technological University, Singapore***Powering Smart Wearable Systems with Flexible Solar Energy Harvesting..... 1400***Petar Jokic, Michele Magno
Eidgenössische Technische Hochschule Zürich, Switzerland***Towards a Smartphone-Aided Electronic ELISA for Real-Time Electrochemical Monitoring 1404***Nikolaos Pechlivanidis, Konstantinos Papadimitriou, Daniel Evans, Nikolaos Vasilakis, Themistoklis Prodromakis
University of Southampton, United Kingdom

CAS for Human Machine Interfaces / Brain Machine Interfaces**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Grand Ballroom IX**Chair(s):** Julius Georgiou - University of Cyprus; Pantelis Georgiou - Imperial College London***A High Temporal Resolution Multiscale Recording System for in Vivo Neural Studies* 1408**

Gian Nicola Angotzi{2}, Mario Malerba{2}, Alessandro Maccione{2}, Fabio Boi{2}, Marco Crepaldi{2}, Alberto Bonanno{1}, Luca Berdondini{2}

{1}Istituto Italiano di Tecnologia, Italy; {2}Istituto Italiano di Tecnologia, Italy

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

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Tufts University, United States

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

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

Michal Maslik{1}, Yan Liu{1}, Tor Sverre Lande{2}, Timothy Constandinou{1}

{1}Imperial College London, United Kingdom; {2}University of Oslo, Norway

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

Luis Eduardo Rueda Guerrero{2}, Marco Ballini{1}, Nick Van Helleputte{1}, Srinjoy Mitra{3}

{1}IMEC, Belgium; {2}Universidad Industrial de Santander, Colombia; {3}University of Glasgow, United Kingdom

Data Converters I**Time:** Tuesday, May 30 (11:00-12:30)**Room:** Grand Ballroom X**Chair(s):** Ioannis Syllaios - University of Texas at Dallas; George Yuan - Hong Kong University of Science and Technology***A Novel Wavelet-Based Analog-to-Digital Converter*..... 1428**

Isadora Freire Martins{2}, José Edil Guimarães de Medeiros{2}, José Alberto Alves de Andrade{1}, Sandro Augusto Pavlik Haddad{2}

{1}DFchip Ltd., Brazil; {2}Universidade de Brasília, Brazil

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

Praveen Kumar Venkatachala{1}, Ahmed Elshater{1}, Yang Xu{1}, Manar El-Chammas{2}, Un-Ku Moon{1}

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

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

Bayan Nasri, Sunit Sebastian, Kae-Dyi You, Ramkumar RanjithKumar, Davood Shahrjerdi

New York University, United States

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

Hamidreza Maghami{2}, Pedram Payandehnia{2}, Hossein Mirzaie{2}, Kartikeya Mayaram{2}, Ramin Zanbaghi{1}, Terri Fiez{3}

{1}Cirrus logic, United States; {2}Oregon State University, United States; {3}University of Colorado Boulder, United States

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

Cryptography & PUF Circuits

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

Room: Laurel AB

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

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

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

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Fatemeh Tehranipoor, Nima Karimian, Wei Yan, John Chandy
University of Connecticut, United States

A Technique to Transform 6T-SRAM Arrays Into Robust Analog PUF with Minimal Overhead 1460
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Columbia University, United States

Networks-on-Chip

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

Room: Laurel CD

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

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

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

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N Prasad, Rajit Karmakar, Santanu Chattopadhyay, Indrajit Chakrabarti
Indian Institute of Technology Kharagpur, India

Comprehensive Performance and Robustness Analysis of 2D Turn Models for Network-on-Chips 1476
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{1}Tallinn University of Technology, Estonia; {2}Tallinn University of Technology / Frankfurt University of Applied Sciences, Germany; {3}Technische Universität Darmstadt, Germany

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

TECHNICAL SESSIONS – TUESDAY, MAY 30TH

Multimedia Content Analysis & Retrieval

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

Room: Kent AB

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

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N/A

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

A New Algorithm for Accurate and Automatic Chessboard Corner Detection 1485

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

Better Deep Visual Attention with Reinforcement Learning in Action Recognition 1489

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

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

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

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

Video Interfaces & High Speed IO

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

Room: Essex AB

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

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

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

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

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

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

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

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

Fatemeh Akbar, Amir Mortazawi
University of Michigan, United States

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

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

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

Xuan Hu, Joseph Friedman

University of Texas at Dallas, United States

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

Todd Freeborn{1}, Ahmed Elwakil{2}

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

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

Francesco Chicco, Alessandro Pezzotta, Christian Enz

École Polytechnique Fédérale de Lausanne, Switzerland

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

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

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

{3}Instituto Tecnológico de Tijuana, Mexico

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

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

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

{2}Université Paris-Est - ESIEE, France

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

John Hu, Suming Lai

Maxim Integrated, United States

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

Yuya Nakagawa, Hirotaka Koizumi

Tokyo University of Science, Japan

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

Hao Luo, Lier Siek

Nanyang Technological University, Singapore

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

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Franco Maloberti{2}

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

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

Neural Arrays

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

Room: Grand Ballroom I

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

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

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

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

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

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

DSP for Biosignals

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

Room: Grand Ballroom II

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

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

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

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

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

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

RF Circuits II

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

Room: Grand Ballroom III

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

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

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

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

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

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

PUF Circuits & Hardware Trojans

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

Room: Grand Ballroom IV

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

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

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

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

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

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

Amplifiers & Analog Filtering

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

Room: Grand Ballroom VII

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

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

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

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

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

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

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

A Multi-Path Ring Amplifier with Dynamic Biasing 1621

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

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

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

Yang Xu, Praveen Kumar Venkatachala, Un-Ku Moon

Oregon State University, United States

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

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

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

Flexible Internet of Things: From Devices to Systems

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

Room: Grand Ballroom VIII

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

Printed Organic TFT Sensor Tags..... 1633

Tse Nga Ng

University of California, San Diego, United States

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

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

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

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

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

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

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

A Stimulation Platform for Optogenetic and Bionic Vision Restoration..... 1644

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

A Miniaturized Low Power Biomedical Sensor Node for Clinical Research and Long Term Monitoring of Cardiovascular Signals 1648

Jarno Tuominen, Eero Lehtonen, Mojtaba Jafari Tadi, Juho Koskinen, Mikko P nk    , Tero Koivisto
University of Turku, Finland

An Efficient Electronic Measurement Interface for Memristive Biosensors..... 1652

S bastien Naus{2}, Ioulia Tzouvadaki{1}, Pierre-Emmanuel Gaillardon{3}, Armando Biscontini{3}, Giovanni De Micheli{1}, Sandro Carrara{1}
{1} cole Polytechnique F d rale de Lausanne, Switzerland; {2}Universit  de Li ge, Belgium; {3}University of Utah, United States

Analyte Sampling in Paper Biosensors Powered by Graphite-Based Light Absorption 1656

Mingquan Yuan, Keng-Ku Liu, Srikanth Singamaneni, Shantanu Chakrabartty
Washington University in St. Louis, United States

An Implantable 128-Channel Wireless Neural-Sensing Microsystem Using TSV-Embedded Dissolvable  -Needle Array and Flexible Interposer..... 1660

Po-Tsang Huang{3}, Yu-Chieh Huang{3}, Shang-Lin Wu{3}, Yu-Chen Hu Hu{3}, Ming-Wei Lu{3}, Ting-Wei Sheng{3}, Fung-Kai Chang{3}, Chun-Pin Lin{4}, Nien-Shang Chang{2}, Hung-Lieh Chen{2}, Chi-Shi Chen{2}, Jeng-Ren Duann{1}, Tzai-Wen Chiu{3}, Wei Hwang{3}, Kua-Neng Chen{3}, Ching-Te Chuang{3}, Jin-Chern Chiou{2}
{1}China Medical University, Taiwan; {2}Nation Chip Implementation Center, Taiwan; {3}National Chiao Tung University, Taiwan; {4}National Chip Implementation Center, Taiwan

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

A 14-Bit 2.5 Gs/s Digital Pre-Distorted DAC in 65 nm CMOS with SFDR > 70 dB Up to 1.2 GHz 1664

Zhiheng Zuo, Qingjun Fan, Jinghong Chen
University of Houston, United States

A Digital Calibration Technique Canceling Non-Linear Switch and Package Impedance Effects of a 1.6 GS/s TX-DAC in 28 nm CMOS..... 1668

Hossein Ghafarian, Friedel Gerfers
Technische Universit t Berlin, Germany

A 13Bit 200MS/s Pipeline ADC with Current-Mode MDACs..... 1672

Carlos Briseno-Vidrios{1}, Dadian Zhou{2}, Suraj Prakash{2}, Qiyuan Liu{2}, Alexander Edward{2}, Jose Silva-Martinez{2}
{1}Silicon Labs, United States; {2}Texas A&M University, United States

The Analytic Expression of the Output Spectrum of    ADCs with Nonlinear Binary-Weighted DACs and Gaussian Input Signals 1676

Ghysl in Gagnon{1}, Fran ois Gagnon{1}, Gordon Roberts{2}
{1} cole de Technologie Sup rieure, Canada; {2}McGill University, Canada

Communication & Timing Circuits**Time:** Tuesday, May 30 (13:30-15:00)**Room:** Laurel AB**Chair(s):** Jin-Ku Kang - Inha University; Shoba Krishnan - Santa Clara University***A Low Latency and Area Efficient FFT Processor for Massive MIMO Systems*..... 1680**

Mojtaba Mahdavi, Ove Edfors, Viktor Öwall, Liang Liu

Lund University, Sweden

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

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Marco Crepaldi, Gian Nicola Angotzi, Antonio Maviglia, Luca Berdondini

Istituto Italiano di Tecnologia, Italy

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

Naveen Kadayinti, Amitalok Budkuley, Dinesh Sharma

Indian Institute of Technology Bombay, India

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

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Khoa Le{1}, Fakhreddine Ghaffari{1}, David Declercq{1}, Bane Vasic{2}

{1}École Nationale Supérieure de l'Électronique et de ses Applications, France; {2}University of Arizona, United States

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

Tomonori Tanaka{2}, Kosuke Furuichi{2}, Hiromu Uemura{2}, Ryosuke Noguchi{2}, Natsuyuki Koda{2}, Koki

Arauchi{2}, Daichi Omoto{2}, Hiromi Inaba{2}, Keiji Kishine{2}, Shinsuke Nakano{1}, Masafumi Nogawa{1},

Hideyuki Nosaka{1}

{1}NTT Communications Corporation, Japan; {2}University of Shiga Prefecture, Japan

Memory Circuits**Time:** Tuesday, May 30 (13:30-15:00)**Room:** Laurel CD**Chair(s):** Lan-Da Van - National Chiao Tung University; Yuan-Hao Huang - National Tsing Hua University***Area-Efficient STT/CMOS Non-Volatile Flip-Flop*..... 1700**

Jaeyoung Park

University of Texas at Austin, United States

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

Jiacong He, Joseph Callenes-Sloan

University of Texas at Dallas, United States

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

Masashi Tawada, Shinji Kimura, Masao Yanagisawa, Nozomu Togawa

Waseda University, Japan

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

Chao Qun Liu, Yue Zheng, Chip-Hong Chang

Nanyang Technological University, Singapore

TECHNICAL SESSIONS – TUESDAY, MAY 30TH

Video Coding & Multimedia System Architecture

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

Room: Kent AB

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

A Fast Intra Encoding Platform for AVS2..... N/A

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

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

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

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

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

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

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

Corner Proposals from HEVC Bitstreams 1729

Hyomin Choi, Ivan Bajić
Simon Fraser University, Canada

Applied Signal Processing & Deep Learning

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

Room: Essex AB

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

Fully-Parallel Area-Efficient Deep Neural Network Design Using Stochastic Computing N/A

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

Bringing Offline Mining to Online Learning System: Low-Cost and Efficient Self-Healing Synaptic Storage for Deep Learning N/A

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

Deep Texture Features for Robust Face Spoofing Detection N/A

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

Chattering Free Fixed-Time Convergent Sliding Mode Controller N/A

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

Accurate Spectral Testing with Non-Coherent Sampling for Multi Tone Applications N/A

Yuming Zhuang, Degang Chen
Iowa State University, United States

LIVE DEMONSTRATIONS – tuesday, may 30TH

Demonstration Session II**Time:** Tuesday, May 30 (13:30-16:30)**Room:** Harborside Ballroom**Chair(s):** Jennifer Blain Christen - Arizona State University; Shih-Chii Liu - Swiss Federal Institute of Technology in Zurich

O-1 - Live Demonstration: Automated Data Acquisition and Digital Curation Platform for Enhancing Research Precision, Productivity and Reproducibility..... 1738Yousef Gtat, Sina Parsnejad, Andrew J. Mason
Michigan State University, United States**O-2 - Live Demonstration: Unipolar Symmetrical Variable-Capacitance Generators for Energy Harvesting 1739**Antonio de Queiroz, Luiz de Oliveira Filho
Universidade Federal do Rio de Janeiro, Brazil**O-3 - Live Demonstration: a Wearable EIT System Using Active Electrodes for Monitoring Respiration 1740**Yu Wu{2}, Dai Jiang{2}, Andy Bardill{1}, Serena De Gelidi{1}, Richard Bayford{1}, Andreas Demosthenous{2}
{1}Middlesex University, United Kingdom; {2}University College London, United Kingdom**O-4 - Live Demo of a Vibration-Powered Bluetooth Sensor with Running PFC Power Conditioning..... 1741**Kang Zhao, Yuheng Zhao, Junrui Liang
ShanghaiTech University, China**O-5 - Live Demonstration: Depth from Focus on a Focal Plane Processor Using a Focus Tunable Liquid Lens..... 1742**Julien N.P. Martel{1}, Lorenz K. Müller{1}, Stephen J. Carey{2}, Jonathan Müller{1}, Yulia Sandamirskaya{1}, Piotr Dudek{2}
{1}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland; {2}University of Manchester, United Kingdom**O-6 - Live Demonstration: a Wirelessly Powered Highly Miniaturized Neural Stimulator 1743**Adam Khalifa{1}, Sherry Chiu{1}, Yasha Karimi{2}, Milutin Stanačević{2}, Ralph Etienne-Cummings{1}
{1}Johns Hopkins University, United States; {2}Stony Brook University, United States**O-7 - Live Demonstration: Behaving Cyborg Locusts for Standoff Chemical Sensing 1744**Darshit Mehta, Ege Altan, Rishabh Chandak, Baranidharan Raman, Shantanu Chakrabarty
Washington University in St. Louis, United States**O-8 - Live Demonstration: Prosthesis Grip Force Modulation Using Neuromorphic Tactile Sensing 1745**Luke Osborn{2}, Harrison Nguyen{2}, Rahul Kaliki{1}, Nitish Thakor{3}
{1}Infinite Biomedical Technologies, United States; {2}Johns Hopkins University, United States; {3}Johns Hopkins University / National University of Singapore, United States**O-9 - Live Demonstration - an Adaptable Prosthetic Socket: Regulating Independent Air Bladders Through Closed-Loop Control 1746**Daniel Candrea{1}, Avinash Sharma{3}, Luke Osborn{4}, Yikun Gu{2}, Nitish Thakor{5}
{1}Duke University, United States; {2}Harbin Institute of Technology, China; {3}Indian Institute of Technology Delhi, India; {4}Johns Hopkins University, United States; {5}Johns Hopkins University / National University of Singapore, United States**O-10 - Live Demonstration: Real-Time, Dynamic Visual Saliency Computation in a VR Environment Seeing Through the Eyes of a Mobile Robot 1747**

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

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

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

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

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

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

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

poster session – tuesday, may 30th

Integrated Biomedical Systems & BioMEMS

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

Room: Harborside Ballroom

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

***O-17 - An Adaptable Prosthetic Socket: Regulating Independent Air Bladders Through Closed-Loop Control* N/A**

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

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

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

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

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

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

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

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

Cheikh Latyr Fall{2}, Francis Quevillon{2}, Alexandre Campeau-Lecours{2}, Simon Latour{1}, Martine Blouin{1}, Clément Gosselin{2}, Benoit Gosselin{2}
{1}Kinova Robotics, Canada; {2}Université Laval, Canada

***O-22 - Dielectric Analysis of Changes in Electric Properties of Leukemic Cells Through Travelling and Negative Dielectrophoresis with 2-D Electrodes*..... 1774**

Sameh Sherif{1}, Yehya H. Ghallab{2}, Hamdy Abd El Hamid{2}, Yehea Ismail{2}
{1}American University in Cairo, Egypt; {2}American University in Cairo / Zewail City of Science and Technology, Egypt

***O-23 - Separation and Electrochemical Detection Platform for Portable Individual PM2.5 Monitoring* 1778**

Heyu Yin, Hao Wan, Andrew J. Mason
Michigan State University, United States

***O-24 - A 32-by-32 CMOS Microelectrode Array for Capacitive Biosensing and Impedance Spectroscopy* 1782**

Virgilio Valente, Andreas Demosthenous
University College London, United Kingdom

***O-25 - Characterization of a High Dynamic Range Lab-on-CMOS Capacitance Sensor Array*..... 1786**

Bathiya Senevirathna, Sheung Lu, Pamela Abshire
University of Maryland, College Park, United States

Other Areas in Analog & Mixed Signal Circuits & Systems**Time:** Tuesday, May 30 (15:00-16:30)**Room:** Harborside Ballroom**Chair(s):** Tong Ge - Nanyang Technological University; Igor Filanvosky - University of Alberta

***P-26 - A New 1.8V Pierce-Gate Crystal Oscillator Based on the Constant gm Cell in 28nm CMOS Technology for Automotive Radar Applications* 1790**

Giuseppe Macera, Patrick Crowley

Analog Devices Inc., Ireland

***P-27 - A Merged Window Comparator Based Relaxation Oscillator with Low Temperature Coefficient* 1794**

Lin Ma, Kuan Chuang Koay, Pak Kwong Chan

Nanyang Technological University, Singapore

***P-28 - Multi-Band Inductor-Less VCO for IoT Applications* 1798**

Fayrouz Haddad, Imen Ghorbel, Wenceslas Rahajandraibe

Universités de Toulon Laboratoire Matériaux et Microelectronique de Provence, France

***P-29 - A 0.13 μm CMOS Fully Integrated 0.1~12 GHz Frequency Synthesizer for Avionic SDR Applications* 1802**

Zakaria El Alaoui Ismaili{1}, Wessam Ajib{2}, François Gagnon{1}, Frédéric Nabki{1}

{1}École de Technologie Supérieure, Canada; {2}Université du Québec à Montréal, Canada

***P-30 - A Charge Limiting and Redistribution Method for Delay Line Locking in Multi-Output Clock Generation* 1806**

Yury Antonov, Kari Stadius, Jussi Ryyänen

Aalto University, Finland

***P-31 - A 7 μA 1.6ppm/°C Bandgap Design Realizable in CMOS Process* 1810**

Kin Keung Jeff Lau

Silicon Mitus Technology, United States

***P-32 - A PVT Resistant Coarse-Fine Time-to-Digital Converter* 1814**

Esrafil Jedari, Rashid Rashidzadeh, Mehrdad Saif

University of Windsor, Canada

***P-33 - A 0.6V 50-to-145MHz PVT Tolerant Digital PLL with DCO-Dedicated $\Delta\Sigma$ LDO and Temperature Compensation Circuits in 65nm CMOS* 1818**

Yudong Zhang{1}, Xiaofeng Liu{2}, Woogeun Rhee{2}, Hanjun Jiang{2}, Zhihua Wang{2}

{1}Columbia University, United States; {2}Tsinghua University, China

***P-34 - A Low-Power Temperature-Compensated CMOS Peaking Current Reference in Subthreshold Region* 1822**

Mohammad Sadegh Eslampanah{1}, Siavash Kananian{4}, Elaheh Zندهrouh{5}, Mohammad Sharifkhani{3},

Amir Masoud Sodagar{2}, Mahdi Shabany{3}

{1}Georgia Institute of Technology, United States; {2}Khajeh Nasir Toosi University of Technology, Iran; {3}Sharif University of Technology, Iran; {4}Stanford University, United States; {5}West Tehran Islamic Azad University, Iran

***P-35 - Analog Layout Density Uniformity Improvement Using Interconnect Widening and Dummy Fill Insertion* 1826**

Gholamreza Shomalnasab{1}, Lihong Zhang{2}

{1}Memorial University, Canada; {2}Memorial University of Newfoundland, Canada

***P-36 - A 5mW Batteryless Start-Up Boost Charger for Wireless Power Transfer* 1830**

Seok-Tae Koh{1}, Se-Un Shin{1}, Yu-Jin Yang{1}, Minseong Choi{1}, Seungchul Jung{2}, Gyu-Hyung Cho{1}

{1}Korea Advanced Institute of Science and Technology, Korea, South; {2}Samsung Electronics, Korea, South

- P-37 - Ultra Miniature Offset Cancelled Bandgap Reference with $\pm 0.534\%$ Inaccuracy from -10°C to 110°C 1834**
Natan Vinshtok-Melnik, Robert Giterman, Joseph Shor
Bar-Ilan University, Israel
- P-38 - Using Dynamic Dependence Analysis to Improve the Quality of High-Level Synthesis Designs 1838**
Rafael Garibotti, Brandon Reagen, Yakun Sophia Shao, Gu-Yeon Wei, David Brooks
Harvard University, United States
- P-39 - DPA-Resistant QDI Dual-Rail AES S-Box Based on Power-Balanced Weak-Conditioned Half-Buffer 1842**
James Lim, Weng-Geng Ho, Kwen-Siong Chong, Bah-Hwee Gwee
Nanyang Technological University, Singapore
- P-40 - A Voltage Reference Generator Targeted at Extracting the Silicon Bandgap VGO from VBE 1846**
Zhiqiang Liu, Degang Chen
Iowa State University, United States
- P-41 - A Calibration-Free Low-Power Supply-Pushing Reduction Circuit (SPRC) for LC VCOs 1850**
Muhammad Ahmed Swilam, Ahmed Naguib, Brian Dupaix, Waleed Khalil, Ayman Fayed
Ohio State University, United States
- P-42 - Deep Modeling: Circuit Characterization Using Theory Based Models in a Data Driven Framework 1854**
David Bolme{1}, Aravind Mikkilineni{1}, Derek Rose{1}, Srikanth Yoginath{1}, Mohsen Judy{2}, Jeremy Holleman{2}
{1}Oak Ridge National Laboratory, United States; {2}University of Tennessee, United States
- P-43 - A Size-Adaptive Time-Step Algorithm for Accurate Simulation of Aging in Analog ICs 1858**
Pablo Martín-Lloret{1}, Antonio Toro-Frías{1}, Javier Martín-Martínez{2}, Rafael Castro-Lopez{1}, Elisenda Roca{1},
Rosana Rodríguez Martínez{2}, Montserrat Nafria{2}, Francisco V. Fernandez{1}
{1}Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain; {2}Universitat Autònoma de
Barcelona, Spain
- P-44 - Timing Speculative SRAM 1862**
Elnaz Ebrahimi, Matthew Guthaus, Jose Renau
University of California, Santa Cruz, United States
- P-45 - Low Power Speech Detector on a FPAA 1866**
Sahil Shah, Jennifer Hasler
Georgia Institute of Technology, United States
- P-46 - Wafer-Level Adaptive Trim Seed Forecasting Based on E-Tests 1870**
Constantinos Xanthopoulos{2}, Ali Ahmadi{2}, Sirish Boddikurapati{1}, Amit Nahar{1}, Bob Orr{1}, Yiorgos
Makris{2}
{1}Texas Instruments Inc., United States; {2}University of Texas at Dallas, United States
- P-47 - CMOS Current-Mode PWL Implementation Using MAX and MIN Operators 1874**
Oscar Jair Cinco-Izquierdo{1}, María Teresa Sanz-Pascual{1}, Luis Hernández{1}, Carlos Arostóteles de la Cruz-
Blas{2}
{1}Instituto Nacional de Astrofísica, Óptica y Electrónica, Mexico; {2}Universidad Pública de Navarra, Spain

- P-48 - An Efficient and Fair Scheduling Policy for Multiprocessor Platforms 1878**
Theodoros Marinakis{2}, Alexandros-Herodotos Haritatos{1}, Konstantinos Nikas{1}, Georgios Goumas{1}, Iraklis Anagnostopoulos{2}
{1}National Technical University Of Athens, Greece; {2}Southern Illinois University Carbondale, United States
- P-49 - Design Methodology for Area and Energy Efficient OxRAM-Based Non-Volatile Flip-Flop 1882**
Mahesh Nataraj{4}, Alexandre Levisse{2}, Bastien Giraud{2}, Jean-Philippe Noel{2}, Pascal Meinerzhagen{3}, Jean-Michel Portal{1}, Pierre-Emmanuel Gaillardon{4}
{1}Aix-Marseille Universite, France; {2}Commissariat à l'Energie Atomique et aux Energies Alternatives, France; {3}Intel Research Labs, United States; {4}University of Utah, United States
- P-50 - An Analog Phase Prediction Based Fractional-N PLL 1886**
Aaron Bluestone, Ryan Kaveh, Luke Theogarajan
University of California, Santa Barbara, United States

DSP : Algorithms and Implementations**Time:** Tuesday, May 30 (15:00-16:30)**Room:** Harborside Ballroom**Chair(s):** Arjuna Madanayake - University of Akron; Mohsin Jamali - University of Toledo

- Q-51 - Pipeline Tracking and Event Classification for an Automatic Inspection Vision System 1890**
Felipe Petraglia, Roberto Campos, José Gabriel Gomes, Mariane Petraglia
Universidade Federal do Rio de Janeiro, Brazil
- Q-52 - Fast Human-Animal Detection from Highly Cluttered Camera-Trap Images Using Joint Background Modeling and Deep Learning Classification 1894**
Hayder Yousif{2}, Jianhe Yuan{2}, Roland Kays{1}, Zhihai He{2}
{1}North Carolina State University, United States; {2}University of Missouri, United States
- Q-53 - Face Hallucination Using Deep Collaborative Representation for Local and Non-Local Patches 1898**
Tao Lu{2}, Lanlan Pan{2}, Hao Wang{2}, Yanduo Zhang{2}, Bo Wang{1}, Zixiang Xiong{1}
{1}Texas A&M University, United States; {2}Wuhan Institute of Technology, China
- Q-54 - A 0.53mW Ultra-Low-Power 3D Face Frontalization Processor for Face Recognition with Human-Level Accuracy in Wearable Devices 1902**
Sanghoon Kang, Jinmook Lee, Kyeongryeol Bong, Changhyeon Kim, Hoi-Jun Yoo
Korea Advanced Institute of Science and Technology, Korea, South
- Q-55 - Single Image Super-Resolution Using Hybrid Patch Search and Local Self-Similarity 1906**
Shen-Li Lo, Ching-Te Chiu
National Tsing Hua University, Taiwan
- Q-56 - Design of Composite Filters with Equiripple Passbands and Least-Squares Stopbands 1910**
Wu-Sheng Lu{2}, Takao Hinamoto{1}
{1}Hiroshima University, Japan; {2}University of Victoria, Canada
- Q-57 - An Indirect Approach to Synthesis of Noise Shaping IIR Filters in $\Delta\Sigma$ Modulators 1914**
Muhammad Rizwan Tariq, Shuichi Ohno
Hiroshima University, Japan
- Q-58 - Speech Recognition Using TVLPC Based MFCC for Similar Pronunciation Phrases N/A**
George Mufungulwa{1}, Alia Asheralieva{1}, Hiroshi Tsutsui{1}, Shini-Ichi Abe{2}, Yoshikazu Miyanaga{1}
{1}Hokkaido University, Japan; {2}Vehicle Information and Communication System Center, Japan
- Q-59 - sWMF: Separable Weighted Median Filter for Efficient Large-Disparity Stereo Matching 1922**
Shiqiang Chen, Xuchong Zhang, Hongbin Sun, Nanning Zheng
Xi'an Jiaotong University, China

- Q-60 - Joint-Domain Unsupervised Stylization for Portraits** 1926
Saboya Yang, Jiaying Liu, Shuai Yang, Wenhan Yang, Zongming Guo
Peking University, China
- Q-61 - Census Transform-Based Static Caption Detection for Frame Rate Up-Conversion** 1930
Gyujin Bae{1}, Young Hwan Kim{1}, Suk-Ju Kang{2}
{1}Pohang University of Science and Technology, Korea, South; {2}Sogang University, Korea, South
- Q-62 - Variable Pixel G-Neighbor Filters**..... 1934
Yerbol Akhmetov{2}, Joshin John Mathew{1}, Alex James{2}
{1}ARS Traffic & Transport Technology, India; {2}Nazarbayev University, Russia
- Q-63 - FPGA Acceleration of Hyperspectral Image Processing for High-Speed Detection Applications** 1938
Simon Vellas, George Lentaris, Konstantinos Maragos, Dimitrios Soudris, Zacharias Kandylakis, Konstantinos Karantzalos
National Technical University of Athens, Greece
- Q-64 - Throughput Evaluation of DSP Applications Based on Hierarchical Dataflow Model** 1942
Hamza Deroui{1}, Karol Desnos{1}, Jean-François Nezan{1}, Alix Munier-Kordon{2}
{1}Institut National des Sciences Appliquées de Rennes, France; {2}Laboratoire d'informatique de Paris 6 / Université Pierre et Marie Curie / Sorbonne Universités, France
- Q-65 - Robust Speaker Verification with a Two Classifier Format and Feature Enhancement** 1946
Joshua Edwards, Ravi Ramachandran, Umashanger Thayasivam
Rowan University, United States
- Q-66 - Sparse FIR Filter Design via Partial L1 Optimization**..... 1950
Li Zheng{1}, Aimin Jiang{1}, Hon Keung Kwan{2}
{1}Hohai University, China; {2}University of Windsor, Canada
- Q-67 - A QCQP Design Method of the Symmetric Pulse-Shaping Filters Against Receiver Timing Jitter** 1954
Chia-Yu Yao, Shui-Chin Wang
National Taiwan University of Science and Technology, Taiwan
- Q-68 - Least-Squares Estimation of the Common Acoustical Poles in Room Acoustics and Head Related Transfer Functions** 1958
Sahar Hashemgeloogerd, Mark Bocko
University of Rochester, United States
- Q-69 - Efficient Implementation of Modular Multiplication by Constants Applied to RNS Reverse Converters** 1962
Roberto de Matos{1}, Rogerio Paludo{3}, Nikolay Chervyakov{2}, Pavel Lyakhov{2}, Hector Pettenghi{3}
{1}Instituto Federal de Santa Catarina, Brazil; {2}North Caucasus Federal University, Russia; {3}Universidade Federal de Santa Catarina, Brazil
- Q-70 - A New Electric Encoder Position Estimator Based on the Chinese Remainder Theorem for the CMG Performance Improvements** 1966
Gian Carlo Cardarilli{2}, Luca Di Nunzio{2}, Rocco Fazzolari{2}, Luca Gerardi{2}, Marco Re{2}, Giovanni Campolo{1}, Domenico Cascone{1}
{1}Thales Alenia Space, Italy; {2}Università degli Studi di Roma Tor Vergata, Italy

Nanoelectronics & Memristor Technology**Time:** Tuesday, May 30 (15:00-16:30)**Room:** Harborside Ballroom**Chair(s):** Danella Zhao - University of Louisiana at Lafayette; Hao Jiang - San Francisco State University

R-71 - Exploring Logic Architectures Suitable for TFETs Devices 1970

Juan Núñez, María J. Avedillo

Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain

R-72 - A High Performance Full Adder Based on Ballistic Deflection Transistor Technology..... 1974

Poorna Marthi{2}, Nazir Hossain{2}, Huan Wang{2}, Jean-Francois Millithaler{2}, Martin Margala{2}, Ignacio Iñiguez-de-la-Torre{1}, Javier Mateos{1}, Tomas González{1}

{1}Universidad de Salamanca, Spain; {2}University of Massachusetts Lowell, United States

R-73 - A Compliance Current Circuit with Nanosecond Response Time for ReRAM Characterization.... 1978

Qingjiang Li, Jinling Xing, Zhaolin Sun, Fei Jing, Hui Xu

National University of Defense Technology, China

R-74 - Transient Response Enhancement of RF MEMS Tuners Using Digital Signal Processing N/A

Mohammad Abu Khater, Mahmoud Abdelfattah, Yu-Chiao Wu, Wesley Allen, Dimitrios Peroulis

Purdue University, United States

R-75 - A Unified Analytical Reliability Model of NBTI and HCD for Undoped Double Gate PMOS..... N/A

Omnia Samy{1}, Hamdy Abd El Hamid{2}, Yehea Ismail{2}, Abd El Halim Zekry{3}

{1}Ain Shams University, Egypt; {2}American University in Cairo / Zewail City of Science and Technology, Egypt;

{3}Arizona State University, Egypt

R-76 - Adapting Large-Area Flexible Hybrid TFT/CMOS Electronics and Display Technology to Create an Optical Sensor Array Architecture N/A

Joseph Smith, Edward Bawolek, Jovan Trujillo, Gregory Raupp, David Allee, Jennifer Blain Christen

Arizona State University, United States

R-77 - Size-Dependent Switching Coherence of Elliptical Single-Domain Magnetostrictive Nanomagnets in Straintronic Circuit N/A

Huanqing Cui, Li Cai, Li Xu, Sen Wang, Xiaokuo Yang, Chaowen Feng

Air Force Engineering University, China

R-78 - Process Variation Immune and Energy Aware Sense Amplifiers for Resistive Non-Volatile Memories N/A

Soheil Salehi, Ronald F. DeMara

University of Central Florida, United States

R-79 - A TiO₂ ReRAM Parameter Extraction Method N/A

Ioannis Messaris{1}, Spyridon Nikolaidis{1}, Alexantrou Serb{2}, Spyros Stathopoulos{2}, Isha Gupta{2}, Ali Khat{2}, Themistoklis Prodromakis{2}

{1}Aristotle University of Thessaloniki, Greece; {2}University of Southampton, United Kingdom

R-80 - A Practical Hafnium-Oxide Memristor Model Suitable for Circuit Design and Simulation 2006

Sherif Amer{2}, Sagarvarma Sayyaparaju{2}, Garrett S. Rose{2}, Karsten Beckmann{1}, Nathaniel C. Cady{1}

{1}State University of New York Polytechnic Institute, United States; {2}University of Tennessee, United States

R-81 - Novel Hafnium Oxide Memristor Device: Switching Behaviour and Size Effect..... 2010

Heba Abunahla, Baker Mohammad, Maguy Abi Jaoude, Mahmoud Al-Qutayri

Khalifa University, U.A.E.

R-82 - Design and Optimization of a Strong PUF Exploiting Sneak Paths in Resistive Cross-Point Array 2014

Rui Liu, Pai-Yu Chen, Shimeng Yu

Arizona State University, United States

- R-83 - A Pulse-Based Memristor Programming Circuit** 2018
Olufemi Akindele Olumodeji, Massimo Gottardi
Fondazione Bruno Kessler, Italy
- R-84 - Test Point Insertion for RSFQ Circuits** 2022
Gleb Krylov, Eby G. Friedman
University of Rochester, United States
- R-85 - A Memristor Based Image Sensor Exploiting Compressive Measurement for Low-Power Video Streaming** 2026
Fengyu Qian, Yanping Gong, Lei Wang
University of Connecticut, United States
- R-86 - A Placement Management Circuit for Efficient Realtime Hardware Reuse on FPGAs Targeting Reliable Autonomous Systems** 2030
Godwin Enemali, Adewale Adetomi, Tughrul Arslan
University of Edinburgh, United Kingdom

Spiking and Learning Systems**Time:** Tuesday, May 30 (15:00-16:30)**Room:** Harborside Ballroom**Chair(s):** Ricardo Carmona Galán - Instituto of Microelectrónica of Sevilla; Shoushun Chen - Nanyang Technological University

- S-87 - PredictiveNet: an Energy-Efficient Convolutional Neural Network via Zero Prediction** 2034
Yingyan Lin, Charbel Sakr, Yongjune Kim, Naresh Shanbhag
University of Illinois at Urbana-Champaign, United States
- S-88 - A Real-Time 17-Scale Object Detection Accelerator with Adaptive 2000-Stage Classification in 65nm CMOS** 2038
Minkyu Kim{1}, Abinash Mohanty{1}, Deepak Kadedtotad{1}, Naveen Suda{2}, Luning Wei{3}, Pooja Saseendran{1}, Xiaofei He{3}, Yu Cao{1}, Jae-Sun Seo{1}
{1}Arizona State University, United States; {2}ARM, Inc., United States; {3}Zhejiang University, China
- S-89 - Comparison of Three FPGA Architectures for Embedded Multidimensional Categorization Through Kohonen's Self-Organizing Maps** 2042
Miguel Sousa, Emilio Del-Moral-Hernandez
Universidade de São Paulo, Brazil
- S-90 - Energy-Efficient Scheduling Method with Cross-Loop Model for Resource-Limited CNN Accelerator Designs** 2046
Kaiyi Yang, Shihao Wang, Jianbin Zhou, Takeshi Yoshimura
Waseda University, Japan; Waseda University, Japan
- S-91 - Robust Reconstruction of Network Topology via Huber Algorithm** N/A
Juan Liu{1}, Jinhu Lü{1}, Maciej J. Ogorzalek{2}, Kexin Liu{3}
{1}Academy of Mathematics and Systems Science, Chinese Academy of Sciences, China; {2}Jagiellonian University, Poland; {3}Peking University, China
- S-92 - Multiplexing AER Asynchronous Channels Over LVDS Links with Flow-Control and Clock-Correction for Scalable Neuromorphic Systems** 2054
Amirreza Yousefzadeh{2}, Miroslav Jabłoński{1}, Taras Iakymchuk{4}, Alejandro Linares-Barranco{3}, Alfredo Rosado{4}, Luis Plana{5}, Teresa Serrano-Gotarredona{2}, Steve Furber{5}, Bernabe Linares-Barranco{2}
{1}AGH University of Science and Technology, Poland; {2}Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain; {3}Universidad de Sevilla, Spain; {4}Universitat de València, Spain; {5}University of Manchester, United Kingdom

- S-93 - Online Multiclass Passive-Aggressive Learning on a Fixed Budget..... 2058**
Chung-Hao Wu, Wei-Chen Hsi, Henry Horng-Shing Lu, Hsueh-Ming Hang
National Chiao Tung University, Taiwan
- S-94 - Compact Digital-Controlled Neuromorphic Circuit with Low Power Consumption..... 2062**
Jin Zhang, Yuan Wang, Xing Zhang, Ru Huang
Peking University, China
- S-95 - Neural Network Based ECG Anomaly Detection on FPGA and Trade-Off Analysis 2066**
Matthias Wess, Sai Dinakarrao, Axel Jantsch
Technische Universität Wien, Austria
- S-96 - A Switched-Capacitor Dendritic Arbor for Low-Power Neuromorphic Applications..... 2070**
Pezhman Mamdough, Alice Parker
University of Southern California, United States
- S-97 - Taking Advantage of Correlation in Stochastic Computing..... 2074**
Rahul Kumar Budhwani{1}, Rengarajan Ragavan{2}, Olivier Sentieys{1}
{1}IRISA/ INRIA, University of Rennes, France; {2}University of Rennes, France
- S-98 - Towards Bioinspired Close-Loop Local Motor Control: a Simulated Approach Supporting Neuromorphic Implementations..... 2078**
Fernando Pérez-Peña{1}, Juan Antonio Leñero-Bardallo{1}, Alejandro Linares-Barranco{2}, Elisabetta Chicca{3}
{1}Universidad de Cádiz, Spain; {2}Universidad de Sevilla, Spain; {3}Universität Bielefeld, Germany
- S-99 - Snowflake: an Efficient Hardware Accelerator for Convolutional Neural Networks..... 2082**
Vinayak Gokhale, Aliasger Zaidy, Andre Chang, Eugenio Culurciello
Purdue University, United States
- S-100 - Extending the Neural Engineering Framework for Nonideal Silicon Synapses..... 2086**
Aaron Voelker{2}, Ben Benjamin{1}, Terrence Stewart{2}, Kwabena Boahen{1}, Chris Eliasmith{2}
{1}Stanford University, United States; {2}University of Waterloo, Canada

Signal Processing for Interaction & Augmented Reality**Time:** Tuesday, May 30 (15:00-16:30)**Room:** Harborside Ballroom**Chair(s):** Susanto Rahardja - Northwestern Polytechnical University; Zicheng Liu - Microsoft Research

- T-101 - D-PET: A Direct 6 DoF Pose Estimation and Tracking System on Graphics Processing Units 2090**
Hung-Yu Tseng, Po-Chen Wu, Yu-Sheng Lin, Shao-Yi Chien
National Taiwan University, Taiwan
- T-102 - An Efficient DFT-Based Algorithm for the Charger Noise Problem in Capacitive Touch Applications 2094**
Shih-Lun Huang, Sheng-Yi Hung, Chung-Ping Chen
National Taiwan University, Taiwan
- T-103 - Reflection Removal Based on Single Light Field Capture..... 2098**
Yun Ni, Jie Chen, Lap-Pui Chau
Nanyang Technological University, Singapore
- T-104 - Bare-Finger Projector-Camera-Touchpad (PCT) HCI System Using Color Structured Light..... 2102**
Sen Li, Xiang Xie, Guolin Li, Zhihua Wang
Tsinghua University, China

T-105 - Real-Time Streaming Challenges in Internet of Video Things (IoVT) 2106
Ahmed Sammoud{2}, Ashok Kumar{2}, Magdy Bayoumi{2}, Tarek Elarabi{1}
{1}Penn State Behrend, United States; {2}University of Louisiana at Lafayette, United States

Digital Integrated Circuits and Systems

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

Room: Harborside Ballroom

Chair(s): Saeid Nooshabadi - Michigan Technological University

U-106 - Hardware Accelerators for Recurrent Neural Networks on FPGA..... 2110
Andre Xian Ming Chang, Eugenio Culurciello
Purdue University, United States

U-107 - Residual Sampling Clocking Offset Estimation and Compensation for FBMC-OQAM Baseband Receiver in the 60 GHz Band 2114
Chun-Yi Liu{2}, Yu-Cheng Yao{3}, Meng-Siou Sie{1}, Edmund Wen Jen Leong{1}, Henry Lopez{2}, Chih-Wei Jen{2}, Shyh-Jye Jou{2}
{1}MediaTek, Taiwan; {2}National Chiao Tung University, Taiwan; {3}Realtek Semiconductor Corp., Taiwan

U-108 - Scalable Memory-Less Architecture for String Matching with FPGAs 2118
Ideh Sarbishei{1}, Shervin Vakili{2}, J.M. Pierre Langlois{2}, Yvon Savaria{2}
{1}École Polytechnique de Montréal, Canada; {2}Polytechnique Montréal, Canada

U-109 - Design of Majority Logic Based Approximate Arithmetic Circuits..... 2122
Carson Labrado{2}, Himanshu Thapliyal{2}, Fabrizio Lombardi{1}
{1}Northeastern University, United States; {2}University of Kentucky, United States

U-110 - Noise Voltage Analysis of Spiral Inductor for on-Chip Buck Converter Design..... 2126
Emeshaw Ashenafi, Masud Chowdhury
University of Missouri–Kansas City, United States

U-111 - A New Digital True Random Number Generator Based on Delay Chain Feedback Loop 2130
Xufan Wu, Shuguo Li
Tsinghua University, China

U-112 - A Digital Clock-Less Pulse Stretcher with Application in Deep Sub-Nanosecond Pulse Detection 2134
Zhiqiang Liu{1}, Nanqi Liu{1}, Shravan Chaganti{1}, Degang Chen{1}, Amitava Majumdar{2}
{1}Iowa State University, United States; {2}Xilinx Inc., United States

U-113 - A New Watermarking Scheme on Scan Chain Ordering for Hard IP Protection 2138
Xiaonan Huang{1}, Aijiao Cui{1}, Chip-Hong Chang{2}
{1}Harbin Institute of Technology, China; {2}Nanyang Technological University, Singapore

U-114 - A 450kHz PVT-Resilient All-Digital BPSK Demodulator for Energy Harvesting Sensor Nodes 2142
Adelson Chua, Louis Alarcon
University of the Philippines - Diliman, Philippines

U-115 - Single Supply CMOS Up Level Shifter for Dual Voltage System 2146
Jose Carlos García{2}, Juan Montiel-Nelson{2}, Saeid Nooshabadi{1}
{1}Michigan Technological University, United States; {2}Universidad de Las Palmas de Gran Canaria, Spain

U-116 - Nodal Thermal Analysis for Multi-VT SOFET Based Subthreshold Circuits 2150
Emeshaw Ashenafi, Azzedin Es-Sakhi, Masud Chowdhury
University of Missouri–Kansas City, United States

- U-117 - Trojan-Feature Extraction at Gate-Level Netlists and its Application to Hardware-Trojan Detection Using Random Forest Classifier** 2154
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Waseda University, Japan
- U-118 - Non-Blocking BIST for Continuous Reliability Monitoring of Networks-on-Chip** 2158
Junshi Wang{3}, Letian Huang{3}, Masoumeh Ebrahimi{1}, Qiang Li{3}, Guangjun Li{3}, Axel Jantsch{2}
{1}KTH Royal Institute of Technology / University of Turku, Finland; {2}Technische Universität Wien, Austria;
{3}University of Electronic Science and Technology of China, China
- U-119 - Combined Packet and TDM Circuit Switching NoCs with Novel Connection Configuration Mechanism**..... 2162
Yong Chen, Emil Matus, Gerhard Fettweis
Technische Universität Dresden, Germany
- U-120 - A Cost-Efficient Delay-Fault Monitor** 2166
Gaole Sai, Basel Halak, Mark Zwolinski
University of Southampton, United Kingdom
- U-121 - Level Shifter Design for Voltage Stacking** 2170
Elnaz Ebrahimi, Rafael Possignolo, Jose Renau
University of California, Santa Cruz, United States
- U-122 - 130nm Low Power Asynchronous AES Core** 2174
Nada El-Meligy{3}, Moustafa Amin{3}, Eslam Yahya{2}, Yehea Ismail{1}
{1}American University in Cairo / Zewail City of Science and Technology, Egypt; {2}American University in Cairo / Zewail City of Science and Technology / Banha University, Egypt; {3}Banha University, Egypt
- U-123 - A Low-Cost Masquerade and Replay Attack Detection Method for CAN in Automobiles** 2178
Mohammad Raashid Ansari, Tom Miller, Chenghua She, Qiaoyan Yu
University of New Hampshire, United States

Communications Security**Time:** Tuesday, May 30 (15:00-16:30)**Room:** Harborside Ballroom**Chair(s):** Weiqiang Liu - Nanjing University of Aeronautics and Astronautics; Maire O'Neill - Queens University

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- V-124 - Interpolation Based Wideband Beamforming Architecture**..... 2182
Bindi Wang, Hao Gao, Marion Matters-Kammerer, Peter Baltus
Eindhoven University of Technology, Netherlands
- V-125 - Concatenated LDPC-Polar Codes Decoding Through Belief Propagation** 2186
Syed Mohsin Abbas, Youzhe Fan, Ji Chen, Chi-Ying Tsui
Hong Kong University of Science and Technology, Hong Kong
- V-126 - Rate-Compatible and High-Throughput Architecture Designs for Encoding LDPC Codes**..... 2190
Nishil Talati{1}, Zhiying Wang{2}, Shahar Kvatinsky{1}
{1}Technion – Israel Institute of Technology, Israel; {2}University of California, Irvine, United States
- V-127 - A Low-Complexity Fully Scalable Interleaver/Address Generator Based on a Novel Property of QPP Interleavers** 2194
Arash Ardakani, Mahdi Shabany
Sharif University of Technology, Iran
- V-128 - FPGA-Based Strong PUF with Increased Uniqueness and Entropy Properties** 2198
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Queen's University Belfast, United Kingdom

- V-129 - Optimization of the PLL Based TRNG Design Using the Genetic Algorithm..... 2202**
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University of Lyon, Jean Monnet University Saint-Etienne, France
- V-130 - Low-Latency Hardware Architecture for Cipher-Based Message Authentication Code 2206**
Imed Ben Dhaou{2}, Tuan Nguyen Gia{3}, Pasi Liljeberg{3}, Hannu Tenhunen{1}
{1}KTH Royal Institute of Technology, Sweden; {2}Qassim University, Saudi Arabia; {3}University of Turku, Finland
- V-131 - A Delay-Efficient Ring-LWE Cryptography Architecture for Biometric Security 2210**
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Inha University, Korea, South
- V-132 - Secure Dynamic Authentication of Passive Assets and Passive IoTs Using Self-Powered Timers 2214**
Liang Zhou, Shantanu Chakrabarty
Washington University in St. Louis, United States
- V-133 - A Reliable True Random Number Generator Based on Novel Chaotic Ring Oscillator 2218**
Yunfan Yang, Song Jia, Yuan Wang, Shaonan Zhang, Chao Liu
Peking University, China
- V-134 - An Energy-Based Attack Flow for Temporal Misalignment Countermeasures on Cryptosystems 2222**
Rodrigo Lellis{2}, Rafael Soares{2}, Adão Souza Jr.{1}
{1}Instituto Federal Sul-Rio-Grandense, Brazil; {2}Universidade Federal de Pelotas, Brazil
- V-135 - Highly Secured State-Shift Local Clock Circuit to Countermeasure Against Side Channel Attack 2226**
Ali Akbar Pammu, Kwen-Siong Chong, Bah-Hwee Gwee
Nanyang Technological University, Singapore

Power Transfer & Charging Circuits**Time:** Tuesday, May 30 (15:00-16:30)**Room:** Harborside Ballroom**Chair(s):** Hiroo Sekiya - Chiba University; Junrui Liang – Shanghai Tech University

- W-136 - A Delay Time Controlled Active Rectifier with 95.3% Peak Efficiency for Wireless Power Transmission Systems..... 2230**
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Xi'an Jiaotong University, China
- W-137 - Analysis and Implementation of Wireless Power Transfer System with Phase and Supply Modulation Control 2234**
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National Taiwan University, Taiwan
- W-138 - A 13.56 MHz One-Stage High-Efficiency 0X/1X R³ Rectifier for Implantable Medical Devices 2238**
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- W-139 - Adaptive 6.78-MHz ISM Band Wireless Charging for Small Form Factor Receivers 2242**
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Özyeğin University, Turkey
- W-140 - A Primary-Side Output Current Estimator with Process Compensator for Flyback LED Drivers 2246**
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- W-141 - High-Speed Driver for SiC MOSFET Based on Class-E Inverter..... 2250***
Yuchong Sun{2}, Ryoko Sugano{2}, Xiuqin Wei{1}, Takashi Hikiyara{3}, Hiroo Sekiya{2}
{1}Chiba Institute of Technology, Japan; {2}Chiba University, Japan; {3}Kyoto University, Japan
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Time: Tuesday, May 30 (16:30-17:30)

Room: Grand Ballroom V-VI

Chair(s): Pamela Abshire - University of Maryland

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Sanjit K. Mitra

University of California, Santa Barbara, United States

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Ibrahim Hajj

University of Illinois at Urbana-Champaign, United States

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Fudan University, China

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Hong Kong Polytechnic University, Hong Kong

***Modeling of Cascading Failures in Cyber-Coupled Power Systems* 2283**

Dong Liu, Xi Zhang, Choujun Zhan, Chi Kong Tse
Hong Kong Polytechnic University, Hong Kong

***Optimal Resource Allocation with Node and Link Capacity Constraints in Complex Networks* 2287**

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{1}Hong Kong Polytechnic University, Hong Kong; {2}Zhejiang University, China

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Istanbul Technical University, Turkey

Circuits & Systems for Energy Harvesting

Time: Wednesday, May 31 (8:00-9:30)

Room: Dover BC

Chair(s): Dong He - Virginia Polytechnic Institute and State University; Philip X.-L. Feng - Case Western Reserve University

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Julien Stamatakis
Senseware, United States

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Georgia Institute of Technology, United States

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{1}FSP-Powerland Technology Inc., China; {2}Virginia Polytechnic Institute and State University, United States

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{1}Case Western Reserve University, United States; {2}Xi'an Jiaotong University, China

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 {1}National Chiao Tung University, Taiwan; {2}Realtek Semiconductor Corp., Taiwan

Neuromorphic Vision

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom I

Chair(s): Fathi Salem - Michigan Statue University; Alejandro Linares-Barranco - Universidad de Sevilla

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Twenty Billion Neurons GmbH, Germany

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 {1}Huaqiao University, China; {2}TCL Research America, United States; {3}University of Missouri, United States

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 {1}Johns Hopkins University, United States; {2}Massachusetts Institute of Technology, United States

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 {1}Consejo Superior de Investigaciones Científicas / Universidad de Sevilla, Spain; {2}Massachusetts Institute of Technology, France

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Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom II

Chair(s): Mrityunjoy Chakraborty - Indian Institute of Technology Kharagpur; Wei Xing Zheng - Western Sydney University

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{1}Chubu University, Japan; {2}National Institute of Technology, Mastue College, Japan; {3}National Institute of Technology, Niihama College, Japan; {4}Tampere University of Technology, Finland; {5}Tottori University, Japan

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University of Windsor, Canada

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Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom VII

Chair(s): Andreas Andreou - Johns Hopkins University; Amine Bermak - Hamad Bin Khalifa University

In-Vivo Validation of Fully Implantable Multi-Panel Devices for Remote Monitoring of Metabolism

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{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Università della Svizzera italiana / Institute for Research in Biomedicine, Switzerland

High-Precision, Mixed-Signal Mismatch Measurement of Metal-Oxide-Metal Capacitors N/A

Danilo Bustamante{1}, Eric Swindlehurst{2}, Shih-Hua Wood Chiang{1}, Devon Janke{1}
{1}Brigham Young University, United States; {2}Georgia Institute of Technology, United States

CMOS Amperometric ADC with High Sensitivity, Dynamic Range and Power Efficiency for Air Quality Monitoring..... N/A

Haitao Li{1}, Sam Boiling{2}, Andrew J. Mason{2}
{1}Maxim Integrated Products Inc., United States; {2}Michigan State University, United States

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Hang Yu{1}, Menghan Guo{1}, Shoushun Chen{1}, Wei Tang{2}
{1}Nanyang Technological University, Singapore; {2}New Mexico State University, United States

A PFM Based Digital Pixel with Off-Pixel Residue Measurement for Small Pitch FPAs N/A

Shahbaz Abbasi, Arman Galioglu, Atia Shafique, Omer Ceylan, Melik Yazici, Yasar Gurbuz
Sabanci University, Turkey

Signal Integrity & Energy Efficiency

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom VIII

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Shanghai Jiao Tong University, China

Design of Clock Generation Circuitry for High-Speed Subranging Time-Interleaved ADCs 2408
Seyed Alireza Zahrai{2}, Nicolas Le Dortz{1}, Marvin Onabajo{2}
{1}Analog Devices Inc., United States; {2}Northeastern University, United States

Wearable Sensors, Circuits & Systems

Time: Wednesday, May 31 (8:00-9:30)

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Chair(s): Wouter Serdijn - Delft University of Technology; Zhihua Wang - Tsinghua University

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University of Turku, Finland

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{1}Analog Devices Inc., United States; {2}University of Massachusetts Medical School, United States; {3}Worcester Polytechnic Institute, United States

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Amirhossein Shahshahani{1}, Davood Raeisi Nafchi{2}, Zeljko Zilic{1}
{1}McGill University, Canada; {2}Tehran University, Iran

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Texas A&M University, United States

Filter Design

Time: Wednesday, May 31 (8:00-9:30)

Room: Grand Ballroom X

Chair(s): Igor Filanovsky - University of Alberta; Nuno Paulino - UNINOVA

Property of Rational Functions Related to Band-Pass Transformation with Application to Symmetric Filters Design N/A
Igor Filanovsky
University of Alberta, Canada

Analysis of Second-Order Intermodulation in Miller Bandpass Filters N/A
Joung Won Park{1}, Behzad Razavi{2}
{1}Qualcomm Technologies, Inc., United States; {2}University of California, Los Angeles, United States

A New 2nd-Order Allpass Filter in 130nm CMOS N/A
Brent Maundy{2}, Peyman Ahmadi{2}, Ahmed Elwakil{3}, Leonid Belostotski{2}, Arjuna Madanayake{1}
{1}University of Akron, United States; {2}University of Calgary, Canada; {3}University of Sharjah, U.A.E.

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Hugo Serra, João Pedro Oliveira, Nuno Paulino
Universidade Nova de Lisboa / CTS-UNINOVA, Portugal

Error Correcting Codes**Time:** Wednesday, May 31 (8:00-9:30)**Room:** Laurel AB**Chair(s):** Zhiyuan Yan - Lehigh University; Xinmiao Zhang - Case Western University

***A Fast Polar Code List Decoder Architecture Based on Sphere Decoding*..... N/A**

Seyyed Ali Hashemi, Carlo Condo, Warren Gross

McGill University, Canada

***Efficient Metric Sorting Schemes for Successive Cancellation List Decoding of Polar Codes* 2440**

Haochuan Song{2}, Shunqing Zhang{1}, Xiaohu You{2}, Chuan Zhang{2}

{1}Intel Corporation, China; {2}Southeast University, China

***Low-Complexity Transformed Encoder Architectures for Quasi-Cyclic Nonbinary LDPC Codes Over Subfields*..... N/A**

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Western Digital, United States

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Nanjing University, China

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{1}Princeton University, United States; {2}Sharif University of Technology, Iran

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***Design-Oriented Models for Quick Estimation of Path Delay Variability via the Fan-Out-of-4 Metric* 2453**

Massimo Alioto{1}, Giuseppe Scotti{2}, Alessandro Trifiletti{2}

{1}National University of Singapore, Singapore; {2}Sapienza – Università di Roma, Italy

***A Secure Scan Chain Test Scheme Exploiting Retention Loss of Memristors*..... 2457**

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University of Connecticut, United States

***Layout Decomposition for Hybrid E-Beam and DSA Double Patterning Lithography* 2461**

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{1}Fudan University, China; {2}Shanghai High-Performance Integrated-Circuit Design Center, China

***Test Pattern Generation for Multiple Stuck-at Faults Not Covered by Test Patterns for Single Faults*..... 2465**

Conrad Moore, Peikun Wang, Amir Masoud Gharehbaghi, Masahiro Fujita

University of Tokyo, Japan

***A New Approach for Diagnosing Bridging Faults in Logic Designs* 2469**

Amir Masoud Gharehbaghi, Masahiro Fujita

University of Tokyo, Japan

CAS-T papers on Memory**Time:** Wednesday, May 31 (8:00-9:30)**Room:** Kent AB**Chair(s):** Pierre-Emmanuel Gaillardon - University of Utah; Lan-Da Van - National Chiao Tung University

***A Study on the Programming Structures for RRAM-Based FPGA Architectures*..... N/A**Xifan Tang{1}, Gain Kim{1}, Giovanni De Micheli{1}, Pierre-Emmanuel Gaillardon{2}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}University of Utah, United States***Reconfigurable Writing Architecture for Reliable RRAM******Operation in Wide Temperature Ranges* N/A**Fernando García-Redondo, Pablo Royer, Marisa López-Vallejo, Hernan Aparicio, Pablo Ituero, Carlos López-Barrio
Universidad Politécnica de Madrid, Spain***PEVA: a Page Endurance Variance Aware Strategy for the Lifetime Extension of NAND Flash* N/A**Debao Wei, Liyan Qiao, Peng Zhang, Xiyuan Peng, Libao Deng
Harbin Institute of Technology, China***28-nm 1T-1MTJ 8Mb 64 I/O STT-MRAM with Symmetric 3-Section Reference Structure and Cross-Coupled Sensing Amplifier* 2476**Artur Antonyan, Suksoo Pyo, Hyuntaek Jung, Gwan-Hyeob Koh, Taejoong Song
Samsung Electronics, Korea, South

Spintronic-based Technology**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Dover A**Chair(s):** Malgorzata Chrzanos-Jeske - Portland State University; Mircea Stan - University of Virginia

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University of Kentucky, United States***A Variation-Aware Simulation Framework for Hybrid CMOS/Spintronic Circuits*..... 2484**Raffaele De Rose{6}, Marco Lanuzza{6}, Felice Crupi{6}, Giulio Siracusano{3}, Riccardo Tomasello{5}, Giovanni Finocchio{4}, Mario Carpentieri{2}, Massimo Alioto{1}
{1}National University of Singapore, Singapore; {2}Politecnico di Bari, Italy; {3}Università degli Studi di Catania, Italy; {4}Università degli Studi di Messina, Italy; {5}Università degli Studi di Perugia, Italy; {6}Università della Calabria, Italy***Hybrid Polymorphic Logic Gate Using 6 Terminal Magnetic Domain Wall Motion Device* 2488**Farhana Parveen, Shaahin Angizi, Zhezhi He, Deliang Fan
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{1}IMEC, Belgium; {2}Universidad Complutense de Madrid, Spain

Energy Grids & Systems

Time: Wednesday, May 31 (13:30-15:00)

Room: Dover BC

Chair(s): Chika Nwankpa - Drexel University; Xiaozhe Wang - McGill University

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Yuehai Lu, Dongyuan Qiu, Bo Zhang, Yanfeng Chen, Yanwei Jiang

South China University of Technology, China

Subsystem Size Optimization for Efficient Parallel Restoration of Power Systems 2504

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{1}Hong Kong Polytechnic University, Hong Kong; {2}University of Western Australia, Australia

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{1}Massachusetts Institute of Technology, United States; {2}McGill University, Canada

Battery Energy Storage Dispatch Analysis Within the Storage Placement Problem 2512

Jesse Hill, Chika Nwankpa

Drexel University, United States

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{1}Beijing Institute of Technology, China; {2}Global Energy Interconnection Research Institute North America, United States; {3}University of Western Australia, Australia

Brain Inspired Circuits and Systems

Time: Wednesday, May 31 (13:30-15:00)

Room: Grand Ballroom I

Chair(s): Sankar Basu - National Science Foundation; Mona Zaghloul - George Washington University

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Narayan Srinivasa

Intel Corporation, United States

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Ruprecht-Karls-Universität Heidelberg, Germany

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Stanford University, United States

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{1}Georgia Institute of Technology, United States; {2}Johns Hopkins University, United States; {3}Pennsylvania State University, United States

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Etienne-Cummings{2}

{1}Insightness AG, Switzerland; {2}Johns Hopkins University, United States; {3}Nanyang Technological University, Singapore

Digital Filters & Filter Banks

Time: Wednesday, May 31 (13:30-15:00)

Room: Grand Ballroom II

Chair(s): Tapio Saramaki - Tampere University of Technology; Zhiping Lin - Nanyang Technological University

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{1}Hiroshima Institute of Technology, Japan; {2}Hiroshima University, Japan; {3}University of Victoria, Canada

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{1}Hangzhou Dianzi University, China; {2}Nanyang Technological University, Singapore

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Bergische Universität Wuppertal, Germany

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{1}Akita Prefectural University, Japan; {2}Hangzhou Dianzi University, China; {3}La Trobe University, Australia;

{4}Nanyang Technological University, Singapore

Wireless Power & Data Transfer to Biomedical Implants

Time: Wednesday, May 31 (13:30-15:00)

Room: Grand Ballroom III

Chair(s): Pedram Mohseni - Case Western Reserve; Mehdi Kiani - Pennsylvania State University

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Ahmed Ibrahim, Miao Meng, Mehdi Kiani

Pennsylvania State University, United States

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{1}Case Western Reserve University, United States; {2}Khajeh Nasir Toosi University of Technology, Iran

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Université Laval, Canada

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{1}Masdar Institute of Science and Technology, U.A.E.; {2}Masdar Institute of Science and Technology / National University of Singapore, Singapore

INVITED: Wireless Power Transfer: Far Field to Near Field NA

Zohaib Hameed, Kambiz Moez

3M Corporate Research Laboratories–SEMS, United States

3D Integrated Circuits**Time:** Wednesday, May 31 (13:30-15:00)**Room:** Grand Ballroom IV**Chair(s):** Eby Friedman - University of Rochester; Hassan Mostafa - University of Waterloo

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Boris Vaisband, Eby G. Friedman

University of Rochester, United States

Fault Tolerant Techniques for TSV-Based Interconnects in 3-D ICs 2577

Siroos Madani{2}, Magdy Bayoumi{1}

{1}University of Louisiana at Lafayette, United States; {2}University of Louisiana, United States

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Chen Yan, Scott Kontak, Hailang Wang, Emre Salman

Stony Brook University, United States

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