2016 IEEE 59th International Midwest Symposium on Circuits and Systems (MWSCAS 2016)

Abu Dhabi, United Arab Emirates
16-19 October 2016

Pages 445-897

IEEE Catalog Number: CFP16MID-POD
ISBN: 978-1-5090-0917-6

Copyright © 2016 by the Institute of Electrical and Electronics Engineers, Inc
All Rights Reserved

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

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

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

IEEE Catalog Number:	CFP16MID-POD
ISBN (Print-On-Demand):	978-1-5090-0917-6
ISBN (Online):	978-1-5090-0916-9
ISSN:	1548-3746

Additional Copies of This Publication Are Available From:

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

Program

2016 IEEE 59th International Midwest Symposium on Circuits and Systems (MWSCAS)

Special Session 1: Circuits and Systems for Implantable Biomedical Devices

A Time-Based, Digitally Intensive Circuit and System Architecture for Wireless Neural Recording with High Dynamic Range

Wen-Yang Hsu (Swiss Federal Institute of Technology in Lausanne, Switzerland), Alexandre Schmid (Swiss Federal Institute of Technology, Switzerland), Chen Cao (Swiss Federal Institute of Technology in Lausanne, Switzerland) 1

Neural Stimulators for Retinal Prosthesis Embedded with CMOS Microchips

Toshihiko Noda (Nara Institute of Science and Technology, Japan), Hiroaki Takehara (Nara Institute of Science and Technology, Japan), Kiyotaka Sasagawa (Nara Institute of Science and Technology, Japan), Takashi Tokuda (Nara Institute of Science and Technology, Japan), Jun Ohta (Nara Institute of Science and Technology, Japan) 5

A Wireless Image Acquisition System for Artificial Knee Implant Surgeries

Shaolin Xiang (Tsinghua University, P.R. China), Zhi Bie (Tsinghua University, Beijing, P.R. China), Hanjun Jiang (Tsinghua University, P.R. China), Zhihua Wang (Tsinghua University, P.R. China), Wen Jia (Research Institute of Tsinghua University in Shenzhen, P.R. China) 9

Low-Power CMOS Bandpass Filter for Application of Cochlear Prosthesis

Hsing-Chien Chu (National Chiao Tung University, Taiwan), Yu-Hua Huang (National Chiao Tung University, Taiwan), Chung-Chih Hung (National Chiao Tung University, Taiwan) 13

Smart Artificial Urinary Sphincters: Implementation Challenges

Sami Hached (Polytechnique Montréal & Polystim Neurotech lab, Canada), Mohamad Sawan (Polytechnique Montréal, Canada), André Garon (Polytechnique Montréal, Canada), Oleg Loutochin (McGill University - Faculty of Medecine, Canada), Jacques Corcos (McGill University - Faculty of Medecine, Canada) 17

Linear and Nonlinear Circuits 1

Electrode Location Impact on Cole-impedance Parameters Using Magnitude-Only Measurements

Todd Freeborn (University of Alabama, USA), Ahmed Elwakil (University of Sharjah, United Arab Emirates (UAE)), Brent Maundy (University of Calgary, Canada) 21

Wave Digital Emulation of a Double Barrier Memristive Device

Karlheinz Ochs (Ruhr-University Bochum, Germany), Enver Solan (Ruhr-Universität Bochum, Germany), Sven Dirkmann (Ruhr-University Bochum, Germany), Thomas Mussenbrock (Ruhr-Universität Bochum, Germany) 25

Simple Generic Memristor Emulator for Voltage-Controlled Models

Abdullah G. Alharbi (University of Missouri - Kansas City, MO, USA), Mohamed Fouda (Faculty of Engineering, Cairo University, Egypt), Zainulabideen J. Khalifa (King Fahad University of Petroleum and Minerals, Saudi Arabia), Masud H. Chowdhury (University of Missouri Kansas City, Kansas City, MO, USA) 29

Recursive Synchronization of the Unified Chaotic System Using a Single Time Series

Ashraf A Zaher (American University of Kuwait - College of Arts and Sciences & IEEE, Kuwait) 33

Digital Predistortion of Wiener Systems Using the Nonlinear Filtered-x PEM Algorithm with Initial Subsystem Estimates

Emad Abd-Elrady (Abu Dhabi Women's College & Higher Colleges of Technology, UAE, United Arab Emirates (UAE)) 37

Digital Integrated Circuits 1

Thermal-Aware Floorplanning for NoC-Sprinting
Hui Zhu (Waseda University, Japan), Cong Hao (Waseda University, Japan), Takeshi Yoshimura (Waseda University, Japan) 41
A Voltage-Scalable Zero-Delay-Overhead Scheme for Standby Power Reduction in Dynamic Register Files
Khawar Sarfraz (The Hong Kong University of Science and Technology, Hong Kong), Mansun Chan (HKUST, Hong Kong) 45
FinFET MPSoC 32 Gb/s Transceivers: Custom ESD Protection and Verification
James Karp (Xilinx, Inc, USA), Michael Hart (Xilinx, Inc, USA), Mohammed Fakhruddin (Xilinx, Inc, USA), Vassili Kireev (Xilinx, Inc, USA), Lawrence Horwitz (Mentor Graphics Corp., USA), Matthew Hogan (Mentor Graphics Corp., USA) 49
A Survey on the Power and Robustness of FinFET SRAM
Mahmoud Darwich (University of Louisiana at Lafayette, USA), Ahmed Abdelgawad (Central Michigan University, USA), Magdy Bayoumi (University of Louisiana, USA) 53

Image Processing 1

Facial Landmarks Detection Using 3D Constrained Local Model on Mesh Manifold
Marwa Chendeb (Khalifa University of Science, Technology & Research, United Arab Emirates, United Arab Emirates (UAE)), Naoufel Werghi (Khalifa University, United Arab Emirates (UAE)), Claudio Tortorici (Khalifa University, United Arab Emirates (UAE)), Hassan Al-Mheiri (Higher Colleges of Technology, United Arab Emirates (UAE)), Marius Linguraru (Children's National Medical Center, USA) 57
Face Recognition Using the Principal Components of the Scatter Matrix in the Frequency Domain
Taif Al Obaidi (University of Central Florida, USA), George Atia (University of Central Florida, USA), Wasfy Mikhael (University of Central Florida, USA) 61
Real-Time Defects Detection System for Orange Citrus Fruits Using Multi-Spectral Imaging
Ahmed Medhat Abdelsalam (Polytechnique Montréal, Université de Montréal, Canada), Mohammed Sayed (Egypt-Japan University of Science and Technology, Egypt) 65
Employing Vector Quantization Algorithm in A Transform Domain for Facial Recognition
Ahmed Aldhahab (University of Central Florida, USA), Taif Al Obaidi (University of Central Florida, USA), Wasfy Mikhael (University of Central Florida, USA) 69

Analog1

PASSIOT: A Pareto-Optimal Multi-Objective Optimization Approach for Synthesis of Analog Circuits Using Sobol' Indices-based Engine
Taher Kourany (Center of Nanoelectronics and devices, American University in Cairo/Zewail City of Science and Technology, Cairo, Egypt, Egypt), Maged Ghoneima (Mechatronics Department, Ain-Shams University, Cairo, Egypt, Egypt), Emad Hegazi (Integrated Circuits Lab, Ain-Shams University, Cairo, Egypt, Egypt), Yehea Ismail (Center of Nanoelectronics and devices, American University in Cairo/Zewail City of Science and Technology, Cairo, Egypt, Egypt) 73
A 24-mW 65-nm CMOS TI-Flash ADC for Multi-Standard Serial-Link Receivers
Khaled A. El-Gammal (Ain Shams University, Egypt), Sameh Ahmed Assem Mostafa Ibrahim (Ain Shams University, Egypt) 77
A Fast-Locking All-Digital Clock and Data Recovery Circuit Using Successive Approximation
Ahmed AbdelRahman (Ain Shams University, Egypt), Sameh Ahmed Assem Mostafa Ibrahim (Ain Shams University, Egypt) 81
A High-speed Method of Dynamic Comparators for SAR Analog to Digital Converters
Ata Khorami (Sharif University of Technology, Iran), Mohammad Sharifkhani (Sharif University of Technology, Iran) 85

Invited Papers

Error Analysis and Reliability Metrics for Software in Safety Critical Systems
Jonathan Lockhart (University of Cincinnati, USA), Carla Purdy (University of Cincinnati, USA), Philip Wilsey (University of Cincinnati, USA) 89
Spur-Free Current-Mode Hysteretic Boost Converter for Noise-Sensitive Loads
Mina Nashed (Iowa State University, USA), Ayman Fayed (The Ohio State University, USA) 93
Energy-Harvesting Microsensors: Low-Energy Task Schedule & Fast Drought-Recovery Design
Andres Blanco (Georgia Institute of Technology, USA), Gabriel Rincón-Mora (Georgia Institute of Technology, USA) 97
Quantifying Metrics for Analyzing Integrated Circuit Design Integrity
Adam Kimura (The Ohio State University & Dagsi Area Graduate Studies Institute, USA), Steven Bibyk (The Ohio State University, USA) 101

Control 1

Multi-objective Optimization of Planar 3PRR (Prismatic-Revolute-Revolute) Parallel Mechanism Using Genetic Algorithm
Abdur Rosyid (Khalifa University, United Arab Emirates (UAE)), Bashar El-Khasawneh (Khalifa University, United Arab Emirates (UAE)), Anas Alazzam (Khalifa University, United Arab Emirates (UAE)) 105
Trajectory Analysis of Endoscopic Capsule Images: A Feasibility Study
Yasmeen Abu-Kheil (Khalifa University, United Arab Emirates (UAE)), Marco Mura (Scuola Superiore Sant'Anna, Italy), Gastone Ciuti (Scuola Superiore Sant'Anna, Italy), Paolo Dario (Scuola Superiore Sant'Anna, Italy), Lakmal Seneviratne (KURI, United Arab Emirates (UAE)), Jorge Dias (Khalifa University, United Arab Emirates (UAE)) 109
GPU Accelerated Coverage Path Planning Optimized for Accuracy in Robotic Inspection Applications
Randa Almadhoun (Khalifa University, United Arab Emirates (UAE)), Tarek Taha (Khalifa University, United Arab Emirates (UAE)), Lakmal Seneviratne (KURI, United Arab Emirates (UAE)), Jorge Dias (Khalifa University, United Arab Emirates (UAE)), Guowei Cai (Khalifa University, United Arab Emirates (UAE)) 113
Modeling and Simulation of Motion of a Quadcopter in a Light Wind
Hideaki Okazaki (Shonan Institute of Technology, Graduate School of Engineering, Japan), Kaito Isogai (Shonan Institute of Technology, Graduate School of Engineering, Japan), Hideo Nakano (Shonan Institute of Technology, Japan) 117

Digital Signal Processing 1

A Compensation Method of a Drift on a Vibrating Sensor Due to an Air Density
Kohei Okamoto (Tokyo University of Science, Japan) 121
Weighted Pole and Zero Sensitivity Minimization Subject to l_2-Scaling Constraints for State-Space Digital Filters
Takao Hinamoto (Hiroshima University, Japan), Akimitsu Doi (Hiroshima Institute of Technology, Japan), Wu-Sheng Lu (University of Victoria, Canada) 125
Algorithmic Foundations for Hardware Implementation of Scale-insensitive MSER Features
Andrzej S Sluzek (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)) 129
Robust Speaker Identification Under Noisy Conditions Using Feature Compensation and Signal to Noise Ratio Estimation
Megan Frankle (Rowan University, USA), Ravi Prakash Ramachandran (Rowan University, USA) 133

Posters 1 and Coffee Break

A Novel Comb Compensator with a Good Passband Deviation-Complexity Tradeoff
Gordana Jovanovic Dolecek (INAOE, Mexico) 137

Experimental Evaluation and Comparison of Time- Multiplexed Multi-FPGA Routing Architectures
Asmeen Kashif (University of Windsor, Canada), Mohammed Khalid (University of Windsor, Canada) 141

Variable Latching Phenomenon in CE BJT and Its Impact
Bijay K. Sharma (National Instityute of Technolgy Patna & Indian Institute of Technology Patna, India) 145

Performance Evaluation of Buffer Sharing Routers for Network on Chip
Hossam Hassan (Chungbuk National University & College of Electrical and Computer Engineering, Korea), Mostafa Said Abdelrehim (Sun Yat-sen University-Carnegie Mellon University (SYSU-CMU) Joint Institute of Engineering, Guangzhou, China, Egypt), HyungWon Kim (Chungbuk National University & College of Electrical and Computer Engineering, Korea) 149

Modified Comb Decimation Filter: Design and Implementation
Jose Ricardo Garcia Baez (Institute INAOE, Mexico), Gordana Jovanovic Dolecek (INAOE, Mexico) 153

Design of a 9-bit 4MS/s Wilkinson ADC for SiPM-based Imaging Detectors
Gerard Fernandez (Universitat de Barcelona, Spain), David Gascon (Universitat de Barcelona, Spain), Jose M de la Rosa (IMSE-CNM/University of Seville, Spain) 157

Wave Digital Emulation of Charge- Or Flux-Controlled Memristors
Karlheinz Ochs (Ruhr-University Bochum, Germany), Enver Solan (Ruhr-University Bochum, Germany) 161

Sensitivity Analysis of Memristors Based on Emulation Techniques
Karlheinz Ochs (Ruhr-University Bochum, Germany), Enver Solan (Ruhr-Universität Bochum, Germany) 165

Equal Sub-Area-Based DV-Hop
Enas Mohamed (Benha Faculty Of Engineering, Egypt), Hatem M. Zakaria (Benha University, Egypt), Mohamed B Abdelhalim (Arab Academy for Science, Technology & Maritime Transport, Egypt) 169

A Modified Space Vector Modulation Algorithm for a Matrix Converter with Lower Total Harmonic Distortion
Kotb Basem (Menofia University, Egypt), Ahmed Fathi Ahmed Abdou (Faculty of Engineering, Shebin Elkom, Menoufia University, Egypt), Elwy EL-kholy (Menofia University, Egypt), Shokry Saad (Faculty of Engineering, Egypt) 173

Dual-Mode Double Precision Division Architecture
Manish Kumar Jaiswal (The University of Hong Kong, Hong Kong), Hayden K.-H. So (The University of Hong Kong, Hong Kong) 177

The Pole-zero Doublet: a Cascode Operational Amplifier with Cross Coupled Capacitor
Ashish Joshi (Indian Institute of Technology Mandi, India), Indu Yadav (Indian Institute of Technology Mandi, India), Satinder Sharma (Indian Institute of Technology Mandi, India), Hitesh Shrimali (IIT Mandi, India) 181

Frequency Estimation in Unbalanced Three-Phase Power Systems Using Complex Adaptive Notch Filters
Shotaro Nishimura (Shimane University, Japan) 185

Computationally Efficient 2D Adaptive Filters Based on Essentially Separable FIR Structures
Yuan Jiajing (The Pennsylvania State University, USA), Niranjan Yardi (The Pennsylvania State University, USA), William K. Jenkins (The Pennsylvania State University, USA) 189

A Regression Based Methodology to Estimate SNM for Improving Yield of 6T SRAM
Anil Gundu Kumar (IIIT Delhi, India), Mohammad Hashmi (IIITD, India), Ramkesh Sharma (ST Microelectronics, India) 193

Efficient Pseudo-Random Number Generators for Wireless Sensor Networks
Rana Ahmed (American University of Sharjah, United Arab Emirates (UAE)) 197

Slotted Multi-Step RF MEMS-CMOS Parallel Plate Variable Capacitor
Neda Emami (American University of Shaerjah, United Arab Emirates (UAE)), Maher Bakri-Kassem (American University of Sharjah, United Arab Emirates (UAE)) 201

A Current-Mirror Technique Used for High-Order Curvature Compensated Bandgap Reference in Automotive Application

Dongwoo Ha (Seoul National University, Korea), Yujin Park (Seoul National University, Korea), Suhwan Kim (Seoul National University, Korea) 205

High Selective CMOS Bandpass Filter Design for Millimeterwave Applications

Abdelhalim A. Saadi (Centre de Développement des Technologies Avancées, Algeria), Abdelhalim Slimane (CDTA, Algeria), Mustapha Yagoub (University of Ottawa, Canada), Rachida Touhami (USTHB University, Algeria), Mohand Tahar Belaroussi (Centre de Développement des Technologies Avancées, Algeria) 209

Serial Data Link Interface for Memory Applications

Waleed Madany (Aswan University & Faculty of Engineering, Egypt), Mostafa Rashdan (University of Calgary, Canada), El-Sayed Hassaneen (Aswan, Egypt) 213

A Low Cost, Constant Throughput and Reusable 8X8 DCT Architecture for HEVC

Subiman Chatterjee (IIT(BHU) Varanasi, India), Kishor Prabhakar Sarawadekar (Indian Institute of Technology, India) 217

Impact of Fractional Bandwidth on the Bit Error Rate of a Beamforming System

Owais Talaat Waheed (iMicro, Masdar Institute of Science & Technology, United Arab Emirates (UAE)), Ayman Shabra (MediaTek Inc., USA), Ibrahim M Elfadel (Masdar Institute of Science and Technology, United Arab Emirates (UAE)) 221

Accelerated Evolutionary Algorithms with Parameter Importance Based Population Initialization for Variation-aware Analog Yield Optimization

Sita Kondamadugula (IIITBangalore, India), Srinath Naidu (IIIT Bangalore, India) 225

A Nested-Chopped Current-Feedback Instrumentation Amplifier for MEMS Flow Sensors

Moaaz Ahmed (Hong Kong University of Science and Technology, Hong Kong), Saqib Mohamad (HKUST, Hong Kong, Qatar), Amine Bermak (HKUST, Hong Kong) 229

Virtual Reality Navigation Simulation for Users Who are Blind

Tony Morelli (Central Michigan University, USA), Ethan Coggins (Central Michigan University, USA), Kevin Andrews (Central Michigan University, USA), Kumar Yelamarthi (Central Michigan University, USA), Ahmed Abdelgawad (Central Michigan University, USA) 233

An Efficient Method of RFI and Clutter Removal in Wind Profiler Spectra

Swati Sinha (BITS PILANI DUBAI CAMPUS, United Arab Emirates (UAE)), Chandrasekhar T V C Sarma (NARL, India), Mary Lourde Regeena (BPDC, Dubai & BPDC, United Arab Emirates (UAE)) 237

Bootstrapped Leakage Suppression Switch for Switched Capacitor Circuits with Zero Input Common Mode

Rahul Thottathil (Amrita University, India), Bibhu Datta Sahoo (University of Illinois at Urbana-Champaign, USA), Veeresh Vulligaddala (ams Semiconductor India Pvt. Ltd., India), Chandra Nyshadham (ams Semiconductor India Pvt. Ltd., India) 241

Design of Low Power FPGA Architecture of Image Unit for Space Applications

Fatma Taher (Khalifa University, United Arab Emirates (UAE)), Amal Zaki (Electronics Research Institute, Egypt), Hamed Elsimary (Prince Sattam Bin Abdulaziz University, Saudi Arabia) 245

A Linear CMOS Balanced Output Transconductor Using Double Differential Pair with Source Degeneration and Adaptive Biasing

Mohamed Elamien (University of Sharjah, United Arab Emirates (UAE)), Soliman Mahmoud (University of Sharjah, United Arab Emirates (UAE)) 249

An Accurate Low-power DAC for SAR ADCs

Seyed Behnam Yazdani (Sharif University of Technology, Iran), Ata Khorami (Sharif University of Technology, Iran), Mohammad Sharifkhani (Sharif University of Technology, Iran) 253

Low Power Multi Threshold 7T SRAM Cell

Divyesh Sachan (Indian Institute of Information Technology, Allahabad, India), Harish Peta (Indian Institute of Information Technology, Allahabad, India), Kamaldeep Singh Malik (Indian Institute of Information Technology, Allahabad, India), Manish Goswami (Indian Institute of Information Technology, India) 257

An 8B/10B Encoder with 2GHz Operating Frequency

Hamed Ashrafi (University of Urmia, Iran), Morteza Mousazadeh (Urmia University, Iran), Khayrollah Hadidi (Urmia University, Iran) 261

Special Session 2: Hardware Security

Remote Field Device Fingerprinting Using Device-Specific Modbus Information
Anastasis Keliris (New York University, USA), Michail Maniatakos (New York University Abu Dhabi, United Arab Emirates (UAE)) 265
Exploring Active Manipulation Attacks on the TERO Random Number Generator
Yang Cao (ESAT/COSIC, KU Leuven, Belgium), Vladimir Rozic (ESAT/COSIC, KU Leuven, Belgium), Bohan Yang (ESAT/COSIC, KU Leuven, Belgium), Josep Balasch (ESAT/COSIC, KU Leuven, Belgium), Ingrid Verbauwhede (UCLA, USA) 269
Secure Public Key Hardware for IoT Applications
Poulami Das (IIT Kharagpur, India), Debapriya Basu Roy (Indian Institute of Technology, India), Debdeep Mukhopadhyay (Indian Institute of Technology, India) 273
A Stochastic Approach to Analog Physical Unclonable Function
Nima Maghari (University of Florida, USA), Troy Bryant (Universty of Florida, USA), Mark M. Tehranipoor (University of Florida, USA), Domenic Forte (University of Florida, USA), Sreeja Chowdhury (University of Florida, USA) 277

Power Management 1

Secure Communication Interface Design for IoT Applications Using the GSM Network
Andrew Wightwick (University of Southampton, United Kingdom), Basel Halak (Southampton University, United Kingdom) 281
A 40V Current Sensing Circuit with Fast on/off Transition for High-Voltage Power Management
Peter Renz (Reutlingen University, Robert Bosch Center for Power Electronics, Germany), Philipp Lamprecht (Reutlingen University, Germany), Daniel Teufel (University Reutlingen, Germany), Bernhard Wicht (Reutlingen University, Robert Bosch Center for Power Electronics, Germany) 285
Electret-Free Electrostatic Energy Harvesting Interface Circuit Design and Analysis
Lilas Alrahis (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Baker Mohammad (Khalifa University, United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)), Mohammed Ismail (Khalifa University, United Arab Emirates (UAE)) 289
Power Loss Analysis in Single-Step, Single-Inductor Energy-Harvesting-based Power Supplies
Ahmed A Abdelmoaty (The Ohio State University, USA), Ayman Fayed (The Ohio State University, USA) 293
Transient Suppression with Pseudo Error Voltage Technique for Wide Supply Range Automotive DC-DC Converters
Hafeez Koonari Thoombath (Indian Institute of Technology & AMS Semiconductors, India), Krishna Kanth Gowri Avalur (ams Semiconductors India pvt. Ltd & Secretary, IEEE CAS Hyderabad, India), Ashudeb Dutta (Indian Institute of Technology Hyderabad, India), ShivGovind Singh (IIT Hyderabad, India) 297

RF/Photonics 1

Hybrid Extraction Method Based on Pinch-off S-parameters for mm-Wave Modeling of GaN HEMTs
Anwar Hasan Jarndal (University of Sharjah, United Arab Emirates (UAE)) 301
ESD Protection Design for High-Speed Applications in CMOS Technology
Jie-Ting Chen (National Chiao Tung University, Taiwan), Chun-Yu Lin (National Taiwan Normal University, Taiwan), Rong-Kun Chang (National Chiao-Tung University, Taiwan), Ming-Dou Ker (National Chiao-Tung University, Taiwan), Tzu-Chien Tzeng (Novatek Microelectronics Corp., Taiwan), Tzu-Chiang Lin (Novatek Microelectronics Corp., Taiwan) 305

A mm-Wave Push-Push Voltage Controlled Oscillator with Double-Tuned LC Load
Ahmed Ahmed (University of California, Santa Barbara, CA, USA), Ahmed Mohieldin (Cairo University, Egypt), Mohamed Aboudina (Cairo University, Egypt) 309
A 0.6 V, 2.1 mW CMOS UWB LNA for 3-5 GHz Wireless Receivers
Abdelhalim Slimane (CDTA, Algeria), Abdelkader Taibi (Centre de Développement des Technologies Avancées, Algeria), Abdelhalim A. Saadi (Centre de Développement des Technologies Avancées, Algeria), Djabar Maafri (Centre de Développement des Technologies Avancées, Algeria), Sid Ahmed Tedjini (Centre de Développement des Technologies Avancées, Algeria), Smail Traiche (Advanced Technologies and Development Center, Algeria) 313
A Novel High-Order Sliding Mode Control of Magnetic Levitation System
Ankur Goel (National Institute of Technology, India), A Swarup (NIT Kurukshetra, India) 317

Bio-Engineering

A Nafion Coated Capacitive Humidity Sensor on a Flexible PET Substrate
Christos Sapsanis (King Abdullah University of Science and Technology (KAUST), Saudi Arabia), Ulrich Buttner (King Abdullah University of Science and Technology (KAUST), Saudi Arabia), Hesham Omran (King Abdullah University of Science and Technology (KAUST), Saudi Arabia), Youssef Belmabkhout (King Abdullah University of Science and Technology (KAUST), Saudi Arabia), Osama Shekhah (King Abdullah University of Science and Technology (KAUST), Saudi Arabia), Mohamed Eddaoudi (King Abdullah University of Science and Technology (KAUST), Saudi Arabia), Khaled N Salama (King Abdullah University of Science and Technology, Saudi Arabia) 321
A 3D Model of Quadrupole Dielectrophoresis Levitation
Reda Mohamed (Helwan University & American University in Cairo, Egypt), Yehya Ghallab (Helwan University, Egypt), Hamdy Abd elhamid (Zewail City University & American University in Cairo, Egypt), Yehea Ismail (American University in Cairo, Egypt), Mohamed-Tarek I El-Wakad (Hewlan University & Faculty of Engineering at Helwan, Egypt) 325
PTT Based Continuous Time Non-invasive Blood Pressure System
Li Xiyan (Shanghai Jiao Tong University, P.R. China), Mohamed Atef (Assiut University & SJTU University, Egypt), Guoxing Wang (Shanghai Jiao Tong University, P.R. China), Yong Lian (Shanghai Jiao Tong University, Singapore) 329
A Sub 1 dB NF High Dynamic Range Low-input Impedance CMOS Amplifier
Mehrdad A. Ghanad (Ecole Polytechnique Fédérale de Lausanne, Switzerland), Catherine Dehollain (EPFL, Switzerland) 333

Analog 2

Experimental Operation of Time-Mode Building Blocks Using A Time-Mode Switched-Delay Unit
Moataz Abdelfattah (McGill University & Integrated Microsystems Laboratory, Canada), Gordon Roberts (McGill University, Canada) 337
A High Efficiency Straightforward Design and Verification Methodology for PLL Systems
Markus Scholl (RWTH Aachen University, Germany), Ye Zhang (RWTH Aachen University, Germany), Ralf Wunderlich (RWTH Aachen University, Germany), Stefan Heinen (RWTH Aachen, Germany) 341
A Current Mode Time-of-Flight Pixel with 400 Klx Background Light Subtraction
Chandani Anand (Indian Institute of Technology Delhi, India), Vinod Jacob (NIT Calicut, India), Mukul Sarkar (Indian Institute of Technology, Delhi, India) 345
Low-Power Bootstrapped Sample and Hold Circuit for Analog-to-Digital Converters
Tasnim Nazzal (University of Sharjah, United Arab Emirates (UAE)), Soliman Mahmoud (University of Sharjah, United Arab Emirates (UAE)) 349

Image Processing 2

A Trapezoid Multiresolution CMOS Image Sensor for Traffic Monitoring
Bingxing Wu (University of Idaho, USA), Ahmed Abdel-Rahim (University of Idaho, USA), Suat U Ay (University of Idaho, USA) 353
Single-frame Super-resolution Using Superpixel Based Dictionary
Taku Nakahara (Tokyo University of Science, Japan), Kazunori Uruma (Tokyo University of Science, Japan), Tomohiro Takahashi (Tokyo University of Science, Japan), Toshihiro Furukawa (Tokyo University of Science, Japan) 357
Enhancing Automatic Polyp Detection Accuracy Using Fusion Techniques
Alaa El Khatib (Khalifa University, United Arab Emirates (UAE)), Naoufel Werghi (Khalifa University, United Arab Emirates (UAE)), Hussain Al-Ahmad (University of Dubai, United Arab Emirates (UAE)) 361
Robust Fabric Defect Detection Algorithm Using Entropy Filtering and Minimum Error Thresholding
Mohammed Sayed (Egypt-Japan University of Science and Technology, Egypt) 365

Digital Integrated Circuits 2

Self-Timed Automatic Test Pattern Generation for Null Convention Logic
Nastaran Nemati (University of New South Wales, Canberra, Australia), Mark C Reed (University of New South Wales, Australia), Sri Parameswaran (University of New South Wales, Australia), Karl Fant (Theseus Logic Inc., USA) 369
Chipless RFID Tag for IoT Applications
Ayesha Habib (UET Taxila, Pakistan), M. Ali Afzal (UET Taxila, Pakistan), Haleema Sadia (UET Taxila, Pakistan), Yasar Amin (UET Taxila, Pakistan), Hannu Tenhunen (University of Turku, Finland) 373
A 90 nm Leakage Control Transistor Based Clock Gating for Low Power Flip Flop Applications
Pritam Bhattacharjee (National Institute of Technology, Arunachal Pradesh, India), Alak Majumder (NIT Arunachal Pradesh, India), Tushar Dhabal Das (National Institute of Technology, Arunachal Pradesh, India) 377
A 65nm ASIC Based 256 NIST Prime Field ECC Processor
Hamad Marzouqi (Khalifah University, United Arab Emirates (UAE)), Mahmoud Al-Qutayri (Khalifa University, United Arab Emirates (UAE)), Khaled Salah (Khalifa University of Science, Technology and Research (KUSTAR), United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)) 381

Communications and Wireless

Effect of Simultaneous Transmit and Receive Antennas on Cooperative Cognitive Radio Networks
Sangwoo Park (Korea Advanced Institute of Science and Technology, Korea), Iickho Song (Korea Advanced Institute of Science and Technology, Korea), Seungwon Lee (Korea Advanced Institute of Science and Technology, Korea), Jin-Hyun Ahn (Korea Advanced Institute of Science and Technology, Korea) 385
A New Reconfigurable Mixerless Polar Transmitter for Multi-standard and SDR Applications
Suhas Illath Veetil (University of Calgary & iRadio Labs, Canada), Mohamed Helaoui (University of Calgary, Canada) 389
LED Driver Performance Analysis for Joint Visible Light Communication and Illumination
Sylvain Haese (IETR-INSA Rennes, France), Lamjed Mtimet (IETR INSA, France), Maryline Hélard (INSA Rennes & IETR Institute of Electronics and Telecommunications of Rennes, France) 393

Full-rate Switched Capacitor Multi-tap DFE for Long-Tail Post-cursor Cancellation
Nevin Alex Jacob (Amrita Vishwa Vidyapeetham University, India), Diego James (Amrita Vishwa Vidyapeetham University, India), Bibhu Datta Sahoo (University of Illinois at Urbana-Champaign, USA) 397

Special Session 3: Sensors for the Internet-of-Things (IoT)

A Crab Leg Suspension Based Dual Axis MEMS Accelerometer with Low Cross Axis Sensitivity
Zakriya Mohammed (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Alabi Bojesomo (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Waqas Amin Gill (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Ibrahim M Elfadel (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Mahmoud Rasras (Masdar Institute of Technology, United Arab Emirates (UAE)) 401

Design of Self Powered Chip Integrated Humidity Sensor
Nasir Quadir (American University of Sharjah, United Arab Emirates (UAE)), Mansour Taghadosi (American University of Sharjah, United Arab Emirates (UAE)), Lutfi Albasha (American University Of Sharjah, United Arab Emirates (UAE)), Nasser Qaddoumi (American University of Sharjah, United Arab Emirates (UAE)) 405

Initial Optimization of Graphene Coated Fabrics for ECG Sensors
Saif Al Ateeqi Al Junaibi (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Nicholas Hallfors (Khalifa University, United Arab Emirates (UAE)), Yarjan Abdul Samad (Khalifa University of Science Research and Technology, United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)), Kin Liao (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Abdel F. Isakovic (KUSTAR, United Arab Emirates (UAE)), Mohammed Ismail (Khalifa University, United Arab Emirates (UAE)) 409

IoT Devices: The Quest for Energy Security
Riad Kanan (Abu Dhabi University, United Arab Emirates (UAE)) 413

Metal Oxide Thin Film Transistor Based Sensing
Mateusz Madzik (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Elangovan Elamurugu (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Jaime Viegas (Masdar Institute of Science and Technology, United Arab Emirates (UAE)) 417

Tutorial Papers

Resistive Switching in Sol-Gel Derived Microscale Memristors
Heba Abunahla (Khalifa University, United Arab Emirates (UAE)), Maguy Abi Jaoude (Khalifa University, United Arab Emirates (UAE)), Ilhaam Aziz Omar (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Baker Mohammad (Khalifa University, United Arab Emirates (UAE)), Mahmoud Al-Qutayri (Khalifa University, United Arab Emirates (UAE)) 421

Overview of PUF-Based Hardware Security Solutions for the Internet of Things
Basel Halak (Southampton University, United Kingdom), Mark Zwolinski (University of Southampton, United Kingdom), M. Syafiq Mispan (University of Southampton, United Kingdom) 425

An Overview of Digital-Intensive Delta-Sigma Phase-Locked Loops Utilizing 1-Bit Conversion and Modulation
Woogeun Rhee (Tsinghua University, P.R. China), Sitao Lv (Tsinghua University, P.R. China), Han Liu (Tsinghua University, P.R. China), Ni Xu (University of tsinghua, P.R. China), Zhihua Wang (Tsinghua University, P.R. China) 429

An Overview of the Fundamentals of Battery Chargers
Bora Tar (The Ohio State University, USA), Ayman Fayed (The Ohio State University, USA) 433

Power Management 2

Power Management Unit for Multi-Source Energy Harvesting in Wearable Electronics
Mohammad Alhawari (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Temesghen Tekeste (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Baker Mohammad (Khalifa University, United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)), Mohammed Ismail (Khalifa University, United Arab Emirates (UAE)) 437

Optimization of the Output Power of A Frequency-Up Conversion Piezoelectric Energy Harvester
Mostafa Shadoufa (Ain shams University, Egypt), Maged Ghoneima (Ain Shams University & NVIDIA Corporation, Egypt), Mohamed Dessouky (Ain Shams University, Egypt), Mohamed Mahmoud (Ain Shams University & Faculty of Engineering, Egypt) 441

A Wireless Pulsed-Current Battery Charger for Implantable Biomedical Stimulators
Iman Ghotbi (University of Tehran, Iran), Mohammad Najjarzadegan (University of Tehran, Iran), Ali Esmailiyan (University of Tehran, Iran), Shahin Ashtiani (University of Tehran, Iran), Omid Shoaei (University of Tehran, Iran) 445

Dynamic Threshold Compensated, Low Voltage CMOS Energy Harvesting Rectifier for UHF Applications
Manal Mohamed (Egypt-Japan University of Science and Technolgy ejust, Egypt), Ghazal Fahmy (National Telecommunication Institute & Graduate School of Information Science and Electrical Engineering, Egypt), Hongting Jia (Egypt-Japan University of Science and Technology, Egypt), Ahmed Allam (Egypt-Japan University of Science and Technology, Egypt), Adel B. Abdel-Rahman (EJUST, Egypt), Ramesh Pokharel (Kyushu University, Japan) 449

Extended Coupling-Range Wireless Power Transfer Using 0× / 4× Resonant Regulating Rectifier
Iman Ghotbi (University of Tehran, Iran), Ali Esmailiyan (University of Tehran, Iran), Shahin Ashtiani (University of Tehran, Iran), Omid Shoaei (University of Tehran, Iran) 453

Digital Signal Processing 2

Blind Sparse Channel Identification Using Subspace-Based Algorithm
Nicthe Nataly Jiménez Castro Martínez, N. (INAOE, Mexico), Alfonso Fernandez-Vazquez (National Polythecnic Institute, Mexico), Gordana Jovanovic Dolecek (INAOE, Mexico) 457

Vocal Separation Using Improved Robust Principal Component Analysis and Post-Processing
Tomohiro Watanabe (Keio University, Japan), Takanori Fujisawa (Keio University, Japan), Masaaki Ikehara (Keio University, Japan) 461

Low Cost Luma Interpolation Filter for Motion Compensation in HEVC
Ahmed Diefy (Egypt Japan University of Science and Technology, Egypt), Ahmed Shalaby (Egypt Japan University for Science and Technology, Egypt), Mohammed Sayed (Egypt-Japan University of Science and Technology, Egypt) 465

A Variable Step Size Affine Projection Algorithm Based on the Principle of Orthogonality
Khuram Naveed (COMSATS Institute of Information Technology, Pakistan), Bakhtiar Ali (COMSATS Institute of Information Technology, Pakistan), Muhammad T Akhtar (COMSATS Institute of Information Technology, Pakistan) 469

Power Systems 1

Online Reliability Prediction of Energy Systems with Wind Generation
Hana Baili (CentraleSupélec, France), Yan-Fu Li (CentraleSupélec, France) 473

Continuous Tuning of Inductive Link Antennae with Zero Voltage Switched Fractional Capacitance
Henry Kennedy (University of Southampton, United Kingdom), Teerasak Lee (University of Southampton, United Kingdom), Rares Bodnar (University of Southampton & School of Electronics and Computer Science, United Kingdom), William Redman-White (University of Southampton, United Kingdom) 477

Analysis of an Isolated Micro-Grid for Nigerian Terrain
Michael S. Okundamiya (Ambrose Alli University, Nigeria), Owen Omorogiuwa (Ambrose Alli University, Nigeria) 481
Adaptive Cascaded Delayed Signal Cancelation PLL Based Fuzzy Controller Under Grid Disturbances
Hany A. Hamed (Faculty of Engineering Menoufiya University, Egypt), Ahmed Fathi Ahmed Abdou (Faculty of Engineering, Shebin Elkom, Menoufia University, Egypt), Ehab Bayoumi (Abu Dhabi Men's College, United Arab Emirates (UAE)), E. E. El-Kholy (Faculty of Engineering Menoufiya University, Egypt) 485

Linear and Nonlinear Circuits 2

Linear Time-Variant System Identification Using FMCW Radar Systems
Tim Poguntke (Robert Bosch GmbH, Germany), Karlheinz Ochs (Ruhr-University Bochum, Germany) 489
A Method for Photo-Diode Array Partitioning Problem
Kunihiro Fujiyoshi (Tokyo University of Agriculture and Technology, Japan), Takahisa Imano (Tokyo University of Agriculture and Technology, Japan) 493
New Tunable Resistorless CM First-Order Filter Based on Single CBTA and Grounded Capacitor
Norbert Herencsar (Brno University of Technology, Czech Republic), Jaroslav Koton (Brno University of Technology & BUT, Czech Republic), Mehmet Sagbas (Yeni Yuzyil University, Turkey), Umut Ayten (Yildiz Technical University, Turkey) 497
A High-Efficiency Good Linearity 21 to 26.5 GHz Fully Integrated Power Amplifier Using 0.18 µm CMOS Technology
Hamed Mosalam (Egypt-Japan University of Science and Technology, Egypt), Ahmed Sayed Ahmed Abdelhamid Allam (Egypt-Japan University of Science and Technology (E-JUST), Egypt), Adel Bedair (Egypt-Japan University of Science and Technology, Egypt), Hongting Jia (E-JUST Center, Kyushu University, Japan), Ramesh K Pokharel (Kyushu University, Japan), Takana Kaho (NTT, Japan) 501

RF/Photonics 2

A Compact Ultra-Wideband Monopole Antenna for Breast Cancer Detection
Asmaa Ibrahim Afifi (EJUST, Egypt), Adel Bedair (Egypt-Japan University of Science and Technology, Egypt), Ahmed Sayed Ahmed Abdelhamid Allam (Egypt-Japan University of Science and Technology (E-JUST), Egypt), Anwer Sayed Abd El-Hameed (Assistant Research & Egypt-Japan University for Science and Technology (E-JUST), Egypt) 505
Dual-Frequency Admittance Property of Two Sections Transmission-Line and Application
Md Ayatullah Maktoomi (CDRL, IIIT Delhi, New Delhi, India), Mohammad Maktoomi (IIIT Delhi, India), Ajay Yadav (IIIT Delhi, India), Mohammad Hashmi (IIITD, India), Fadhel Ghannouchi (University of Calgary, Canada) 509
Using Scattering Parameters and the gm/ID MOST Ratio for Characterisation and Design of RF Circuits
Juan Luis Castagnola (Universidad Católica de Córdoba, Argentina), Fortunato Carlos Dualibe (Université de Mons, Belgium), Hugo Garcia-Vazquez (Université de Mons, Belgium) 513
Gm Over ID Design for UWB Distributed Amplifier
Giovanni Piccinni (Politecnico di Bari, Italy), Gianfranco Avitabile (Politecnico di Bari, Italy), Claudio Talarico (Gonzaga University, USA), Giuseppe Coviello (Politecnico di Bari, Italy) 517

MEMs/NEMs

Multi-electrode Piezoelectric Energy Harvesters
Alabi Bojesomo (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Wajih Syed (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Ibrahim M Elfadel (Masdar Institute of Science and Technology, United Arab Emirates (UAE)) 521

Modeling and Characterization of Thin Film Polysilicon in Thermally Driven MEMS Actuators
Shahabeddin Vamegh Estahbanati (American University of Sharjah, United Arab Emirates (UAE)), Maher Bakri-Kassem (American University of Sharjah, United Arab Emirates (UAE)), Rached Dhaouadi (American University of Sharjah, United Arab Emirates (UAE)) 525

Testing and Characterization of a MEMS Micro-Cantilever System
Said Kafumbe (Higher Colleges of Technology, United Arab Emirates (UAE)) 529

Modeling and Analysis of Stretching Strain in Clamped-Clamped Beams for Energy Harvesting
Ahmed Emad (Faculty of Engineering, Ain Shams University, Egypt), Mohamed Mahmoud (Ain Shams University & Faculty of Engineering, Egypt), Maged Ghoneima (Ain Shams University & NVIDIA Corporation, Egypt), Mohamed Dessouky (Ain Shams University, Egypt) 533

Posters 2 and Coffee Break

Toward a Novel Architecture for Beam Steering of Active Phased-Array Antennas
Giulio D'Amato (Politecnico di Bari, Italy), Gianfranco Avitabile (Politecnico di Bari, Italy), Claudio Talarico (Gonzaga University, USA), Giuseppe Coviello (Politecnico di Bari, Italy) 537

On the Impact of Channel Loss on CDR Locking
Javier Ardila (Universidad Industrial de Santander, Colombia), Elkim Roa (Universidad Indsutrial de Santander, Colombia) 541

A Highly Integrated Wideband LNA with Multiple Inputs for Multi-Band Mobile Devices
Amr Abdelhamid (Istanbul Sehir University, Turkey), Mehmet Ozgun (Istanbul Sehir University, Turkey), Hakan Dogan (Istanbul Sehir University, Turkey) 545

Assertion-Based Verification Technique for ECG Bio-Sensor Algorithms
Hussam Al-Hamadi (Khalifa University for Science, Technology and Research, United Arab Emirates (UAE)), Amjad Gawanmeh (Khalifa University, United Arab Emirates (UAE)), Mahmoud Al-Qutayri (Khalifa University, United Arab Emirates (UAE)) 549

Noise Analysis in Ring Oscillator-based Capacitance Sensor Interface
Javed S Gaggatur (Indian Institute of Science, India), Gaurab Banerjee (Indian Institute of Science, India) 553

A Multi-Input, Multi-Output Power Management Unit Using Dickson Charge Pump for Energy Harvesting Applications
Abdulqader Nael Mahmoud (Khalifa University, United Arab Emirates (UAE)), Mohammad Alhawari (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Baker Mohammad (Khalifa University, United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)), Mohammed Ismail (Khalifa University, United Arab Emirates (UAE)) 557

Design of an OOK IR-UWB Front-End for Biomedical Devices
Maissa Daoud (University of Sfax, ENIS, LETI, Tunisia), Hassene Mnif (National Engineering School of Sfax, University of Sfax, Tunisia), Mohamed Ghorbel (ATMS, Tunisia), Mourad Loulou (National School of Engineering of Sfax, Tunisia) 561

A 0.6V 0.85mW Low Noise Amplifier for 5 GHz Wireless Sensor Networks
Sankaran Aniruddhan (Indian Institute of Technology Madras, India) 565

A New Multiple Watermarking Scheme for Copyright Protection and Image Authentication
Sohailah Alyammahi (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Fatma Taher (Khalifa University, United Arab Emirates (UAE)), Hussain Al-Ahmad (University of Dubai, United Arab Emirates (UAE)), Tim McGloughlin (Khalifa University & University of Limerick, United Arab Emirates (UAE)) 569

A Unified Analysis Approach for Hardware and Software Implementations
Issam W. Damaj (American University of Kuwait, Kuwait) 573

MmWave LNA Using Feedback Guanella Transmission Line Transformer
Mona M. Fouad (Cairo University, Egypt), Mohamed Aboudina (Cairo University, Egypt), Ahmed Eladawy (Cairo University, Egypt), Essam A Hashish (Cairo University, Egypt) 577
An Autonomous System for Hospital-Acquired Infections (HAIs) Prevention
Riad Kanan (Abu Dhabi University, United Arab Emirates (UAE)), Obaidallah Elhassan (Abu Dhabi University, United Arab Emirates (UAE)), Rofaida Bensalem (Abu Dhabi University, United Arab Emirates (UAE)) 581
Fast Transient Harvester Design for Capturing Energy of Activity-Dependent Ambient RF Signals
Sajjad Shieh Ali Saleh (University of Tehran, Iran), Mahmoud Kamarei (University of Tehran, Iran) 585
Inductance Simulator Based on Dual Controlled CMOS Voltage Differencing Current Conveyor
Jan Jerabek (Brno University of Technology, Czech Republic), Roman Sotner (Brno University of Technology, Faculty of Electrical Engineering and Communication, Czech Republic), Roman Prokop (, Czech Republic), Vilem Kledrowetz (Brno University of Technology, Czech Republic), Aslihan Kartci (Brno University of Technology, Czech Republic), Umut Ayten (Yildiz Technical University, Turkey) 589
Comparative Performance Evaluation and Assessment of Organic Light Emitting Diodes and Light Emitting Diodes
Lauren A Fernandes (BITS Pilani, Dubai Campus, United Arab Emirates (UAE)), Gomathi Bhavani Rajagopalan (BITS, Pilani Dubai, United Arab Emirates (UAE)) 593
GPS Based System for Detection and Control of Maritime Boundary Intruding Boats
Friedrich Samuel (BITS Pilani, Dubai Campus, United Arab Emirates (UAE)), Gomathi Bhavani Rajagopalan (BITS, Pilani Dubai, United Arab Emirates (UAE)) 597
High-ISO Image De-noising Using Burst Filtering
Nour Abura'ed (Khalifa University, United Arab Emirates (UAE)), Harish Bhaskar (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Faisal S Khan (Khalifa University of Science, Technology & Research, United Arab Emirates (UAE)) 601
Physical Design of Supergate Cells Aiming Geometrical Optimizations
Maicon Schneider Cardoso (Federal University of Pelotas, Brazil), Gustavo Smaniotto (Federal University of Pelotas, Brazil), Regis Zanandrea (Federal University of Pelotas, Brazil), Renato Souza (Federal University of Pelotas, Brazil), Leomar Soares da Rosa, Jr. (Universidade Federal de Pelotas, Brazil), Felipe S Marques (Federal University of Pelotas & UFPel, Brazil) 605
An 83% Efficiency, 0.6V to 1V Output Switched-Capacitor DC-DC Converter for micro-Watt Power Applications
Dima Kilani (Khalifa University, United Arab Emirates (UAE)), Mohammad Alhawari (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Baker Mohammad (Khalifa University, United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)), Mohammed Ismail (Khalifa University, United Arab Emirates (UAE)) 609
DRAM Write-Only-Cache for Improving Lifetime of Phase Change Memory
Chao Chen (Northwestern Polytechnical University, P.R. China), Jianfeng An (Northwestern Polytechnical University, P.R. China) 613
Reproducibility and Field Emission Characteristics of Nanotips Fabricated by Local Electron Bombardment
Ahmed Ali (Khalifa University, United Arab Emirates (UAE)), Hassan Barada (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Mohd Rezeq (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)) 617
A Framework for Teaching Robotic Control Using a Novel Visual Programming Language
Mohammed Ghazal (Abu Dhabi University, United Arab Emirates (UAE)), Fasila Haneefa (Abu Dhabi University, United Arab Emirates (UAE)), Samr Samir Ali (Abu Dhabi University, United Arab Emirates (UAE)), Yasmina Al Khalil (Abu Dhabi University, United Arab Emirates (UAE)), Ahmed Sweleh (Abu Dhabi University, United Arab Emirates (UAE)) 620
Folded Cascode Current Source with Dual Mirrors Current Feedback
Lim Nguyen (University of Nebraska-Lincoln, USA) 624
Toward Better Layout Design in ASTRAN CAD Tool by Using an Efficient Transistor Folding
Gustavo Smaniotto (Federal University of Pelotas, Brazil), Matheus Moreira (Pontifícia Universidade Católica do Rio Grande do Sul, Brazil), Adriel Ziesemer Junior (Instituto Federal do Rio Grande do Sul, Brazil), Felipe S Marques (Federal University of Pelotas & UFPel, Brazil), Leomar Soares da Rosa, Jr. (Universidade Federal de Pelotas, Brazil) 628

VIBROTOOL - Software Tool for Change Detection and Diagnosis in Vibration Signals
Theodor D. Popescu (National Institute for Research and Development in Informatics, Romania), Dorel Aiordachioaie (Dunarea de Jos University of Galati, Romania) 632
Modeling Analysis and Simulation of 2-DOF Robotic Manipulator
Samia Mahil (The Petroleum Insitiute, United Arab Emirates (UAE)), Ahmed Al-Durra (Petrolum Institute, United Arab Emirates (UAE)) 636
High Gain DC-DC Converter for PV Applications
Hoiam Elobaied (UAEU, United Arab Emirates (UAE)), Abbas Fardoun (United Arab Emirates University, United Arab Emirates (UAE)) 640
A Study on the Phase Noise Performance of Coupled Spin Torque Oscillators
Supriyo Maji (Purdue University, USA) 644
The Effects of I/Q Imbalance on Wireless Communications: A Survey
Bassant Selim (Khalifa University, United Arab Emirates (UAE)), Paschalis C. Sofotasios (Tampere University of Technology, Finland), Sami Muhaidat (Khalifa University, United Arab Emirates (UAE)), George K. Karagiannidis (Aristotle University of Thessaloniki, Greece) 647
Camera Sensor Calibration Approach for Space Control Applications
Mohammad Alhulayil (Khalifa University, United Arab Emirates (UAE)), Ahmad Bani Younes (Khalifa University, United Arab Emirates (UAE)), James Daniel Turner (Khalifa University, United Arab Emirates (UAE)) 651
Maximizing Output Power From Solar Cells/Panels Through the Development of an Integrated Voltage Regulator/MPPT Circuit
Joseph O'Connor (Naval Postgraduate School, USA), Sherif Michael (Naval Postgraduate School, USA), Robert Ashton (Naval Postgraduate School, USA), Joseph Madren (Naval Postgraduate School, USA) 655

Analog 3

Practically Implemented Electronically Controlled CMOS Voltage Differencing Current Conveyor
Roman Sotner (Brno University of Technology, Faculty of Electrical Engineering and Communication, Czech Republic), Jan Jerabek (Brno University of Technology, Czech Republic), Roman Prokop (, Czech Republic), Vilem Kledrowetz (Brno University of Technology, Czech Republic), Josef Polak (Brno University of Technology, Czech Republic), Lukas Fujcik (, Czech Republic), Tomas Dostal (College of Polytechnics Jihlava, Czech Republic) 659
A Low-Energy SAR-Based Capacitance-to-Digital Converter for Pressure Sensors: System Analysis, Design and Calibration
Ayman Hassan Ismail (Ain Shams University, Egypt), Muhammad El-Nafarawi (Ain Shams Universisty & Si-Ware Systems Inc., Egypt) 663
A Low Power High Resolution Time to Digital Converter for ADPLL Application
Hasan Molaei (Sharif University of Technology, Iran), Khosrow Sadeghi (Sharif University of Technology, Iran) 667
A Fully-Synchronous Offset-Insensitive Level-Crossing Analog-to-Digital Converter
Nassim Ravanshad (Sadjad University of Technology, Iran), Hamidreza Rezaee-Dehsorkh (Sadjad University of Technology, Iran), Reza Lotfi (Ferdowsi University of Mashhad, Iran) 671

Image Processing 3

Building a Surface Atlas of Hippocampal Subfields From High Resolution T2-weighted MRI Scans Using Landmark-free Surface Registration
Shan Cong (Purdue University, USA), Maher Rizkalla (Indiana University-Purdue University Indianapolis, USA), Paul Salama (Indiana University-Purdue University Indianapolis, USA), Shannon Risacher (Indiana University School of Medicine, USA), John West (Indiana University School of Medicine, USA), Yu-Chien Wu (Indiana University School of Medicine, USA), Liana Apostolova (Indiana University School of Medicine, USA), Eileen Tallman (Indiana University School of Medicine, USA), Andrew Saykin (Indiana University School of Medicine, USA), Li Shen (Indiana University School of Medicine, USA) 675

Image Noise Level Estimation by Searching for Smooth Patches with Discrete Cosine Transform
Hayato Katase (Keio University, Japan), Takuro Yamaguchi (Keio University, Japan), Takanori Fujisawa (Keio University, Japan), Masaaki Ikehara (Keio University, Japan) 679

Constant Throughput HEVC Core Transform Design
Subiman Chatterjee (IIT(BHU) Varanasi, India), Kishor Prabhakar Sarawadekar (Indian Institute of Technology, India) 683

Lane Departure Warning Tracking System Based on Score Mechanism
Magdy A. El-Moursy (Mentor Graphics Corporation & Electronics Research Institute, Egypt) 687

Fast Region-Based DPM Object Detection for Autonomous Vehicles
Alaa Ali (University of Louisiana at Lafayette, USA), Oladiran G. Olaleye (University of Louisiana at Lafayette, USA), Magdy Bayoumi (University of Louisiana, USA) 691

Control 2

Autonomous Tracking of Oil and Gas Pipelines by an Unmanned Aerial Vehicle
Amit Shukla (The Petroleum Institute, United Arab Emirates (UAE)), Xiaoqian Huang (The Petroleum Institute, United Arab Emirates (UAE)), Hamad Karki (The Petroleum Institute, United Arab Emirates (UAE)) 695

Satellite Attitude Estimation in A Novel Operational Environment
Mohammad Alhulayil (Khalifa University, United Arab Emirates (UAE)), Ahmad Bani Younes (Khalifa University, United Arab Emirates (UAE)), James Daniel Turner (Khalifa University, United Arab Emirates (UAE)) 699

Site Inspection Drone: A Solution for Inspecting and Regulating Construction Sites
Reem Ashour (Khalida University of Science Technology and Research, United Arab Emirates (UAE)), Tarek Taha (Khalifa University, United Arab Emirates (UAE)), Fahad Al Shaibani (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Eman Hableel (SDGs Spicaliest, United Arab Emirates (UAE)), Yasmeen Abu-Kheil (Khalifa University, United Arab Emirates (UAE)), Malak ElSalamouny (Khalifa University, United Arab Emirates (UAE)), Maha Kadadha (Khalifa University, United Arab Emirates (UAE)), Kasturi Rangan (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Jorge Dias (Khalifa University, United Arab Emirates (UAE)), Lakmal Seneviratne (KURI, United Arab Emirates (UAE)), Guowei Cai (Khalifa University, United Arab Emirates (UAE)) 703

System Architecture

A Real-time UEFI Functional Validation Tool with Behavior Colored Petri Net Model
Rongyang Liu (Washington State University, USA), Jose G. Delgado-Frias (Washington State University, USA), Doug Boyce (Washington State University, USA), Rahul Khanna (Intel Corporation, USA) 707

Structural Health Monitoring: Internet of Things Application
Ahmed Abdelgawad (Central Michigan University, USA), Kumar Yelamarthi (Central Michigan University, USA) 711

Vehicle Classification Via 3D Geometries
William McDowell (Lockheed Martin, USA), Wasfy Mikhael (University of Central Florida, USA) 715
Autoscaling of Cores in Multicore Processors Using Power and Thermal Workload Signatures
Rupesh Karn (Masdar Institute of Science and Technology & Mubadala Company, United Arab Emirates (UAE)), Ibrahim M Elfadel (Masdar Institute of Science and Technology, United Arab Emirates (UAE)) 719

Power Systems 2

Economical Smart Home Scheduling for Single and Multiple Users
Cong Hao (Waseda University, Japan), Takeshi Yoshimura (Waseda University, Japan) 723
Parameter Estimation of Valve Regulated Lead Acid Batteries Using Metaheuristic Evolutionary Algorithm
Samantha Stephen (UAE University, United Arab Emirates (UAE)), Zahi Omer (United Arab Emirates University & College of Engineering, United Arab Emirates (UAE)), Abbas Fardoun (United Arab Emirates University, United Arab Emirates (UAE)), Ala Hussein (UAE University, United Arab Emirates (UAE)) 727
A Novel SVPWM-Based Switching Algorithm for MMC for High Power Applications
Safia Bashir (The Petroleum Institute, United Arab Emirates (UAE)), Abdul Rahiman Beig (The Petroleum Institute, United Arab Emirates (UAE)) 731
Automated Characterization of Reverse Recovery Parameters in High Speed LDMOS Devices
Carlos Bernal (University of Puerto Rico at Mayaguez, Puerto Rico), Manuel Jimenez (University of Puerto Rico at Mayaguez, Puerto Rico) 735

Linear and Nonlinear Circuits 3

Novel Grounded Capacitor-Based Resistorless Tunable Floating/Grounded Inductance Simulator
Aslihan Kartci (Brno University of Technology, Czech Republic), Norbert Herencsar (Brno University of Technology, Czech Republic), Kamil Vrba (Brno University of Technology, Czech Republic), Shahram Minaei (Dogus University, Turkey) 739
The Influence of Vessel Segmentation Threshold on the Accuracy of Patient-Specific Coronary Blood Flow Simulations
Alena Uus (City University London, United Kingdom), Panagiotis Liatsis (Petroleum Institute, United Arab Emirates (UAE)), Ronak Rajani (St Thomas' Hospital London, United Kingdom) 743
CFOA-based Fractional Order Simulated Inductor
Kareem H. Khattab (Nile University, Egypt), Ahmed H. Madian (Egyptian atomic energy authority, NCRRT, Egypt), Ahmed G. Radwan (Faculty of Engineering, Cairo University, Egypt) 747
Voltage-controlled M-M Relaxation Oscillator
Haneen Gamal (Eng., Egypt), Gehad Mostafa (Eng., Egypt), Mohamed Fouda (Faculty of Engineering, Cairo University, Egypt), Ahmed H. Madian (Egyptian atomic energy authority, NCRRT, Egypt), Ahmed G. Radwan (Faculty of Engineering, Cairo University, Egypt) 751

RF/Photonics 3

Millimetre-wave Performance of Passive Microstrip Bandpass Filters Based on 40nm CMOS Technology
Xi Sung Loo (Globalfoundries Singapore Pte Ltd, Singapore), Kok Wai Johnny Chew (Globalfoundries Singapore Pte Ltd, Singapore), Michael Cheng (Globalfoundries Singapore Pte Ltd, Singapore), Kiat Seng Yeo (Singapore University of Technology and Design, Singapore) 755

A 0.23 mW, On-Chip, Self-Calibrating RF Amplitude Detector in 65 nm CMOS
Yonatan Kifle (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Mohammad Alhawari (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Sleiman Bou-Sleiman (Intel, USA), Mohammed Ismail (Khalifa University, United Arab Emirates (UAE)) 759
A 9 mW Wideband 60 GHz LNA with 3.55 dB NF
Germin Ghaly (Ain Shams University, Egypt), Mohammed El-Nozahi (Ain Shams University, Egypt), Hani Fikry (Ain Shams University, Egypt) 763
10 Gb/s 1.95 mW Active Cascode Transimpedance Amplifier for High Speed Optical Receivers
Diaa Abd-elrahman (Assiut University, Assiut, Egypt), Mohamed Atef (Assiut University & SJTU University, Egypt), Guoxing Wang (Shanghai Jiao Tong University, P.R. China) 767

Nano-Electronics

Efficient Implementation of Multiplexer and Priority Multiplexer Using 1S1R ReRAM Crossbar Arrays
Debjyoti Bhattacharjee (Nanyang Technological University, Singapore), Anne Siemon (RWTH Aachen University, Germany), Eike Linn (RWTH Aachen University, Germany), Stephan Menzel (RWTH Aachen University, Germany), Anupam Chattopadhyay (Nanyang Technological University, Singapore) 771
Novel Microscale Memristor with Uniqueness Property for Securing Communications
Heba Abunahla (Khalifa University, United Arab Emirates (UAE)), Dina Shehada (Khalifa University, United Arab Emirates (UAE)), Chan Yeob Yeun (Khalifa University, United Arab Emirates (UAE)), Curtis OKelly (Khalifa University, United Arab Emirates (UAE)), Maguy Abi Jaoude (Khalifa University, United Arab Emirates (UAE)), Baker Mohammad (Khalifa University, United Arab Emirates (UAE)) 775
Surface Passivation Method for Optimum Performance of 4H-SiC Devices
Aamenah Siddiqui (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Hazem Elgabra (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Shakti Singh (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)) 779
Series Resistance and Carrier Tunneling of Compact Model for Double Gate Nanoscale Transistors
Islam Shaboon (Mentor Graphics, Egypt), Wael Fikry (Ain Shams University, Egypt), Serag E. D. Habib (Faculty of Engineering, Cairo University, Egypt) 783

Special Session 4: Low Power SoCs for Wearable Healthcare

Design of Low Power CMOS Subthreshold Current Mode Instrumentation Amplifier Based on CCII
Mohammed A. Eldeeb (Misr International University, Egypt), Yehya Ghallab (Helwan University, Egypt), Yehea Ismail (American University in Cairo, Egypt), Hassan Elghitani (Misr International University, Egypt) 787
A 130nm CMOS Integrated Lab-On-a-Chip Based on DeFET Sensor for Biomedical Analysis
Ahmad Qassem (The American University in Cairo (AUC), Egypt), Reda Mohamed (Helwan University & American University in Cairo, Egypt), Yehya Ghallab (AUC, Egypt), Yehea Ismail (American University in Cairo, Egypt) 791
Novel Logarithmic ECG Feature Extraction Algorithm Based on Pan and Tompkins
Muna Darweesh (Khalifa University, United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)), Temesghen Tekeste (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Baker Mohammad (Khalifa University, United Arab Emirates (UAE)), Mohammed Ismail (Khalifa University, United Arab Emirates (UAE)) 795

Fused Floating Point Arithmetic for Discrete Wavelet Transform
Temesghen Tekeste (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Hani Saleh (Khalifa University of Sciente, Technology & Research, United Arab Emirates (UAE)), Baker Mohammad (Khalifa University, United Arab Emirates (UAE)), Mohammed Ismail (Khalifa University, United Arab Emirates (UAE)) 799

SoC for IoT

A Versatile Hardware Platform for the Development and Characterization of IoT Sensor Networks
Shahzad Muzaffar (Masdar Institute of Science and Technology, United Arab Emirates (UAE)), Ibrahim M Elfadel (Masdar Institute of Science and Technology, United Arab Emirates (UAE)) 802
A Four-Layer Wireless Sensor Network Framework for IoT Applications
Kevin Laubhan (Central Michigan University, USA), Khaled Talaat (Central Michigan University, USA), Sarah Riehl (Central Michigan University, USA), Tony Morelli (Central Michigan University, USA), Ahmed Abdelgawad (Central Michigan University, USA), Kumar Yelamarthi (Central Michigan University, USA), Md Sayedul Aman (Central Michigan University, USA) 806
Flexible Gesture Recognition Using Wearable Inertial Sensors
Huda Abualola (Khalifa University, United Arab Emirates (UAE)), Hanin Al Ghothani (Khalifa University, United Arab Emirates (UAE)), Abdulrahim Naser Eddin (Khalifa University, United Arab Emirates (UAE)), Nawaf Almoosa (Khalifa University, United Arab Emirates (UAE)), Kin Fai Poon (Khalifa University, United Arab Emirates (UAE)) 810

Digital Signal Processign 3

Efficient Mixed-Signal Synapse Multipliers for Multi-Layer Feed-Forward Neural Networks
Bahar Youssefi (University of Windsor, Canada), Mitra Mirhassani (University of Windsor, Canada), Iman Taha (University of Windsor, Canada), Jonathan Wu (University of Windsor, Canada) 814
Modal Analysis of the ℓ0-LMS and ℓ0-NLMS Sparse Adaptive Algorithms
Abdullah Al-Shabili (Khalifa University, United Arab Emirates (UAE)), Luis Weruaga (Proactivaudio, Austria), Shihab Jimaa (Khalifa University, United Arab Emirates (UAE)) 818
A Robust Normalized Variable Tap-Length Normalized Fractional LMS Algorithm
Muhammad T Akhtar (COMSATS Institute of Information Technology, Pakistan), Shakeel Ahmed (Pakistan Institute of Engineering & Applied Sciences, Pakistan) 822

HW/SW Codesign

Synthesis and Evaluation of SHA-1 Algorithm Using Altera SDK for OpenCL
Mohammed Khalid (University of Windsor, Canada), Ian Janik (University of Windsor, Canada) 826
Speed Up an X86 SAME Simulator Using Synthesizable SystemC Timing Models
Jianfeng An (Northwestern Polytechnical University, P.R. China), Yi Wang (Institute for Infocomm Research, A*STAR, Singapore) 830
Tile-Based Modular Architecture for Accelerating Homomorphic Function Evaluation on FPGA
Mustafa Khairallah (Nanyang Technological University, Egypt), Maged Ghoneima (Ain Shams University & NVIDIA Corporation, Egypt) 834
Zynq-based SoC Implementation of an Induction Machine Control Algorithm
Danyal Mohammadi (Boise State University, USA), Luka Daoud (Boise State University, USA), Nader Rafla (Boise State University, USA), Said Ahmed-Zaid (Boise State University, USA) 838

Analog 4

Linearization of VCO-Based ADCs Using Asynchronous Sigma-Delta Modulation
Vishnu Unnikrishnan (Linköping University, Sweden), Mark Vesterbacka (Linkoping University, Sweden) 842
Routability of Twisted Common-centroid Capacitor Array Under Signal Coupling Constraints
Gong Chen (Chengdu University of Information Technology, P.R. China), Bo Liu (The University of Kitakyushu, Japan), Shigetoshi Nakatake (The University of Kitakyushu, Japan), Bo Yang (Design Algorithm Laboratory, Inc., Japan) 846
A Chopper Capacitive Feedback Instrumentation Amplifier with Input Impedance Boosting Technique
Mohamed Saad (Mentor Graphics & Ain Shams University, Egypt), Mohammed El-Nozahi (Ain Shams University, Egypt), Hani Ragai (Ain Shams University, Egypt) 850

Image Processing 4

Real Time Algorithm for Efficient HCI Employing Features Obtained From MYO Sensor
Ehab H. El-Shazly (Kyushu University & EJUST & EAEA, Egypt), Moataz Abdelwahab (EJUST, Egypt), Rin-ichiro Taniguchi (Kyushu University, Japan) 854
Content-Aware and Occupancy-Based Hybrid ARQ for Video Transmission
Husameldin Mukhtar (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)), Arafat Al-Dweik (Khalifa University, United Arab Emirates (UAE)), Mohammed Al-Mualla (Khalifa University of Science, Technology and Research, United Arab Emirates (UAE)) 858
Depth Image Coding Algorithm Via the Colorization Based Image Coding
Kazunori Uruma (Tokyo University of Science, Japan), Katsumi Konishi (Kogakuin University, Japan), Tomohiro Takahashi (Tokyo University of Science, Japan), Toshihiro Furukawa (Tokyo University of Science, Japan) 862

Digital Integrated Circuits 3

A Quantitative Performance Analysis of FinFET Based Multiplier Circuits
Santosh Kumar Koppa Venkataswamy (University of Texas at San Antonio, USA), Paromita Syam (University of Texas at San Antonio, USA), Sruthi Nanduru (University of Texas at San Antonio, USA), Eugene John (University of Texas at San Antonio, USA) 866
Unified Data Authenticated Encryption for Vehicular Communication
Yi Wang (Institute for Infocomm Research, A*STAR, Singapore), Jianfeng An (Northwestern Polytechnical University, P.R. China), Yajun Ha (National University of Singapore, Singapore) 870
Look-Up Tables with Multiple Inputs for Secured-by-Design FPGAs
Ziyad Almohaimeed (University of Victoria & Qassim University, Canada), Mihai Sima (University of Victoria, Canada) 874
Design and Analysis of SRAM Cell in 4H-SiC
Hazem Elgabra (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Aamenah Siddiqui (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)), Shakti Singh (Khalifa University of Science Technology and Research, United Arab Emirates (UAE)) 878

Bio-Inspired Circuits

A 0.2 nJ/bit QPSK Transmitter with Tuning for Process Variation for Biomedical Telemetry in the MedRadio Band of 401-457MHz

Abhiram Reddy Gundla (Colorado State University, USA), Tom Chen (Colorado State University & Dept. of Electrical & Computer Engineering, USA) 882

Ultra Low Power ECG Acquisition Front-end with Enhanced Common Mode Rejection

Prathamesh Khatavkar (Indian Institute of Technology Madras, India), Aravind Nagulu (Indian Institute of Technology Madras, India), Sankaran Aniruddhan (Indian Institute of Technology Madras, India) 886

Restoring Function in Paralyzed Limbs Using EEG

Maha Diab (University of Sharjah, United Arab Emirates (UAE)), Zainab Hussain (University of Sharjah, United Arab Emirates (UAE)), Soliman Mahmoud (University of Sharjah, United Arab Emirates (UAE)) 890

A Power Optimized Switched-Capacitor Based Approach in Voltage-Controlled Cardiac Stimulation

Ali Esmailiyan (University of Tehran, Iran), Iman Ghotbi (University of Tehran, Iran), Omid Shoaei (University of Tehran, Iran) 894