

2020 IEEE 63rd International Midwest Symposium on Circuits and Systems (MWSCAS 2020)

**Springfield, Massachusetts, USA
9-12 August 2020**

Pages 1-557



**IEEE Catalog Number: CFP20MID-POD
ISBN: 978-1-7281-8059-5**

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

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

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

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

IEEE Catalog Number:	CFP20MID-POD
ISBN (Print-On-Demand):	978-1-7281-8059-5
ISBN (Online):	978-1-7281-8058-8
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

CURRAN ASSOCIATES INC.
proceedings
.com

MWSCAS 2020 Table of Contents

A1L-A Analog Circuits and Systems I

Date: Monday, August 10, 2020

Time: 10:00 - 12:00

Location: Room 1

Chair(s): Armin Tajalli, *University of Utah*

Shiuh-hua Wood Chiang, *Brigham Young University*

Low-Power Single-Transistor Voltage-Mode Third-Order All-Pass Filter in 65-nm CMOS 1

Mohamed Elamien¹, Brent Maundy¹, Leonid Belostotski¹, Ahmed Elwakil²

¹*University of Calgary, Canada;* ²*University of Sharjah, U.A.E.*

An Energy-Efficient Low-Noise Complementary Parametric Amplifier Achieving 0.89 NEF..... 5

Gabriele Atzeni, Jeremy Guichemerre, Alessandro Novello, Taekwang Jang

ETH Zürich, Switzerland

A High Slew Rate, Low Power, Compact Operational Amplifier Based on the Super-Class AB Recycling Folded Cascode 9

Alec Yen, Benjamin Blalock

University of Tennessee, Knoxville, United States

A Sub-Hertz Bandpass Low Noise Amplifier for Biopotential Signal Acquisition with Parasitic Pole Cancellation 13

Jinyong Kim, Hyunkyu Ouh, Matthew Johnston

Oregon State University, United States

CMOS Optoelectronic Sensor with Ping-Pong Auto-Zeroed Transimpedance Amplifier..... 17

Vahid Khojasteh Lazarjan, Seyedeh Nazila Hosseini, Mehdi Noormohammadi Khiarak, Benoit Gosselin

Laval University, Canada

A1L-B NCL Based Asynchronous Design

Date: Monday, August 10, 2020

Time: 10:00 - 12:00

Location: Room 2

Chair(s): Ashiq Sakib, *Florida Polytechnic University*

Exploiting Dual-Rail Register Invariants for Equivalence Verification of NCL Circuits 21

Son Le¹, Sudarshan Srinivasan¹, Scott Smith²

¹*North Dakota State University, United States;* ²*Texas A&M University Kingsville, United States*

Formal Verification of Completion-Completeness for NCL Circuits 25

Son Le¹, Sudarshan Srinivasan¹, Scott Smith²

¹*North Dakota State University, United States;* ²*Texas A&M University Kingsville, United States*

Reducing Power Consumption in Asynchronous MTNCL Circuits Through Selective Sleep..... 29

Cole Sherrill, Michael Tennant, Jia Di

University of Arkansas, United States

Further Speedup of a Large Word-Width High-Speed Asynchronous Multiply and Accumulate Unit 33

Nauman Jalil¹, Scott Smith²

¹*North Dakota State University, United States;* ²*Texas A&M University Kingsville, United States*

Implementation of FinFET Based Static NCL Threshold Gates: an Analysis of Design Choice 37

Ashiq Sakib², Abir Akib¹, Scott Smith³

¹*BRAC University, Bangladesh;* ²*Florida Polytechnic University, United States;* ³*Texas A&M University Kingsville, United States*

A1L-C Sensor Systems and Device Modeling

Date: Monday, August 10, 2020

Time: 10:00 - 12:00

Location: Room 3

Chair(s): Arindam Sanyal, *University at Buffalo*
Vanessa Chen, *Carnegie Mellon University*

Scalable High-Accuracy Ranging and Wireless Frequency Synchronization for Open-Loop Distributed Phased Arrays 41

Sean Ellison, Serge Mghabghab, Jeffrey Nanzer
Michigan State University, United States

Functional Safety of a Lidar Sensor System 45

Sharath Patil³, Bhanu Singh¹, Darrell Livezey¹, Saad Ahmad¹, Martin Margala²
¹*Melexis Inc, United States*; ²*University of Massachusetts Lowell, United States*; ³*University of Massachusetts Lowell / Melexis Inc., United States*

Modeling of Magnetolectric Antennas for Circuit Simulations in Magnetic Sensing Applications 49

Isabel Martos-Repath, Ankit Mittal, Mohsen Zaeimbashi, Diptashree Das, Nian Sun, Aatmesh Shrivastava, Marvin Onabajo
Northeastern University, United States

A High-Frequency Small-Signal Model for Four-Port Network MOSFETs 53

Alejandro Roman-Loera³, Anurag Veerabathini¹, Luis A Flores-Oropeza³, Jaime Ramirez-Angulo²
¹*Maxim Integrated, United States*; ²*New Mexico State University, United States*; ³*Universidad Autonoma de Aguascalientes, Mexico*

A1L-D Sensor Circuits and Systems I

Date: Monday, August 10, 2020

Time: 10:00 - 12:00

Location: Room 4

Chair(s): Takashi Tokuda, *Tokyo Institute of Technology*
Ruolin Zhou, *UMass Dartmouth*

Position and Posture Estimation of Capsule Endoscopy with a Single Wearable Coil Toward Daily Life Diagnosis 57

Ryohei Shimizu, Ryo Shirai, Masanori Hashimoto
Osaka University, Japan

Neuronal Networks as a Way to Introduce System Knowledge in Numerical Computations 61

Phil Meier, Kris Rohrmann, Marvin Sandner, Marcus Prochaska
Ostfalia University of Applied Sciences, Germany

Magnet Integrated Shirt for Spinal Posture Detection 65

Emily Dolezalek, Mary Farnan, Sam Wielgos, Cheol-Hong Min
University of St. Thomas, United States

A Prototype Novel Zero-IF Non-Contact Respiration Monitor Using Software Defined Radio (SDR) 69

Miguel Hernandez, Yves Tchatchoua, Tam Nguyen, Donald Lie
Texas Tech UNiversity, United States

Enabling Large-Scale Fine-Grained Simulation of IED Vapor Concentration in Open-Air Environments 73

Agamyrat Agambayev, Christopher Sang, Jennifer Blain Christen, Sule Ozev
Arizona State University, United States

Development of a Point-of-Care Diagnostic Smart Sensing System to Detect Creatinine Levels 77

Sumedha Prabhu¹, Chinthaka Gooneratne², Ky Anh Hoang¹, Subhas Mukhopadhyay¹
¹*Macquarie University, Australia*; ²*Saudi Aramco, Saudi Arabia*

A1L-E Artificial Intelligence & Internet of Things I

Date: Monday, August 10, 2020

Time: 10:00 - 12:00

Location: Room 5

Chair(s): Pamela Abshire, *University of Maryland College Park*
Jennifer Blain Christen, *Arizona State University*

Electrically-Tunable Stochasticity for Spin-Based Neuromorphic Circuits: Self-Adjusting to Variation	81
Hossein Pourmeidani ² , Punyashloka Debashis ¹ , Zhihong Chen ¹ , Ronald Demara ² , Ramtin Zand ³ ¹ <i>Purdue University, United States</i> ; ² <i>University of Central Florida, United States</i> ; ³ <i>University of South Carolina, United States</i>	
Implementation of Multi Spin-Thread Architecture to Fully-Connected Annealing Processing AI Chips	85
Ryoma Iimura, Satoshi Kitamura, Takayuki Kawahara <i>Tokyo University of Science, Japan</i>	
A Generative Graph Method to Solve the Travelling Salesman Problem	89
Amal Nammouchi, Hakim Ghazzai, Yehia Massoud <i>Stevens Institute of Technology, United States</i>	
Robot Trajectory Target Delivery Using Machine Learning	93
Andrew Gardner, Kourosh Rahnaimai <i>Western New England University, United States</i>	
An Edge Intelligence Framework for Resource Constrained Community Area Network	97
Ogheneuriri Oderhohwo ¹ , Hawzhin Mohammed ¹ , Tolulope A. Odetola ¹ , Terry N. Guo ¹ , Syed Rafay Hasan ¹ , Felix Dogbe ² ¹ <i>Tennessee Technological University, United States</i> ; ² <i>University of Maryland, Baltimore County, United States</i>	
Data-Triggered Approach for Real-Time Machine Learning in IoT Systems	101
Tou Cheng, Falla Coulibaly, Ahmad Patooghy, Olcay Kursun <i>University of Central Arkansas, United States</i>	

A1L-F RF Receivers: Basic Building Blocks

Date: Monday, August 10, 2020

Time: 10:00 - 12:00

Location: Room 6

Chair(s): Soumyajit Mandal, *University of Florida*

A Passive Star Microwave Circuit for 1-3 GHz Self-Interference Cancellation	105
Udara De Silva, Sravan Pulipati, Satheesh Bojja Venkatakrishnan, Shubhendu Bhardwaj, Arjuna Madanayake <i>Florida International University, United States</i>	
A Broadband CMOS Receiver for Multi-Channel Ground-Penetrating Radar (GPR) Systems	109
Phong Nguyen ¹ , Soumyajit Mandal ² ¹ <i>Case Western Reserve University, United States</i> ; ² <i>University of Florida, United States</i>	
A Low-Power Fast Settling 5.4–8.4 GHz Digitally Controlled Oscillator in 45 nm RFSOI CMOS	113
Rui Ma, Florian Protze, Jan Pliva, Martin Kreißig, Frank Ellinger <i>Technische Universität Dresden, Germany</i>	
Low Power Mixer-First Receiver with Second-Order Baseband Filtering TIA	117
Qaiser Nehal <i>MediaTek USA Inc., United States</i>	
A 0.6dB NF, 12dBm IIP3, 4.6-6GHz LNA in 0.13µm Floating-Body SOI CMOS	121
Amit Jha ¹ , Jie Zheng ² , Chris Masse ² , Paul Hurwitz ² , Samir Chaudhry ² ¹ <i>Renesas Electronics America, United States</i> ; ² <i>Tower Semiconductor, United States</i>	

A1L-G Signal and Image Processing I

Date: Monday, August 10, 2020

Time: 10:00 - 12:00

Location: Room 7

Chair(s): Cheol-Hong Min, *University of St. Thomas*
Michael Rahaim, *University of Massachusetts, Boston*

Analog vs. Digital Spatial Transforms: a Throughput, Power, and Area Comparison 125

Zephan Enciso³, Seyed Mirfarshbafan¹, Oscar Castañeda¹, Clemens Schaefer³, Christoph Studer²,
Siddharth Joshi³

¹Cornell University, United States; ²ETH Zürich, Switzerland; ³University of Notre Dame, United States

SDR-Based PHY Characterization of Zigbee Devices 129

Stefan Gvozdenovic, Johannes Becker, David Starobinski
Boston University, United States

A PYNQ Evaluation Platform for FPGA Architectures of the Line Hough Transform 133

David Northcote, Louise Crockett, Paul Murray, Robert Stewart
University of Strathclyde, United Kingdom

Reversible Logic Implementation of Image Denoising for Grayscale Images 138

Sithara Raveendran, Pranose J. Edavoor, Nithin Kumar Y. B., Vasantha M.H.
National Institute of Technology Goa, India

Configurable FPGA-Based Outlier Detection for Time Series Data 142

Leonard Maceachern, Ghazaleh Vazhbakht
Carleton University, Canada

A2L-A Analog Circuits and Systems II

Date: Monday, August 10, 2020

Time: 12:30 - 14:30

Location: Room 1

Chair(s): Shih-hua Wood Chiang, *Brigham Young University*
John Hu, *Oklahoma State University*

A Current-Mode Photon Counting Circuit for Long-Range LiDAR Applications 146

Sachin Purushothaman Nambodiri², Gonzalo Arteaga², James Skelly², Francisco Mata-Carlos²,
Angsuman Roy¹, Russel Jacob Baker²

¹Freedom Photonics, United States; ²University of Nevada Las Vegas, United States

Analyzing the Effects of Noise and Variation on the Accuracy of Analog Neural Networks 150

Devon Janke, David Anderson
Georgia Institute of Technology, United States

A 4th-Order Programmable Channel Selection Filter for Acoustic and Ultrasonic Applications 154

Ningcheng Gaoding, Jean-Francois Bousquet
Dalhousie University, Canada

A Two-Step Multi-Stage Noise-Shaping Incremental Analog-to-Digital Converter 158

Jia-Sheng Huang², Yu-Cheng Huang², Chia-Wei Kao², Che-Wei Hsu², Shih-hua Wood Chiang¹,
Chia-Hung Chen²

¹Brigham Young University, United States; ²National Chiao Tung University, Taiwan

A2L-B Digital Filters

Date: Monday, August 10, 2020
Time: 12:30 - 14:30
Location: Room 2
Chair(s): Nicole McFarlane, *University of Tennessee, Knoxville*
Arindam Sanyal, *University at Buffalo*

Low Order Wideband Multiplierless Comb Compensator 162

Gordana Jovanovic Dolecek², Luis Camuñas-Mesa¹, Jose M. de la Rosa¹
¹IMSE, Spain; ²Institute INAOE, Mexico

Stability and Bias Analysis for Adaptive Normal State-Space Notch Digital Filters 166

Yoichi Hinamoto¹, Shotaro Nishimura²
¹National Institute of Technology, Kagawa College, Japan; ²Shimane University, Japan

Optimization of Artificial Port Reflectances for Wave Digital Filters with Topology-Related Delay-Free Loops 170

Lech Kolonko, Jörg Velten, Anton Kummert
University of Wuppertal, Germany

Design Procedure for 2D Gaussian Anisotropic Filters 174

Radu Matei
Gheorghe Asachi Technical University, Romania

A Digital Random Number Generator Based on Chaotic Sampling of Regular Waveform 178

Hikmet Seha Öztürk, Salih Ergün
TÜBİTAK Informatics and Information Security Research Center, Turkey

Area/Power-Efficient True-Single-Phase-Clock D-Flipflops with Improved Metastability 182

Parth Parekh², Fei Yuan², Yushi Zhou¹
¹Lakehead University, Canada; ²Ryerson University, Canada

A2L-C Smart Power

Date: Monday, August 10, 2020
Time: 12:30 - 14:30
Location: Room 3
Chair(s): RAVI VUNNAM, *Intel Corporation*
Sarath Makala, *Intel Corporation*

Regulation Control Design Techniques for Integrated Switched Capacitor Voltage Regulators 186

Usama Awais, Jae-Sun Seo
Arizona State University, United States

A Wireless Power Transfer System for Biomedical Implants Based on an Isolated Class-E DC-DC Converter with Power Regulation Capability 190

Andrea Celentano², Fabio Pareschi², Virgilio Valente¹, Riccardo Rovatti³, Wouter Serdijn¹, Gianluca Setti²
¹Delft University of Technology, Netherlands; ²Politecnico di Torino, Italy; ³University of Bologna, Italy

A Novel Approach to Reduce Bandwidth Cost and Balance Network and Server Level Load in Intra Data Center Network 194

Mahmuda Akter², Mirza Mohd Shahriar Maswood², Shamima Sultana Sonia², Abdullah G. Alharbi¹
¹Jouf University, Saudi Arabia; ²Khulna University of Engineering & Technology, Bangladesh

A Fully Synthesizable, 0.3V, 10nW Rail-to-Rail Dynamic Voltage Comparator 199

Xuncheng Zou, Shigetoshi Nakatake
University of Kitakyushu, Japan

Split-Capacitor Boost Converter Operating in Boundary Conduction Mode with Impedance Matching for Kinetic Energy Harvesting	203
Alante Dancy, Jiayu Li, Dong Sam Ha <i>Virginia Polytechnic Institute and State University, United States</i>	
An Efficient 2.4 GHz Differential Rectenna for Radio Frequency Energy Harvesting	208
Ryan Reed, Fariborz Lohrabi Pour, Dong Sam Ha <i>Virginia Polytechnic Institute and State University, United States</i>	
A2L-D SPECIAL SESSION: Cognitive Radio	
Date: Monday, August 10, 2020	
Time: 12:30 - 14:30	
Location: Room 4	
Chair(s): Ruolin Zhou, <i>UMass Dartmouth</i>	
Hierarchical Mixed Signal Detection and Modulation Classification	213
Yang Qu ² , Zhiqiang Wu ² , Ruolin Zhou ¹ , Yan Su ² ¹ <i>University of Massachusetts Dartmouth, United States</i> ; ² <i>Wright State University, United States</i>	
RF Device Identification Using CNN Based PUF	217
Todd Morehouse, Ruolin Zhou <i>University of Massachusetts Dartmouth, United States</i>	
PUF Implementation and Application for Securing IoT Devices	221
Ruolin Zhou ¹ , Jed Briones ² , Todd Morehouse ¹ ¹ <i>University of Massachusetts Dartmouth, United States</i> ; ² <i>Western New England University, United States</i>	
Baseband Modulation Classification Using Incremental Learning	225
Todd Morehouse, Neela Rahimi, Ming Shao, Ruolin Zhou <i>University of Massachusetts Dartmouth, United States</i>	
A2L-E Internet of Things	
Date: Monday, August 10, 2020	
Time: 12:30 - 14:30	
Location: Room 5	
Chair(s): Jennifer Blain Christen, <i>Arizona State University</i> Matthew Johnston, <i>Oregon State University</i>	
A Study on IMU Sampling Rate Mismatch for a Wireless Synchronized Platform	229
Giuseppe Coviello ² , Gianfranco Avitabile ² , Antonello Florio ² , Claudio Talarico ¹ ¹ <i>Gonzaga University, United States</i> ; ² <i>Politecnico di Bari, Italy</i>	
Computational Resource Allocation for Edge Computing in Social Internet-of-Things	233
Abdullah Khanfor ¹ , Raby Hamadi ¹ , Hakim Ghazzai ¹ , Ye Yang ¹ , Mohammad Haider ² , Yehia Massoud ¹ ¹ <i>Stevens Institute of Technology, United States</i> ; ² <i>University of Alabama at Birmingham, United States</i>	
Improving Object Localization Resolution Using a Wearable Ultrasonic Sensor Array	237
Sylmarie Dávila-Montero, Sina Parsnejad, Yousef Gtat, Andrew Mason <i>Michigan State University, United States</i>	
A Smart IoT System for Continuous Sleep State Monitoring	241
Vishalini Laguduva Ramnath, Srinivas Katkoori <i>University of South Florida, United States</i>	
Watts Better Than mAh for IoT Devices?	245
Brad Jolly <i>Keysight Technologies, United States</i>	

Human Activity Recognition from Multi-Modal Wearable Sensor Data Using Deep Multi-Stage LSTM Architecture Based on Temporal Feature Aggregation	249
Tanvir Mahmud ¹ , Shaimur Salehin Akash ¹ , Shaikh Anowarul Fattah ¹ , Wei-Ping Zhu ² , M. Omair Ahmad ²	
¹ Bangladesh University of Engineering and Technology, Bangladesh; ² Concordia University, Canada	
A2L-F Neuromorphic Circuits and Systems III	
Date: Monday, August 10, 2020	
Time: 12:30 - 14:30	
Location: Room 6	
Chair(s): Vanessa Chen, <i>Carnegie Mellon University</i> Arindam Sanyal, <i>University at Buffalo</i>	
Neural Networks for Authenticating Integrated Circuits Based on Intrinsic Nonlinearity	253
Sudarsan Sadasivuni ² , Sanjeev T Chandrasekaran ² , Akshay Jayaraj ¹ , Arindam Sanyal ²	
¹ Intel Corporation, United States; ² University at Buffalo, United States	
8T XNOR-SRAM Based Parallel Compute-in-Memory for Deep Neural Network Accelerator	257
Hongwu Jiang ² , Rui Liu ¹ , Shimeng Yu ²	
¹ Arizona State university, United States; ² Georgia Institute of Technology, United States	
Low Power Phase-Encoded MAC Accelerator for Smart Sensors with VCO-Based ADCs	261
Eric Gutierrez, Carlos Perez, Susana Paton, Luis Hernandez	
<i>Carlos III University, Spain</i>	
Machine-Learning Based Nonlinearity Correction for Coarse-Fine SAR-TDC Hybrid ADC	265
Hao Deng ² , Qingjun Fan ² , Runxi Zhang ¹ , Jinghong Chen ²	
¹ East China Normal University, China; ² University of Houston, United States	
Wireless Bayesian Neural Networks with Self-Assembly DNA Memory and Spin-Torque Oscillators	269
Ethan Chen, Jiachen Xu, Jian-Gang Zhu, Vanessa Chen	
<i>Carnegie Mellon University, United States</i>	
A2L-G Secure and Trusted Communication in Hardware	
Date: Monday, August 10, 2020	
Time: 12:30 - 14:30	
Location: Room 7	
Chair(s): Yang Yi, <i>Virginia Polytechnic Institute and State University</i>	
An Ultra-Low Power and Lower Area Current-Mode Based Physically Unclonable Function with Less Than 100nW Power Consumption and a Native Instability of 0.6875% for IoT Applications	273
Nikita Mirchandani, Nasim Shafiee, Yunsi Fei, Aatmesh Shrivastava	
<i>Northeastern University, United States</i>	
Challenges and New Directions for AI and Hardware Security	277
Benjamin Tan, Ramesh Karri	
<i>New York University, United States</i>	
FTAI: Frequency-Based Trojan-Activity Identification Method for 3D Integrated Circuits	281
Zhiming Zhang, Qiaoyan Yu	
<i>University of New Hampshire, United States</i>	
An Inverter-Based True Random Number Generator with 4-Bit Von-Neumann Post-Processing Circuit	285
Xingyu Wang, Hongjie Liu, Ruilin Zhang, Kunyang Liu, Hirofumi Shinohara	
<i>Waseda University, Japan</i>	

Randomized Pulse-Based Encoding for Secure Wireless Data Communications.....	289
Md. Kamal Hossain ¹ , Md. Imtiaz Rashid ² , Mohammad Haider ¹ , Md. Tauhidur Rahman ²	
¹ University of Alabama at Birmingham, United States; ² University of Alabama in Huntsville, United States	
Vulnerability of Deep Learning Model Based Anomaly Detection in Vehicle Network	293
Yi Wang ¹ , Dan Wei Ming Chia ³ , Yajun Ha ²	
¹ Continental Automotive Singapore, Singapore; ² ShanghaiTech University, China; ³ Singapore Institute of Technology, Singapore	
A3L-A Analog Circuits and Systems III	
Date:	Monday, August 10, 2020
Time:	15:00 - 17:00
Location:	Room 1
Chair(s):	John Hu, Oklahoma State University Armin Tajalli, University of Utah
Preliminary Assessment of a Novel Intraoral-Tongue Operated Assistive Technology with Computer Interface.....	297
Fanpeng Kong ² , Yaoyao Jia ³ , Maysam Ghovanloo ¹	
¹ Bionic Sciences Inc., United States; ² Georgia Institute of Technology, United States; ³ North Carolina State University, United States	
Low-Noise, Low-Power Pulse Shaper for Particle Detection.....	301
Devon Webb, Yixin Song, Jace Rozsa, Elaura Gustafson, Daniel Austin, Aaron Hawkins, Shih-hua Wood Chiang	
Brigham Young University, United States	
Three-Junction Bandgap Circuit with Sub 1 ppm/°C Temperature Coefficient.....	305
Pallavi Sugantha Ebenezer, Vijayalakshmi Naganadhan, Degang Chen, Randall Geiger	
Iowa State University, United States	
A Constant gm Current Reference Generator with Purely Off-Chip Resistor	309
Mohsen Shahghasemi, Kofi Odame	
Dartmouth College, United States	
Anticipation of Irregular Patterns: a Wave Digital Approach	313
Karlheinz Ochs, Sebastian Jenderny, Enver Solan	
Ruhr-University Bochum, Germany	
A3L-B Digital Circuits and Systems II	
Date:	Monday, August 10, 2020
Time:	15:00 - 17:00
Location:	Room 2
Chair(s):	M. W. Chaudhary, Fraunhofer IIS
Mitigation Effects of Decoupling Cells on Full Adders Process Variability	317
Fábio G. Rossato G. Da Silva ² , Cristina Meinhardt ¹ , Ricardo Reis ²	
¹ Universidade Federal de Santa Catarina, Brazil; ² Universidade Federal do Rio Grande do Sul, Brazil	
All-Digital Time Integrator Using Bi-Directional Gated Vernier Delay Line.....	321
Parth Parekh ² , Fei Yuan ² , Yushi Zhou ¹	
¹ Lakehead University, Canada; ² Ryerson University, Canada	
Energy Adaptive Convolution Neural Network Using Dynamic Partial Reconfiguration.....	325
Eman Youssef ² , Ahmed Khattab ¹ , Hamed A. Elsemery ⁴ , Magdy A. El-Moursy ³ , Hassan Mostafa ⁵	
¹ Cairo University, Egypt; ² Electronics Research Institute, Egypt; ³ Mentor Graphics, United States; ⁴ Prince Sattam Bin Abdulaziz University, Saudi Arabia; ⁵ Zewail City / Cairo University, Egypt	

A 112-fJ/Bit 10-Gb/s Charge-Steering Equalizer Utilizing a Discrete-Time Linear Equalizer	329
Marco Saif, Amr Kotb, Khaled Hassan, Sameh Ibrahim <i>Ain Shams University, Egypt</i>	
13-Gb/s Transmitter for Bunch of Wires Chip-to-Chip Interface Standard.....	333
Muhammad Waqas Chaudhary ¹ , Andy Heinig ¹ , Bhaskar Choubey ² ¹ <i>Fraunhofer Institute for Integrated Circuits IIS Division Engineering of Adaptive Systems EAS, Germany;</i> ² <i>Universität Siegen, Germany</i>	
A3L-C Converter Circuits and Systems I	
Date: Monday, August 10, 2020 Time: 15:00 - 17:00 Location: Room 3 Chair(s): Tingshu Hu, <i>University of Massachusetts Lowell</i> Sri Navaneeth Easwaran, <i>Texas Instruments Inc</i>	
A Fast Response Reference Voltage Buffer for 12b 200MS/s SAR ADC	337
Wenbin He, Fan Ye, Junyan Ren <i>Fudan University, China</i>	
A 13-Bit 312.5-MS/s Pipelined SAR ADC with Integrator-Type Residue Amplifier and Inter-Stage Gain Stabilization Technique	341
Meng Ni, Xiao Wang, Zhe Zhou, Yang Ding, Fule Li, Woogeun Rhee, Zhihua Wang <i>Tsinghua University, Korea; Tsinghua University, China</i>	
A Correlation-Based Timing Skew Calibration Strategy Using a Time-Interleaved Reference ADC	345
Meng Ni, Xiao Wang, Zhe Zhou, Yang Ding, Fule Li, Woogeun Rhee, Zhihua Wang <i>Tsinghua University, Korea; Tsinghua University, China</i>	
A Sawtooth Relaxation ICO Based 1-1 MASH ADC.....	349
Sudhanva Vasishta ² , K R Raghunandan ¹ , Ananth Dodabalapur ² ¹ <i>Silicon Labs, United States;</i> ² <i>University of Texas at Austin, United States</i>	
Noise-Shaping SAR ADC Using a Two-Capacitor Digitally Calibrated DAC with 85.1 dB DR and 91 dB SFDR.....	353
Lukang Shi ¹ , Eashwar Thaigarajan ¹ , Rajiv Singh ¹ , Erhan Hancioglu ¹ , Un-Ku Moon ² , Gabor Temes ² ¹ <i>Infineon Technologies, United States;</i> ² <i>Oregon State University, United States</i>	
A 10.75-ENOB 20 MS/s SAR ADC for an UWB Transceiver Applied in Breast Cancer Detection in 180 nm CMOS	357
David Reyes, Tarciso Martins, Hugo Hernandez, Wilhelmus Van Noije <i>University of São Paulo, Brazil</i>	
A3L-D Sensor Circuits and Systems II	
Date: Monday, August 10, 2020 Time: 15:00 - 17:00 Location: Room 4 Chair(s): Ruolin Zhou, <i>UMass Dartmouth</i> Takashi Tokuda, <i>Tokyo Institute of Technology</i>	
An Enhanced Visual-Inertial Navigation System Based on Multi-State Constraint Kalman Filter	361
Soroush Sheikhpour Kourabbaslou, Mohamed M. Atia <i>Carleton University, Canada</i>	
Image Quality and Complexity Metric for Smart CMOS Image Sensors.....	365
Mohamed Elmezayen, Suat Ay <i>University of Idaho, United States</i>	

Leader-Follower Coverage Based on Power Transmission and Heading Angles.....	369
Eduardo Gamaliel Hernandez-Martinez ³ , Jaime González-Sierra ⁴ , Eduardo Álvarez-Guzmán ¹ , Guillermo Fernandez-Anaya ³ , Enrique Dumas Ferreira-Vazquez ² , José Job Flores-Godoy ² ¹ Universidad Autónoma de Baja California, Mexico; ² Universidad Católica del Uruguay, Uruguay; ³ Universidad Iberoamericana Ciudad de México, Mexico; ⁴ Universidad Politécnica de Pachuca, Mexico	
A Carbon Nanotube Inkjet-Printed Hybrid Circuit for Non-Conventional Computing	373
Steven Gardner ² , Md Toriqul Islam ³ , J. Iwan D. Alexander ² , Yehia Massoud ¹ , Mohammad Haider ² ¹ Stevens Institute of Technology, United States; ² University of Alabama at Birmingham, United States; ³ University of Virginia, United States	
Single Photon Avalanche Diode Based Vision Sensor with On-Chip Memristive Spiking Neuromorphic Processing	377
Mst Shamim Ara Shawkat, Sagarvarma Sayyarparaju, Nicole McFarlane, Garrett S. Rose University of Tennessee, Knoxville, United States	
Multi-Site Impedance Measurement System Based on MAX30001 Integrated-Circuit.....	381
Shelby Critcher, Todd Freeborn University of Alabama, United States	
A3L-E Neural Networks	
Date:	Monday, August 10, 2020
Time:	15:00 - 17:00
Location:	Room 5
Chair(s):	Neeraj Magotra, <i>Western New England University</i> Nicole McFarlane, <i>University of Tennessee, Knoxville</i>
Synchronized Analog Capacitor Arrays for Parallel Convolutional Neural Network Training	387
Effendi Leobandung, Malte Rasch, Yulong Li <i>IBM, United States</i>	
Increasing CNN Representational Power Using Absolute Cosine Value Regularization	391
William Singleton, Mohamed El-Sharkawy <i>Purdue University, United States</i>	
Unsupervised Clustering of COVID-19 Chest X-Ray Images with a Self-Organizing Feature Map	395
Bayley King, Siddharth Barve, Andrew Ford, Rashmi Jha <i>University of Cincinnati, United States</i>	
MSB-First Distributed Arithmetic Circuit for Convolution Neural Network Computation	399
Md Kamruzzaman Shuvo, David E Thompson, Haibo Wang <i>Southern Illinois University, United States</i>	
Energy Efficient Fixed-Point Inference System of Convolutional Neural Network	403
Chun Yan Lo, Chiu Wing Sham <i>University of Auckland, New Zealand</i>	
Design of SIW Filter Based on the Equivalent De-Embedding Technique and Inverse Neural Network	407
Gong-Yuan Du, Long Jin <i>University of Electronic Science and Technology of China, China</i>	

A3L-F Energy Harvesting and Power Management Circuits and Devices

Date: Monday, August 10, 2020
Time: 15:00 - 17:00
Location: Room 6
Chair(s): InHee Lee, *University of Pittsburgh*
Sudhanshu Khanna, *Texas Instruments*

Non-Isolated 48V-to-1V Heterogeneous Integrated Voltage Converters for High Performance Computing in Data Centers..... 411

Minxiang Gong¹, Xin Zhang², Arijit Raychowdhury¹
¹*Georgia Institute of Technology, United States*; ²*IBM T.J. Watson Research Center, United States*

A Dual-Band Rectifying Antenna Design for RF Energy Harvesting 415

Jincheng Zhao, Guru Subramanyam, Hailing Yue
University of Dayton, United States

Experimental Validation of CT-Snubber for Multichip SiC MOSFET Power Module 419

Bo Fu, Ali Shahabi, Todd Freeborn, Andrew Lemmon, Mithat Kisacikoglu
University of Alabama, United States

Dual-Purpose Metal Inter-Layer via Utilization in Monolithic Three-Dimensional (M3D) Integration..... 424

Madhava Sarma Vemuri, Umamaheswara Rao Tida
North Dakota State University, United States

A3L-G 5G & mmWave Circuits and Systems

Date: Monday, August 10, 2020
Time: 15:00 - 17:00
Location: Room 7
Chair(s): Leonid Belostotsk, *U. of Calgary*

Phased Array Advantages at BAE Systems 428

Alexander Johnson, Ben McMahon, Matilda Livadaru, Mark Fosberry
BAE Systems, United States

A 28 GHz Highly Accurate Phase- and Gain- Steering Transmitter Frontend for 5G Phased-Array Applications..... 432

Katharina Kolb¹, Julian Potschka¹, Tim Maiwald¹, Klaus Aufinger², Amelie Hagelauer³, Marco Dietz¹, Robert Weigel¹
¹*Friedrich-Alexander-University Erlangen-Nuremberg, Germany*; ²*Infineon Technologies AG, Germany*; ³*University Bayreuth, Germany*

A 6-mW W-Band LNA in 0.13 μ m SiGe BiCMOS for Passive Imaging Systems 436

Berke Gungor², Esref Turkmen², Melik Yazici², Mehmet Kaynak¹, Yasar Gurbuz²
¹*IHP Microelectronics, Germany*; ²*Sabanci University, Turkey*

Passive Third-, Fourth-, and Fifth-Order Reconfigurable D-Band Frequency Multipliers Based on Switched-Capacitor Varactors..... 440

Nan Zhang, Leonid Belostotski, James Haslett
University of Calgary, Canada

A Compact Low-Loss On-Chip N-Way Wilkinson Power Divider for mm-Wave 5G Applications..... 444

Hesham Beshary, Islam Eshrah, Mohamed Abdalla, Ahmed Mohieldin
Cairo University, Egypt

B1L-A Neuromorphic Circuits and Systems II

Date: Tuesday, August 11, 2020

Time: 10:00 - 12:00

Location: Room 1

Chair(s): Yang Yi, *Virginia Polytechnic Institute and State University*
Yanzhi Wang, *Northeastern University*

Mimicking Neuroplasticity by Memristive Circuits..... 448

Karlheinz Ochs², Dennis Michaelis², Sebastian Jenderny², Hermann Kohlstedt¹

¹Kiel University, Germany; ²Ruhr-University Bochum, Germany

Low Power Compact Analog Spiking Neuron Circuit Using Exponential Positive Feedback with Adaptation and Bursting Capability 452

Md Munir Hasan, Jeremy Holleman

University of North Carolina at Charlotte, United States

Pattern Characterization in Second Order Memristor Networks..... 456

Francesco Marrone, Gianluca Zoppo, Fernando Corinto, Marco Gilli

Politecnico di Torino, Italy

Leakage Current Compensation in Large Number of Inactive Synapses in a 130nm CMOS Process 460

Md Munir Hasan, Jeremy Holleman

University of North Carolina at Charlotte, United States

Tunable Non-Volatile Analog Resistive Memory and its Application in Ai..... 464

Heba Abunahla, Yasmin Halawani, Baker Mohammad, Anas Alazzam

Khalifa University, U.A.E.

B1L-B Estimation and Optimization of NoC and System Reliability

Date: Tuesday, August 11, 2020

Time: 10:00 - 12:00

Location: Room 2

Chair(s): Md Farhadur Reza, *University of Central Missouri*

Reinforcement Learning Based Dynamic Link Configuration for Energy-Efficient NoC..... 468

Md Farhadur Reza

University of Central Missouri, United States

Improving Reliability in Spidergon Network on Chip-Microprocessors 474

Biswajit Bhowmik³, Jatindra Kumar Deka², Santosh Biswas¹

¹Indian Institute of Technology Bhilai, India; ²Indian Institute of Technology Guwahati, India;

³National Institute of Technology Karnataka, India

Reliability Optimization Under Severe Uncertainty for NoC Based Architectures Using an Info-Gap Decision Approach 478

Wenkai Guan, Jinhua Zhang, Cristinel Ababei

Marquette University, United States

Gem5Panalyzer: a Light-Weight Tool for Early-Stage Architectural Reliability Evaluation & Prediction..... 482

Hao Qiu², Xiaoxing Qiu², Semiu Olowogemo², Bor-Tyng Lin², William Robinson², Daniel Limbrick¹

¹North Carolina Agricultural and Technical State University, United States; ²Vanderbilt University, United States

Acceleration of Arithmetic Processing with CAM-Based Massive-Parallel SIMD Matrix Core..... 486

Kyosuke Kageyama², Kensuke Watanabe², Akimitsu Hamai², Takeshi Kumaki², Tetsushi Koide¹

¹Hiroshima University, Japan; ²Ritsumeikan University, Japan

Implementation of a CNN Identifying Modulation Signals on an Embedded SoC 490

Changbo Hou, Chen Fang, Yun Lin, Yuqian Li, Jie Zhang

Harbin Engineering University, China

B1L-C AI and Hardware Security

Date: Tuesday, August 11, 2020
Time: 10:00 - 12:00
Location: Room 3
Chair(s): Magdy Bayoumi, *University of Louisiana at Lafayette*

Semantic Feature Discovery of Trojan Malware Using Vector Space Kernels..... 494

John Musgrave², Carla Purdy², Anca Ralescu², David Kapp¹, Temesgen Kebede¹
¹*Air Force Research Laboratory, United States*; ²*University of Cincinnati, United States*

Vilokana - Lightweight COVID19 Document Analysis 500

Srijith Panja, Akshay Maan, Alex James
Indian Institute of Information Technology and Management - Kerala, India

A Reversible-Logic Based Architecture for Artificial Neural Network 505

Bappaditya Dey, Kasem Khalil, Ashok Kumar, Magdy Bayoumi
University of Louisiana at Lafayette, United States

An Energy Efficient Time-Mode Analog Neural Network 509

Liam Crowley, Sameer Sonkusale
Tufts University, United States

A Simple Extreme Learning Machine Model for Detecting Heart Arrhythmia in the Electrocardiography Signal 513

Nelly Elsayed¹, Zaghoul Saad Zaghoul²
¹*University of Cincinnati, United States*; ²*University of Louisiana at Lafayette, United States*

B1L-D Biomedical Circuits and Systems I

Date: Tuesday, August 11, 2020
Time: 10:00 - 12:00
Location: Room 4
Chair(s): Nicole McFarlane, *University of Tennessee, Knoxville*
Mehdi Kiani, *Pennsylvania State University*

A Neurochemical Recording Microsystem with Analog Background Current Subtraction and 400V/s FSCV Sensing Using a 1st-Order $\Delta\Sigma$ 517

Hossein Zamani, Shyue-An Chan, Corey Smith, Pedram Mohseni
Case Western Reserve University, United States

A Low-Power Reconfigurable Readout Circuit with Large DC Offset Reduction for Neural Signal Recording Applications 521

Nishat Tarannum Tasneem, Ifana Mahbub
University of North Texas, United States

A Portable CMOS Based pH Sensor..... 525

Shaghayegh Aslanzadeh, Matthew Smalley, Ava Hedayatipour, Nicole McFarlane
University of Tennessee, Knoxville, United States

Windowed Integration Sampling in Bio-Signal Front-End Design 529

Jialin Liu, David Allstot
Oregon State University, United States

Implantable Neural-Recording Modules for Monitoring Electrical Neural Activity in the Central and Peripheral Nervous Systems 533

Taeju Lee, Wonsuk Choi, Jinseok Kim, Minkyu Je
Korea Advanced Institute of Science and Technology, Korea

B1L-E Microwave Devices, Circuits and Packaging

Date: Tuesday, August 11, 2020
Time: 10:00 - 12:00
Location: Room 5
Chair(s): Vishal Saxena, *University of Delaware*

A Novel Low Loss 3D System-in-Package Approach for 60GHz Antenna on Chip Applications 537

Steve Adamshick², Sandhiya Govindarajulu¹, Elias Alwan¹
¹*Florida International University, United States*; ²*Western New England University, United States*

A 0.9 mW Compact Power Detector with 30 dB Dynamic Range for Automotive Radar Applications 541

Hamza Kandis², Berke Gungor², Melik Yazici², Mehmet Kaynak¹, Yasar Gurbuz²
¹*IHP Microelectronics, Germany*; ²*Sabanci University, Turkey*

Distributed-Model-Based Design Approach for Achieving Matched Phase Velocities in High-Frequency GaN HEMTs 545

Amirreza Ghadimi Avval, Samir El-Ghazaly
University of Arkansas, United States

A Temperature Compensated 5 GHz GaN on SiC Power Amplifier 549

Fariborz Lohrabi Pour, Dong Sam Ha
Virginia Polytechnic Institute and State University, United States

B1L-F Quantum and AI Systems

Date: Tuesday, August 11, 2020
Time: 10:00 - 12:00
Location: Room 6
Chair(s): Esteban Tlelo-Cuautle, *Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE)*
Arjuna Madanayake, *Florida International University*

Design of Ternary Master-Slave D-Flip Flop Using MOS-GNRFET 554

Zarin Tasnim Sandhie, Farid Uddin Ahmed, Masud H Chowdhury
University of Missouri-Kansas City, United States

Design of Ternary Logic Inverter Using Quantum Dot Gate Nonvolatile Memory (QDNVM) 558

Supriya Karmakar
Farmingdale State College - State University of New York, United States

Memristor-CNTFET Based Ternary Full Adders 562

Amr Mohammaden², Mohammed Fouda³, Lobna Said², Ahmed Radwan¹
¹*Cairo University / Nile University, Egypt*; ²*Nile University, Egypt*; ³*University of California Irvine, United States*

Image Analysis and Feature Extraction of Kato-Katz Images for Neglected Tropical Diseases Diagnosis 566

Farah Sinada, Saumya Kareem Reni, Izzet Kale
University of Westminster, United Kingdom

B1L-G Signal and Image Processing III

Date: Tuesday, August 11, 2020
Time: 10:00 - 12:00
Location: Room 7
Chair(s): Kourosh Rahnamai, *Western New England University*
Robert L Brennan, *ON Semiconductor*

Real-Time Image Aesthetic Score Prediction for Portable Devices 570

Prashanth Venkataswamy, M. Omair Ahmad, M.N.S. Swamy
Concordia University, Canada

A Minimax Approach to Perturbation Attacks on Hierarchical Image Classifiers	574
Ismail Alkhouri, Zaid Matloub, George Atia, Wasfy B. Mikhael <i>University of Central Florida, United States</i>	
Speech Separation Using a Composite Model for Complex Mask Estimation.....	578
Mojtaba Hasannezhad ¹ , Zhiheng Ouyang ¹ , Wei-Ping Zhu ¹ , Benoit Champagne ² ¹ Concordia University, Canada; ² McGill University, Canada	
Quantifying Noise Robustness of Bone-Conducted Speech	582
Shiming Zhang, Yosuke Sugiura, Nozomiko Yasui, Tetsuya Shimamura <i>Saitama University, Japan</i>	
CU Size Decision for Low Complexity HEVC Intra Coding Based on Deep Reinforcement Learning	586
Mohammadreza Jamali ¹ , Stéphane Coulombe ¹ , Hamidreza Sadreazami ² ¹ École de Technologie Supérieure, Canada; ² McGill University, Canada	
B2L-A Neuromorphic Circuits and Systems I	
Date: Tuesday, August 11, 2020	
Time: 12:30 - 14:30	
Location: Room 1	
Chair(s): Yang Yi, <i>Virginia Polytechnic Institute and State University</i> Xue Lin, <i>Northeastern University</i>	
Energy Efficient and Adaptive Analog IC Design for Delay-Based Reservoir Computing	592
Fabiha Nowshin, Lingjia Liu, Yang Yi <i>Virginia Polytechnic Institute and State University, United States</i>	
A Case for Lifetime Reliability-Aware Neuromorphic Computing.....	596
Shihao Song, Anup Das <i>Drexel University, United States</i>	
Memory Organization and Structures for On-Chip Learning in Spiking Neural Networks	599
Clemens Schaefer, Siddharth Joshi <i>University of Notre Dame, United States</i>	
AA-ResNet: Energy Efficient All-Analog ResNet Accelerator	603
Jongyup Lim, Myungjoon Choi, Bowen Liu, Taewook Kang, Ziyun Li, Zhehong Wang, Yiqun Zhang, Kaiyuan Yang, David Blaauw, Hun-Seok Kim, Dennis Sylvester <i>University of Michigan, United States</i>	
B2L-B ASIC Circuit and System Design	
Date: Tuesday, August 11, 2020	
Time: 12:30 - 14:30	
Location: Room 2	
Chair(s): Robert L Brennan, <i>ON Semiconductor</i>	
Machine Learning Model Based Digital Hardware System Design for Detection of Sleep Apnea Among Neonatal Infants.....	607
Omiya Hassan, Dilruba Parvin, Syed Islam <i>University of Missouri, United States</i>	
Read-Out Architecture of CRYO System-on-Chip ASIC for Noble Liquid TPC Detectors	611
Aseem Gupta ³ , Aldo Pena-Perez ³ , Bojan Markovic ³ , Dionisio Doering ³ , Benjamin Reese ³ , Camillo Tamma ³ , Hussein Ali ⁵ , Pietro Caragiulo ³ , Savino Pettrignani ² , Lorenzo Rota ³ , Umanath Kamath ³ , Xiaobin Xu ⁴ , Faisal Abu-Nimeh ¹ , Angelo Drag ¹ Apple Inc, United States; ² Politecnico di Bari, Italy; ³ Stanford University / SLAC National Laboratory, United States; ⁴ TDK InvenSense, United States; ⁵ TeraDyne Inc, United States	

Irregular Sampling of Regular Waveform Based Random Number Generator Exploiting Two Simultaneous Metastable Events of Tetrahedral Oscillators	615
Recep Günay, Salih Ergün <i>TÜBİTAK Informatics and Information Security Research Center, Turkey</i>	
Electrical Masking Improvement with Standard Logic Cell Synthesis Using 45 nm Technology Node	619
Semiu Olowogemo ² , Ahmed Yiwere ¹ , Bor-Tyng Lin ² , Hao Qiu ² , William Robinson ² , Daniel Limbrick ¹ ¹ <i>North Carolina Agricultural and Technical State University, United States;</i> ² <i>Vanderbilt University, United States</i>	
B2L-C Hardware & Systems Security	
Date: Tuesday, August 11, 2020 Time: 12:30 - 14:30 Location: Room 3 Chair(s): John Hu, <i>Oklahoma State University</i>	
A Systematic Approach for Internal Entropy Boosting in Delay-Based RO PUF on an FPGA.....	623
Abby Aguirre ¹ , Michael Hall ¹ , Timothy Lim ¹ , Jonathan Trinh ¹ , Wei Yan ² , Fatemeh Tehranipoor ¹ ¹ <i>Santa Clara University, United States;</i> ² <i>Washington University in St. Louis, United States</i>	
Implementation of a Hardware Accelerator for a Real-Time Encryption System.....	627
Islam Mohamed Shaher ¹ , Mostafa Mahmoud ¹ , Hassan Ibrahim ¹ , Moustafa Ali ¹ , Hassan Mostafa ² ¹ <i>Cairo University, Egypt;</i> ² <i>Zewail City / Cairo University, Egypt</i>	
A Comparative Study on Fibonacci-Galois Ring Oscillators for Random Number Generation.....	631
Kaya Demir, Salih Ergün <i>TÜBİTAK Informatics and Information Security Research Center, Turkey</i>	
An Improved Hardware Architecture for Modulo Without Multiplication.....	635
Ryan Swann, James Stine <i>Oklahoma State University, United States</i>	
Efficient Functional Locking of Behavioral IPs	639
Anjana Balachandran ¹ , Benjamin Carrion Schafer ² ¹ <i>Hong Kong Polytechnic University, Hong Kong;</i> ² <i>University of Texas at Dallas, United States</i>	
B2L-D Biomedical Circuits and Systems II	
Date: Tuesday, August 11, 2020 Time: 12:30 - 14:30 Location: Room 4 Chair(s): Matthew Johnston, <i>Oregon State University</i> Soumyajit Mandal, <i>University of Florida</i>	
Continuous ECG Monitoring with Low-Power Electronics and Energy Harvesting	643
Jackson Richards, Michael Lim, Guanting Li, Esteban Araya, Yaoyao Jia <i>North Carolina State University, United States</i>	
Contemporary and Nascent Techniques for Monitoring of Oxygenation as a Vital Sign	647
Devdip Sen, Ian Costanzo, Ulkuhan Guler <i>Worcester Polytechnic Institute, United States</i>	
DC-100 kHz Tunable Readout IC for Impedance Spectroscopy and Amperometric Measurement of Electrochemical Sensors	651
Boyu Shen, Matthew Johnston <i>Oregon State University, United States</i>	
A Fully-Integrated 27.12 MHz Inductive Power and Data Telemetry Link for Biomedical Implants	655
Xinyao Tang ¹ , Haixiang Zhao ² , Soumyajit Mandal ² ¹ <i>Case Western Reserve University, United States;</i> ² <i>University of Florida, United States</i>	

A Wide-Band, Wide-Swing Current Driver for Electrical Impedance Tomography Applications 659

Mohsen Shahghasemi, Kofi Odame
Dartmouth College, United States

B2L-E Converter Circuits and Systems II

Date: Tuesday, August 11, 2020
Time: 12:30 - 14:30
Location: Room 5
Chair(s): Tingshu Hu, *University of Massachusetts Lowell*
Sri Navaneeth Easwaran, *Texas Instruments Inc*

Level-Crossing Detection Based Low-Power Sigma-Delta ADC for Sensor Applications 663

Sudhanva Vasishta², K R Raghunandan¹, Ananth Dodabalapur², T R Viswanathan²
¹*Silicon Labs, United States*; ²*University of Texas at Austin, United States*

A Current-to-Digital $\Delta\Sigma$ ADC for Low-Noise High-Precision Applications 667

Mitra Saeidi, Luke Theogarajan
University of California, Santa Barbara, United States

Blocker-Tolerant Wideband Continuous-Time $\Delta\Sigma$ ADC Using Embedded Minimally-Invasive Filtering 671

Ashwin K. Vijayan, Aydin I. Karsilayan
Texas A&M University, United States

Pseudo-Pseudo-Differential Multibit Delta-Sigma Modulator 675

Emanuel Caceres, Manjunath Kareppagoudr, Jyotindra Shakya, Gabor Temes
Oregon State University, United States

A Sub- μ W Power 10 Bit $\Delta\Sigma$ ADC for Biomedical Applications 679

Laxmeesha Somappa, Maryam Shojaei Baghini
Indian Institute of Technology Bombay, India

B2L-F Communications Circuits

Date: Tuesday, August 11, 2020
Time: 12:30 - 14:30
Location: Room 6
Chair(s): Yushi Zhou, *Lakehead University*
Sleiman Bou-Sleiman, *Intel Corporation*

7-mm Low-Latency Inter-Chiplet Serial Link with Silicon Interposer 683

Mohammed Tmimi¹, Stefano D'Amico³, Jean-Marc Duchamp², Philippe Ferrari², Philippe Galy¹
¹*STMicroelectronics / Université Grenoble Alpes, France*; ²*Université Grenoble Alpes, France*;
³*University of Salento, Italy*

A 0.024-mm² 45.4-GHz-Bandwidth Unity-Gain Output Driver with SDD22<-10dB Up to 35 GHz 687

Yong Chen², Pui-In Mak², Chirn Chye Boon¹, Rui P. Martins²
¹*Nanyang Technological University, Singapore*; ²*University of Macau, Macau*

Square-Wave Modulated Damping in Transimpedance Amplifiers 691

Pouria Aminfar, Glenn Cowan
Concordia University, Canada

Efficient ASIC Implementation of a NB-IoT Security Co-Processor 695

Mohamed A. Sharaf¹, Eslam AbdelBary¹, Hassan Mostafa², Ahmed Hussein Khalil¹, Amin M. Hussein¹
¹*Cairo University, Egypt*; ²*Zewail City / Cairo University, Egypt*

Analog CMOS Non-Linear Chirp Generation Using All-Pass Filters Based on Laguerre Function 699

Srujana Kagita², Sandra George¹, Gerhard Fettweis³
¹*Barkhausen Institut GmbH, Germany*; ²*Kings Abdullah University of Science and Technology, Saudi Arabia*; ³*Technische Universität Dresden, Germany*

Efficient Hardware Design Architectures for BCH Product Codes in the Frequency Domain 703

Arijit Mondal, Shayan Srinivasa Garani
Indian Institute of Science, Bangalore, India

B2L-G Hardware Design

Date: Tuesday, August 11, 2020
Time: 12:30 - 14:30
Location: Room 7
Chair(s): James Stine, *Oklahoma State University*

**Bridging the Gaps Between Different Sign Conventions of Fresnel Reflection Coefficients
Towards a Universal Form 707**

Minsu Oh, Thomas Vandervelde
Tufts University, United States

A Ling-Enhanced Adder for IEEE-Compliant Floating-Point Multiplication 714

Ross Thompson, James Stine
Oklahoma State University, United States

A Survey and Analysis on SoC Platform Security in ARM, Intel and RISC-V Architecture 718

Geraldine Shirley Nicholas, Yutian Gui, Fareena Saqib
University of North Carolina at Charlotte, United States

SRAM Security and Vulnerability to Hardware Trojan: Design Considerations 722

Roghayeh Saeidi², Morteza Nabavi¹, Yvon Savaria¹
¹*Polytechnique Montreal, Canada;* ²*University of Lavaun, Belgium*

B3L-A Analog Circuits and Systems IV

Date: Tuesday, August 11, 2020
Time: 15:00 - 17:00
Location: Room 1
Chair(s): Vishal Saxena, *University of Delaware*
Shaolan Li, *Georgia Institute of Technology*

Approximate Voltage Regulation for Energy Efficient Error Tolerable Applications 726

Longfei Wang¹, Selcuk Köse²
¹*Qualcomm Corporation, United States;* ²*University of Rochester, United States*

A Sub-nW, 8T Current Reference Consuming Constant Power w.r.t Process & Temperature 730

Ashafakh Ali, Abhishek Pullela, Arpan Jain, Zia Abbas
International Institute of Information Technology Hyderabad, India

A Wide Input Range 8/16x Time Amplifier with Gated Ring Oscillator Based Time Registers 734

Chen Zhang, Bo Wang, Cong Lin, Minghim Lui, Yiheng Xi
Peking University Shenzhen Graduate School, Hong Kong; Peking University Shenzhen Graduate School, China

First Quadrant Chua Diode I-V Characteristic and its Chaotic Dynamics in Chua's Circuit 738

Troy Coleman, Todd Wey
Lafayette College, United States

Generalization of Bessel (Thomson), Stokes and Quasi-Butterworth Filters 742

Igor Filanovsky
University of Alberta, Canada

B3L-B Analog Circuits and Systems VI

Date: Tuesday, August 11, 2020
Time: 15:00 - 17:00
Location: Room 2
Chair(s): Shaolan Li, *Georgia Institute of Technology*
Vishal Saxena, *University of Delaware*

A 12-Bit SAR ADC Using Pseudo-Dynamic Weighting C-DAC for Capacitor Error Calibration 746

Fan Ye, Junyan Ren
Fudan University, China

A Hybrid Line Driver with Voltage-Mode SST Pre-Emphasis and Current-Mode Equalization 750

Xiaoran Wang, Ping Gui
Southern Methodist University, United States

A 2-A 6-MHz Hysteretic Buck Converter with an 8-Bit Digital Jitter-Insensitive Frequency Correction Loop Using Dual-Sided Hysteretic Band Modulation..... 754

Manmeet Singh, Ayman Fayed
Ohio State University, United States

A kT/C-Noise-Cancelled Noise-Shaping SAR ADC with a Duty-Cycled Amplifier..... 758

Shaolan Li
Georgia Institute of Technology, United States

A 20.6 Gb/s Programmable Peaking Gain CTLE..... 762

Siamak Delshadpour, Xu Zhang
NXP Semiconductors, United States

B3L-C Communications Systems and Theory

Date: Tuesday, August 11, 2020
Time: 15:00 - 17:00
Location: Room 3
Chair(s): Sleiman Bou-Sleiman, *Intel Corporation*
Yushi Zhou, *Lakehead University*

LLR Calculation for On-Off Keying in Screen to Camera Communication Systems 766

Norisato Suga⁵, Ryohei Sasaki¹, Yuho Tanaka⁴, Kazunori Uruma², Tomohiro Takahashi³
¹*Hosei University, Japan*; ²*Kogakuin University, Japan*; ³*Tokai University, Japan*; ⁴*Tokyo Denki University, Japan*; ⁵*Tokyo University of Science, Japan*

A Spectrum-Efficient Data Modulation Scheme for Internet-of-Things Applications 770

Md. Kamal Hossain², Yehia Massoud¹, Mohammad Haider²
¹*Stevens Institute of Technology, United States*; ²*University of Alabama at Birmingham, United States*

PAPR Reduction of GFDM System Using Xia Pulse and Opts Scheme..... 774

Loth Matheus Barba-Maza, Gordana Jovanovic Dolecek
Institute INAOE, Mexico

Tracking and Mitigation of Chirp-Type Interference in GPS Receivers Using Adaptive Notch Filters 778

Syed Waqas Arif, Adem Coskun, Izzet Kale
University of Westminster, United Kingdom

High Efficiency Scheme for Permutation Index Differential Coherent Chaos-Based Communication System..... 782

Nizar Al Bassam³, Oday Al-Jerew², Ammar Al-Qaraghuli¹
¹*Applied Science and Technology Sheridan College, Canada*; ²*Asia Pacific International College, Australia*; ³*Middle East College, Oman*

A Generalized Vected-Implementation of 2ⁿ-QAM for Software Defined Applications..... 786

Hadi Alasti

Purdue University Fort Wayne, United States

B3L-D RF Circuits & Systems

Date: Tuesday, August 11, 2020

Time: 15:00 - 17:00

Location: Room 4

Chair(s): John Burke, *Western New England University*

Modeling a High Linearity, Low Noise Gilbert Cell Mixer Using Three Optimization Techniques 790

Jooik Chung, Agis Iliadis

University of Maryland, College Park, United States

A Low-Power Synthesizable Time-to-Digital Converter Using Amplification to Overcome Mismatch..... 794

Cong Lin, Bo Wang, Chen Zhang, Xingyu Qi

Peking University Shenzhen Graduate School, China

Low Noise Wideband Monotonically Raising Gain Active Equalizer in SiGe BiCMOS for Phased Arrays 798

Can Çalışkan, Mir Hassan Mahmud, Ali Kasal, Melik Yazici, Yasar Gurbuz

Sabancı University, Turkey

A 10-18 GHz GaN Power Amplifier Based on Asymmetric Magnetically Coupled Resonator..... 802

Jincheng Zhang, Lihe Nie, Shunli Ma, Junyan Ren

Fudan University, China

A Programmable Radio Architecture for 5G Vehicle to Everything Communication 806

Seyedeh Masoumeh Navidi, Mohammed Ismail

Wayne State University, United States

B3L-E High Speed Optical and Physical Links

Date: Tuesday, August 11, 2020

Time: 15:00 - 17:00

Location: Room 5

Chair(s): Abhishek Roy, *Marvell Semiconductors*

Vishal Saxena, *University of Delaware*

Analysis of RF Photonic Link Using Silicon Photonic Ring-Assisted Mach Zehnder Modulator 810

Md Jubayer Shawon, Vishal Saxena

University of Delaware, United States

Single Wire Debug Interface 814

Bhanu Singh¹, Sharath Patil²

¹*Melexis Inc, United States*; ²*University of Massachusetts Lowell / Melexis Inc., United States*

A Survey of Optical and Electronic Delay Lines with a Case Study on Using Optical Delay Lines in 65 nm CMOS Optical Receivers 818

Bahaa Radi, Odile Liboiron-Ladouceur

McGill University, Canada

Smart Adaptive Refresh for Optimum Refresh Interval Tracking Using in-DRAM ECC..... 822

Do-Yeon Kim, Kee-Won Kwon

Sungkyunkwan University, Korea

High-Frequency Memristor-Based BFSK and 8-QAM Demodulators..... 826

Nahla Elashkar², Hossam Fahmy¹, Mohamed Aboudina¹, Ghada Ibrahim², Ahmed Hussein Khalil¹

¹*Cairo University, Egypt*; ²*Electronics Research Institute, Egypt*

B3L-F SPECIAL SESSION: Emerging Concepts in Trusted Systems

Date: Tuesday, August 11, 2020
Time: 15:00 - 17:00
Location: Room 6
Chair(s): Carla Purdy, *University of Cincinnati*

Enhancing SCADA System Security 830

Moustapha Fall, Chris Chuvalas, Nolan Warning, Max Rabiee, Carla Purdy
University of Cincinnati, United States

Secured IC Provisioning Using Advanced Memory Devices 834

Drew Hanna, Rashmi Jha
University of Cincinnati, United States

An Asynchronous FPGA THx2 Programmable Cell for Mitigating Side-Channel Attacks 840

John Emmert, Anvesh Perumalla, Luis Concha
University of Cincinnati, United States

SLED: Sequential Logic Encryption Using Dynamic Keys 844

Yasaswy Kasarabada, Vaishali Muralidharan, Ranga Vemuri
University of Cincinnati, United States

B3L-G Signal and Image Processing IV

Date: Tuesday, August 11, 2020
Time: 15:00 - 17:00
Location: Room 7
Chair(s): Cheol-Hong Min, *University of St. Thomas*
Michael Rahaim, *University of Massachusetts, Boston*

Face Recognition Technique in Transform Domains 848

Taif Alobaidi², Wasfy B. Mikhael¹
¹*University of Central Florida, United States*; ²*University of Information Technology and Communications, Iraq*

On Adaptation of Cancellation Path Modeling Filter in Single-Channel Feedback-Type Adaptive Active Noise Control Systems 852

Muhammad Tahir Akhtar², Markus V.S. Lima¹, Paulo S.R. Diniz¹
¹*Federal University of Rio de Janeiro, Brazil*; ²*Nazarbayev University, Kazakhstan*

Use of the Lévy Flight Firefly Algorithm in 2D McClellan Unconstrained Transform Adaptive Filters 856

Magni Hussain¹, William Jenkins¹, Chandra Radhakrishnan²
¹*Pennsylvania State University, United States*; ²*University of Illinois Urbana-Champaign, United States*

Controlling the Operational Behavior of Complex Empirical Mode Decomposition 860

Steven Sandoval, Matthew Bredin, Phillip De Leon, Susana Terrazas
New Mexico State University, United States

A Study on Network Size Reduction Using Sparse Input Representation in Time Delay Neural Networks 864

Masoumeh Kalantari Khandani, Wasfy B. Mikhael
University of Central Florida, United States

C1L-A Analog Circuits and Systems V

Date: Wednesday, August 12, 2020
Time: 10:00 - 12:00
Location: Room 1
Chair(s): Ulkuhan Guler, *Worcester Polytechnic Institute*
Tian Xia, *University of Vermont*

A Fully Integrated On-Chip Inductive Digital Isolator: Design Investigation and Simulation..... 868

Isa Altoobaji¹, Mohamed Ali¹, Ahmad Hassan¹, Morteza Nabavi¹, Yves Audet¹, Ahmed Lakhssassi²
¹*Polytechnique Montreal, Canada*; ²*University of Quebec in Outaouais, Canada*

A Low-Power, Digitally-Controlled, Multi-Stable, CMOS Analog Memory Circuit 872

Melvin Edwards II, Hamza Al Maharmeh, Nabil Sarhan, Mohammed Ismail, Mohammad Alhawari
Wayne State University, United States

Very High Brightness, High Resolution CMOS Driving Circuit for Microdisplay in Augmented Reality 876

Margaux Vigier, Thomas Pilloix, Bertrand Dupont, Guillaume Moritz
CEA-Leti, France

Deterministic Dither Based Mismatch Characterization of Wide Range of Metal-Oxide-Metal Capacitors..... 880

Harshit Roy, Arkaprov Ray, Bibhu Datta Sahoo
Indian Institute of Technology Kharagpur, India

A Wideband 12 Phase Ring Oscillator for 5G Applications..... 885

Sanmitra Naik, Siddharth R. K., Anirban Chatterjee, Nithin Kumar Y. B., Vasantha M.H., Ramnath Kini
National Institute of Technology Goa, India

C1L-B Sensor Circuits and Systems III

Date: Wednesday, August 12, 2020
Time: 10:00 - 12:00
Location: Room 2
Chair(s): Takashi Tokuda, *Tokyo Institute of Technology*
Ruolin Zhou, *UMass Dartmouth*

Contactless 3D Magnetic Field Imaging for Remote Sensing Based on Hall Sensors 889

Hua Fan³, Jiayi Zhang³, Yuanjun Cen¹, Quanyuan Feng²
¹*Chengdu Sino Microelectronics Technology Co., Ltd., China*; ²*Southwest Jiaotong University, China*; ³*University of Electronic Science and Technology of China, China*

A Horizontal Hall Sensor 3D COMSOL Model..... 893

Hua Fan³, Sujie Li³, Yuanjun Cen¹, Quanyuan Feng², Hadi Heidari⁴
¹*Chengdu Sino Microelectronics Technology Co., Ltd., China*; ²*Southwest Jiaotong University, China*; ³*University of Electronic Science and Technology of China, China*; ⁴*University of Glasgow, United Kingdom*

Elevated LiDAR Placement Under Energy and Throughput Capacity Constraints..... 897

Michael Lucic, Hakim Ghazzai, Yehia Massoud
Stevens Institute of Technology, United States

Enhancing Body-Mounted Lidar Slam Using an IMU-Based Pedestrian Dead Reckoning (PDR) Model 901

Hamza Sadruddin, Ahmed Mahmoud, Mohamed M. Atia
Carleton University, Canada

C1L-C Biomedical Electronics I

Date: Wednesday, August 12, 2020

Time: 10:00 - 12:00

Location: Room 3

Chair(s): Mehdi Kiani, *Pennsylvania State University*
Matthew Johnston, *Oregon State University*

An RF Stethoscope with Digital SSB Frequency Modulation for Use in a Noisy Environment..... 905

Herbert Aumann, Robert Bowie
University of Maine, United States

An Analog Front-End for Non-Invasive Cutaneous Neural Signal Acquisition and Latency Quantification 909

Aatreya Chakravarti², Yuchang Zhang², Michael Tasellari², Maysam Ghovanloo¹, Ulkuhan Guler²
¹*Bionic Sciences Inc., United States*; ²*Worcester Polytechnic Institute, United States*

Dry Electrode Based Low-Power ECG Acquisition System with Adaptive Motion Artifacts Cancellation 913

Nishat Tarannum Tasneem, Ifana Mahbub
University of North Texas, United States

Automated Distributed Element Model Generation for Neural Interface Co-Design..... 917

Fnu Tala, Mehdi Bandali, Benjamin Johnson
Boise State University, United States

A Reconfigurable Passive Switched-Capacitor Multiply-and-Accumulate Unit for Approximate Computing 921

Yuke Zhang, Dina El-Damak
University of Southern California, United States

C1L-D Converter Circuits and Systems III

Date: Wednesday, August 12, 2020

Time: 10:00 - 12:00

Location: Room 4

Chair(s): Tingshu Hu, *University of Massachusetts Lowell*
Sri Navaneeth Easwaran, *Texas Instruments Inc*

Step-Up/Step-Down DC-DC Converter Whose Current Passes Through Only One Switch 925

Takahide Sato², Satomi Ogawa², Yutaka Tamura¹
¹*Toshiba Information Systems Corp., Japan*; ²*University of Yamanashi, Japan*

A Discrete-Time Model for Frequency Modulated Charge Pumps with Synchronized Controller 929

Yi Tan, Hiroki Ishikuro
Keio University, Japan

Design and Optimization of Magnetic-Core Solenoid Inductor for Multi-Phase Buck Converter 933

Madhava Sarma Vemuri, Umamaheswara Rao Tida
North Dakota State University, United States

A Wide Input-Range, Low-Power and Highly Flexible 18 Bit Time-to-Digital Converter with Compact Differential Circuit Topology 937

Peter Toth, Hiroki Ishikuro
Keio University, Japan

C1L-E Security Primitives for Advanced Hardware Attacks

Date: Wednesday, August 12, 2020

Time: 10:00 - 12:00

Location: Room 5

Chair(s): Mehdi Kiani, *Pennsylvania State University*

Understanding and Comparing the Capabilities of On-Chip Voltage Sensors Against Remote Power Attacks on FPGAs..... 941

Shayan Moini, Xiang Li, Peter Stanwicks, George Provelengios, Wayne Burleson, Russel Tessier, Daniel Holcomb

University of Massachusetts Amherst, United States

Can Hardware Performance Counters Detect Adversarial Inputs?..... 945

Preet Derasari, Siva Koppineedi, Guru Venkataramani

George Washington University, United States

Recent Advancements in Microarchitectural Security: Review of Machine Learning Countermeasures 949

Hossein Sayadi¹, Han Wang³, Tahereh Miari¹, Hosein Mohammadi Makrani³, Mehrdad Aliasgari¹, Setareh Rafatirad², Houman Homayoun³

¹*California State University, Long Beach, United States;* ²*George Mason University, United States;*

³*University of California, Davis, United States*

Reconfigurable Gates with Sub-10nm Ambipolar SB-FinFETs for Logic Locking & Obfuscation 953

Talha Canan, Savas Kaya, Harsha Chenji, Avinash Karanth

Ohio University, United States

C1L-F Analog & Mixed-Signal Circuits & Systems

Date: Wednesday, August 12, 2020

Time: 10:00 - 12:00

Location: Room 6

Chair(s): Ulkuhan Guler, *Worcester Polytechnic Institute*
Shaolan Li, *Georgia Institute of Technology*

A Two-Stage LNA Design for 28GHz Band of 5G on 45nm CMOS 957

Jani Järvenhaara¹, Igor Filanovsky², I. Nevalainen¹, N.T. Tchamov¹

¹*Tampere University, Finland;* ²*University of Alberta, Canada*

A PMOS Switch Body and Gate Control Circuit for USB3.2 Compliant Receiver 962

Siamak Delshadpour, Xu Zhang

NXP Semiconductors, United States

A 256-Point Analog Discrete-Time FFT 966

Kaleb Kleine, Jeffrey Reed, Alan Michaels

Virginia Polytechnic Institute and State University, United States

Least Square Based Jitter Decomposition Algorithm for a PAM4 Link 970

Kushagra Bhatheja¹, Srikanth Jagannathan², Degang Chen¹

¹*Iowa State University, United States;* ²*NXP Semiconductors, United States*

Digitally-Assisted Peak Detector for Periodic Signal 974

Asif Wahid, Armin Tajalli

University of Utah, United States

C1L-G Artificial Intelligence & Internet of Things III

Date: Wednesday, August 12, 2020
Time: 10:00 - 12:00
Location: Room 7
Chair(s): Vanessa Chen, *Carnegie Mellon University*
John Hu, *Oklahoma State University*

Digital Machine Learning Circuit for Real-Time Stress Detection from Wearable ECG Sensor..... 978

Sumukh Bhanushali², Sudarsan Sadasivuni², Imon Banerjee¹, Arindam Sanyal²
¹*Emory University, United States*; ²*University at Buffalo, United States*

Graph Theory and Machine Learning Based Epileptic Seizures Analysis from EEG 982

Anand Shankar¹, Samarendra Dandapat², Shovan Barma¹
¹*Indian Institute of Information Technology Guwahati, India*; ²*Indian Institute of Technology Guwahati, India*

Deployment of Object Detection Enhanced with Multi-Label Multi-Classification on Edge Device..... 986

Ogheneuriri Oderhohwo, Tolulope A. Odetola, Hawzhin Mohammed, Syed Rafay Hasan
Tennessee Technological University, United States

Compute-in-Time for Deep Neural Network Accelerators: Challenges and Prospects 990

Hamza Al Maharmeh², Nabil Sarhan², Chung-Chih Hung¹, Mohammed Ismail², Mohammad Alhawari²
¹*National Chiao Tung University, Taiwan*; ²*Wayne State University, United States*

A 220-*n*A Quiescent Current Capacitor-Less Low-Dropout Regulator with Improved Recovery Time..... 994

Rohit Bupathy Sudan, Aydin I. Karsilayan
Texas A&M University, United States

C2L-A Biomedical Electronics II

Date: Wednesday, August 12, 2020
Time: 12:30 - 14:30
Location: Room 1
Chair(s): Shiu-hua Wood Chiang, *Brigham Young University*
Soumyajit Mandal, *University of Florida*

On-Chip Digitally Controlled Operational Amplifier Characterisation Circuit Without Additional Pins 998

Edward Yang, Torsten Lehmann
University of New South Wales, Australia

Improving the Accuracy of Diabetic Retinopathy Severity Classification with Transfer Learning 1003

Narayana Bhagirath Thota, Doshna Umma Reddy
Oregon State University, United States

A Tunable High-Gain Low-Noise Transimpedance Amplifier for Biosensing 1007

Yixuan He², Minsu Choi¹, Yong-Bin Kim²
¹*Missouri University of Science and Technology, United States*; ²*Northeastern University, United States*

Induction Based Detection of Magnetic Particles via Phase Locked Loop 1011

Sara Chaychian², Wamadeva Balachandran¹, Yichuang Sun²
¹*Brunel University London, United Kingdom*; ²*University of Hertfordshire, United Kingdom*

Do the Bio-Impedance Models Exhibit Pinched Hysteresis? 1016

Doaa Abdelrahman², Rawan Mohammed², Mohammed Fouda³, Lobna Said², Ahmed Radwan¹
¹*Cairo University / Nile University, Egypt*; ²*Nile University, Egypt*; ³*University of California Irvine, United States*

C2L-B Signal and Image Processing II

Date: Wednesday, August 12, 2020

Time: 12:30 - 14:30

Location: Room 2

Chair(s): Kourosh Rahnamai, *Western New England University*

MRI Brain Tumor Classification Employing Transform Domain Projections 1020

Maedeh Sadat Fasihi, Wasfy B. Mikhael

University of Central Florida, United States

An Improved Dilated Convolutional Network for Herd Counting in Crowded Scenes..... 1024

Soufien Hamrouni², Hakim Ghazzai², Hamid Menouar¹, Yehia Massoud²

¹*Qatar Mobility Innovations Center, Qatar*; ²*Stevens Institute of Technology, United States*

Single Image Reflection Removal for Privacy Protection Using Deep CNN 1028

Tomohiro Takahashi², Kazunori Uruma¹, Keita Kobayashi¹

¹*Kogakuin University, Japan*; ²*Tokai University, Japan*

Frame Recovery Method for Screen to Camera Communication Using CMOS Sensor Camera..... 1032

Yuho Tanaka⁴, Kazunori Uruma², Ryohei Sasaki¹, Norisato Suga⁵, Tomohiro Takahashi³

¹*Hosei University, Japan*; ²*Kogakuin University, Japan*; ³*Tokai University, Japan*; ⁴*Tokyo Denki University, Japan*; ⁵*Tokyo University of Science, Japan*

Image Segmentation and Adaptive Contrast Enhancement for Haze Removal 1036

Chunyan Wang, Bao Zhu

Concordia University, Canada

C2L-C Artificial Intelligence & Internet of Things II

Date: Wednesday, August 12, 2020

Time: 12:30 - 14:30

Location: Room 3

Chair(s): John Hu, *Oklahoma State University*

Vanessa Chen, *Carnegie Mellon University*

Spiking Sparse Coding Algorithm with Reduced Inhibitory Feedback Weights 1040

Md Munir Hasan, Jeremy Holleman

University of North Carolina at Charlotte, United States

A-MnasNet: Augmented MnasNet for Computer Vision 1044

Prasham Shah, Mohamed El-Sharkawy

Purdue University, United States

A Low Power FinFET Charge Pump for Energy Harvesting Applications 1048

Kyle Whittaker¹, Maher Rizkalla¹, Trond Ytterdal²

¹*Indiana University–Purdue University Indianapolis, United States*; ²*Norwegian University of Science and Technology, Norway*

Front Moving Object Behavior Prediction System Exploiting Deep Learning Technology for ADAS Applications 1052

Wen-Chia Tsai, Kuan-Chou Chen, Jhih-Sheng Lai, Jiun-In Guo

National Chiao Tung University, Taiwan

Graph Neural Networks-Based Clustering for Social Internet of Things 1056

Abdullah Khanfor¹, Amal Nammouchi¹, Hakim Ghazzai¹, Ye Yang¹, Mohammad Haider², Yehia Massoud¹

¹*Stevens Institute of Technology, United States*; ²*University of Alabama at Birmingham, United States*

Architecture of a Novel Low-Cost Hardware Neural Network 1060

Kasem Khalil, Omar Eldash, Bappaditya Dey, Ashok Kumar, Magdy Bayoumi

University of Louisiana at Lafayette, United States

C2L-D Hardware Security

Date: Wednesday, August 12, 2020
Time: 12:30 - 14:30
Location: Room 4
Chair(s): Tian Xia, *University of Vermont*
Ulkuhan Guler, *Worcester Polytechnic Institute*

ADobf: Obfuscated Detection Method Against Analog Trojans on I2C Master-Slave Interface..... 1064

Mezanur Monjur, Sandeep Sunkavilli, Qiaoyan Yu
University of New Hampshire, United States

Minimum On-the-Node Data Security for the Next-Generation Miniaturized Wireless Biomedical Devices..... 1068

Vladimir Vakhter², Betul Soysal¹, Patrick Schaumont², Ulkuhan Guler²
¹*Middlesex University, United States*; ²*Worcester Polytechnic Institute, United States*

Establishing a Covert Communication Channel in RF and mm-Wave Circuits..... 1072

Berke Gungor¹, Melik Yazici¹, Emre Salman², Yasar Gurbuz¹
¹*Sabanci University, Turkey*; ²*Stony Brook University, United States*

Digital LDO Based Power Signature Generation Circuit for IoT Security 1076

David E Thompson, Md Kamruzzaman Shuvo, Haibo Wang
Southern Illinois University, United States

C2L-F Digital Circuits and Systems I

Date: Wednesday, August 12, 2020
Time: 12:30 - 14:30
Location: Room 6
Chair(s): Neeraj Magotra, *Western New England University*

Combining m=2 Multipliers and Adder Compressors for Power Efficient Radix-4 Butterfly 1080

Guilherme Ferreira¹, Leandro M. G. Rocha¹, Eduardo Antonio C da Costa², Sergio Bampi¹
¹*Federal University of Rio Grande do Sul, Brazil*; ²*Universidade Católica de Pelotas, Brazil*

Optimizing the Montgomery Modular Multiplier for a Power- and Area-Efficient Hardware Architecture 1084

Mateus Leme¹, Guilherme Paim¹, Leandro M. G. Rocha¹, Patrícia Ücker², Vitor Gonçalves Lima¹, Rafael Soares³, Eduardo Antonio C da Costa², Sergio Bampi¹
¹*Federal University of Rio Grande do Sul, Brazil*; ²*Universidade Católica de Pelotas, Brazil*;
³*Universidade Federal de Pelotas, Brazil*

Multipliers Based on the Interlaced Carry Arrest Addition..... 1088

Uttam Kumar, Adly Fam
University at Buffalo, United States

An Efficient Implementation of Radix-4 Integer Division Using Scaling..... 1092

James Stine, Kevin Hill
Oklahoma State University, United States

Multirate Hardware of Architecture for Real-Time Fourier Transform Analysis/Synthesis 1096

Mohammed Bahoura
University of Quebec at Rimouski, Canada

Tunable Inexact Subtractors for Division in Image Processing Applications..... 1100

Ankita Nandi, Chandan Kumar Jha, Joyce Mekie
Indian Institute of Technology Gandhinagar, India

C2L-G SPECIAL SESSION: Modeling & Verification of IC Security Properties

Date: Wednesday, August 12, 2020

Time: 12:30 - 14:30

Location: Room 7

Chair(s): Patrick Schaumont, *Worcester Polytechnic Institute*
Jasper Van Woudenberg, *Riscure USA*

Recent Advances in Emerging Technology-Based Security Primitives, Attacks and Mitigation 1104

Karthikeyan Nagarajan², Asmit De², Sina Sayyah Ensan², Abdullah Ash-Saki², Mohammad Nasim
Imtiaz Khan¹, Swaroop Ghosh²

¹*Intel Corporation, United States*; ²*Pennsylvania State University, United States*

Killing EM Side-Channel Leakage at its Source 1108

Debayan Das², Mayukh Nath², Santosh Ghosh¹, Shreyas Sen²

¹*INTEL CORPORATION, United States*; ²*Purdue University, United States*

Verification of Power-Based Side-Channel Leakage Through Simulation 1112

Yuan Yao³, Patrick Schaumont⁴, Jasper Van Woudenberg², Cees-Bart Breunese², Edgar
Santillan², Steve Stecyk¹

¹*Intrinsix, United States*; ²*Riscure USA, United States*; ³*Virginia Polytechnic Institute and State
University, United States*; ⁴*Worcester Polytechnic Institute, United States*