

# **2024 IEEE Computer Society Annual Symposium on VLSI (ISVLSI 2024)**

**Knoxville, Tennessee, USA  
1-3 July 2024**



**IEEE Catalog Number: CFP24179-POD  
ISBN: 979-8-3503-5412-6**

**Copyright © 2024 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:	CFP24179-POD
ISBN (Print-On-Demand):	979-8-3503-5412-6
ISBN (Online):	979-8-3503-5411-9
ISSN:	2159-3469

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2024 IEEE Computer Society Annual Symposium on VLSI (ISVLSI) **ISVLSI 2024**

## Table of Contents

Message from the General Chairs .....	xxvi
Message from the Technical Program Chairs .....	xxviii
Message from the Quantum Computing Workshop Chairs .....	xxx
Steering Committee .....	xxxi
Organizing Committee .....	xxxii
Program Committee .....	xxxiii
Keynotes .....	xxxix

## INVITED TALK

Secure Energy-Efficient Implementation of CNN on FPGAs for Accuracy Dependent Real Time Task Processing .....	1
<i>Krishnendu Guha (University College Cork, Ireland) and Amlan Chakrabarti (University of Calcutta, India)</i>	
STCO: Driving the More than Moore era .....	7
<i>Dwaipayan Biswas (imec, Belgium), James Myers (imec, Belgium), Julien Ryckaert (imec, Belgium), and Srikanth B. Samavedam (imec, Belgium)</i>	

## TECHNICAL SESSION 1A: CIRCUITS, RELIABILITY, AND FAULT-TOLERANCE

An 8-bit 1 MS/s Low-Power SAR ADC with an Enhanced EPC for Implantable Medical Devices .....	9
<i>Deepika Kumaradasan (NIT Rourkela, India), Sougata Kumar Kar (NIT Rourkela, India), and Santanu Sarkar (NIT Rourkela, India)</i>	
Generating Storage-Aware Test Sets Targeting Several Fault Models .....	15
<i>Hari Addepalli (Purdue University, USA), Irith Pomeranz (Purdue University, USA), Enamul Amyeen (Intel Corporation, USA), Suriyaprakash Natarajan (Intel Corporation, USA), Arani Sinha (Intel Corporation, USA), and Srikanth Venkataraman (Intel Corporation, USA)</i>	
Sub-Micron Binary HyperPixel Sensor Circuit: In-Pixel Binarization with Variable Thresholding .....	21
<i>Md Rahatul Islam Udoy (University of Tennessee, USA), Md Mazharul Islam (University of Tennessee, USA), Akhilesh Jaiswal (University of Wisconsin-Madison, USA), and Ahmedullah Aziz (University of Tennessee, USA)</i>	

Ultra-Small Area, Highly Linear, Modified All Mosfet Digital-To-Analog Converters with Novel Real Time Digital Calibration Algorithm .....	27
<i>Ekaniyere Oko-Odion (Iowa State University, USA), Isaac Bruce (Iowa State University, USA), Emmanuel Nti Darko (Iowa State University, USA), Michael Sekyeye (Iowa State University, USA), and Degang Chen (Iowa State University, USA)</i>	

## TECHNICAL SESSION 1B: COMPUTER-AIDED DESIGN AND VERIFICATION

Thermal Analysis of 3D Stacking and BEOL Technologies with Functional Partitioning of Many-Core RISC-V SoC .....	33
<i>Mohamed Naeim (Cadence Design Systems, USA; imec, Belgium; Université Libre de Bruxelles, Belgium), Herman Oprins (imec, Belgium), Sudipta Das (imec, Belgium), Geert Van Der Plas (imec, Belgium), Yun Dai (Cadence Design Systems, USA), Pinhong Chen (Cadence Design Systems, USA), Ct Kao (Cadence Design Systems, USA), Dwaipayan Biswas (imec, Belgium), and Dragomir Milojevic (imec, Belgium; Université Libre de Bruxelles, Belgium)</i>	
Automated Deep Neural Network Inference Partitioning for Distributed Embedded Systems .....	39
<i>Fabian Krefß (Karlsruhe Institute of Technology, Germany), El Mahdi El Annabi (Karlsruhe Institute of Technology, Germany), Tim Hotfilter (Karlsruhe Institute of Technology, Germany), Julian Hoefer (Karlsruhe Institute of Technology, Germany), Tanja Harbaum (Karlsruhe Institute of Technology, Germany), and Juergen Becker (Karlsruhe Institute of Technology, Germany)</i>	
Thermal Implications in Scaling High-Performance Server 3D Chiplet-Based 2.5D SoC from FinFET to Nanosheet .....	45
<i>Yukai Chen (IMEC, Belgium), Venkateswarlu Sankatali (IMEC, Belgium), Subrat Mishra (IMEC, Belgium), Julien Ryckaert (IMEC, Belgium), James Myers (IMEC, Belgium), and Dwaipayan Biswas (IMEC, Belgium)</i>	
Energy-Aware Incremental OTA Update for Flash-Based Batteryless IoT Devices .....	51
<i>Wei Wei (The University of Texas at San Antonio), Jishnu Banerjee (The University of Texas at San Antonio), Sahidul Islam (The University of Texas at San Antonio), Chen Pan (The University of Texas at San Antonio), and Mimi Xie (The University of Texas at San Antonio)</i>	

## TECHNICAL SESSION 2A: DIGITAL CIRCUITS AND FPGA-BASED DESIGNS I

Design of Multiplier Circuit Based on Signed-Digit Hybrid Stochastic Computing .....	57
<i>Yinjie Song (Beihang University, China), Hongge Li (Beihang University, China), Xinyu Zhu (Beihang University, China), and Yuhao Chen (Beihang University, China)</i>	
Energy-Efficient Design of Approximate VVC Interpolation Filters Units .....	63
<i>Rafael da Silva (Universidade Federal do Rio Grande do Sul, Brazil), Mateus Grellert (Universidade Federal do Rio Grande do Sul, Brazil), and Ricardo Reis (Universidade Federal do Rio Grande do Sul, Brazil)</i>	

Adaptive and Offloaded CNNs for IoT-Edge FPGAs .....	69
<i>Guilherme Korol (Universidade Federal do Rio Grande do Sul (UFRGS), Brazil), Hiago Mayk Gomes de Araújo Rocha (Universidade Federal do Rio Grande do Sul (UFRGS), Brazil), and Antonio Carlos Schneider Beck (Universidade Federal do Rio Grande do Sul (UFRGS), Brazil)</i>	
HIERA: High-Quality and High-Throughput Dehazing Hardware Accelerator with Reconfigurable Computing Unit .....	75
<i>Junhao Zhang (University of Electronic Science and Technology of China, China), Dongqi Fan (University of Electronic Science and Technology of China, China), and Liang Chang (University of Electronic Science and Technology of China, China)</i>	

## TECHNICAL SESSION 2B: EMERGING AND POST-CMOS TECHNOLOGIES I

Area-Efficient Digital Design using RRAM-CMOS Standard Cells .....	81
<i>Markus Fritscher (IHP Microelectronics, Germany; BTU Cottbus-Senftenberg, Germany), Max Uhlmann (IHP Microelectronics, Germany), Philip Ostrovskyy (IHP Microelectronics, Germany), Daniel Reiser (University of Rostock, Germany), Junchao Chen (IHP Microelectronics, Germany), Andreas Schubert (IHP Microelectronics, Germany), Carsten Schulze (IHP Microelectronics, Germany), Gerhard Kahmen (IHP Microelectronics, Germany; BTU Cottbus-Senftenberg, Germany), Dietmar Fey (FAU Erlangen-Nürnberg, Germany), Marc Reichenbach (University of Rostock, Germany), Milos Kristic (IHP Microelectronics, Germany; University of Potsdam, Germany), and Christian Wenger (IHP Microelectronics, Germany; BTU Cottbus-Senftenberg, Germany)</i>	
DeepApprox: Rapid Deep Learning Based Design Space Exploration of Approximate Circuits via Check-Pointing .....	88
<i>Muhammad Awais (Paderborn University, Germany), Hassan Ghasemzadeh Mohammadi (CONDO group GmbH, Germany), and Marco Platzner (Paderborn University, Germany)</i>	
A High-Accuracy Time-Efficient Error Metric Model for Approximate Computing Circuits .....	94
<i>Shouji Chen (Nanjing University of Aeronautics and Astronautics, China), Ke Chen (Nanjing University of Aeronautics and Astronautics, China), Ziyang Cui (Nanjing University of Aeronautics and Astronautics, China), and Weiqiang Liu (Nanjing University of Aeronautics and Astronautics, China)</i>	
Random Microfluidic Chip Design with Diagonal Channels using K-Means Clustering for Fluid Dilutions .....	100
<i>Ankita Agrawal (Indian Institute of Technology Roorkee, India) and Sudip Roy (Indian Institute of Technology Roorkee, India)</i>	

## TECHNICAL SESSION 3A: VLSI FOR APPLIED AND FUTURE COMPUTING I

Most Significant Digit First Multiply-and-Accumulate Unit for Neural Networks .....	106
<i>Sahar Moradi Cherati (Instituto Superior Técnico, Portugal), Mohsen Barzegar (Instituto de Telecomunicações, Instituto Superior Técnico, Portugal), and Leonel Sousa (Instituto Superior Técnico, Portugal)</i>	
Exploring a Hybrid SRAM-RRAM Computing-In-Memory Architecture for DNNs Model Inference ....	112
<i>Yu-Guang Chen (National Central University, Taiwan), Zhi-Wei Liu (National Central University, Taiwan), and Ying-Jing Tsai (National Central University, Taiwan)</i>	
Accelerating Large Language Model Training with in-Package Optical Links for Scale-out Systems .....	118
<i>Aakash Patel (Imec, Belgium), Dwaipayan Biswas (Imec, Belgium), Joyjit Kundu (Imec, Belgium), Yoojin Ban (Imec, Belgium), Nicolas Pantano (Imec, Belgium), Arindam Mallik (Imec, Belgium), Julien Ryckaert (Imec, Belgium), and James Myers (Imec, Belgium)</i>	
BafSP: Co-Design of Compute SRAM and Bit-Aware Data Flip Mitigation with In-Memory Sparsity Detection for SpMM .....	124
<i>Xiaojie Li (Sun Yat-sen University, China), Mingyu Wang (Sun Yat-sen University, China), Yangzhan Mai (Sun Yat-sen University, China), Yicong Zhang (Sun Yat-sen University, China), Baiqing Zhong (Sun Yat-sen University, China), and Zhiyi Yu (Sun Yat-sen University, China)</i>	
SHIFFT: A Scalable Hybrid In-Memory Computing FFT Accelerator .....	130
<i>Pragnya Sudershan Nalla (University of Minnesota Twin Cities), Zhenyu Wang (Arizona State University), Sapan Agarwal (Sandia National Laboratories), T. Patrick Xiao (Sandia National Laboratories), Christopher H. Bennett (Sandia National Laboratories), Matthew J. Marinella (Arizona State University), Jae-sun Seo (Cornell Tech), and Yu Cao (University of Minnesota Twin Cities)</i>	

## TECHNICAL SESSION 4A: SYSTEM DESIGN AND SECURITY I

RFET-Based Dynamic Differential Logic Cells Against Power Side-Channel Attacks .....	136
<i>Nima Kavanid (TU Dresden, Germany), Armin Darjani (TU Dresden, Germany), Garvit Chhabra (TU Dresden, Germany), and Akash Kumar (Ruhr University Bochum, Germany)</i>	
Enhancing Graph Execution for Performance and Energy Efficiency on NUMA Machines .....	143
<i>Hiago Mayk Gomes de Araújo Rocha (Institute of Informatics - Federal University of Rio Grande do Sul, Brazil), Marcelo Koji Moori (Institute of Informatics - Federal University of Rio Grande do Sul, Brazil), Guilherme Korol (Institute of Informatics - Federal University of Rio Grande do Sul, Brazil), Arthur Francisco Lorenzon (Institute of Informatics - Federal University of Rio Grande do Sul, Brazil), and Antonio Carlos Schneider Beck (Institute of Informatics - Federal University of Rio Grande do Sul, Brazil)</i>	

Towards Quantum-Resistant Security: Pre-Silicon Power Side-Channel Leakage Analysis of CRYSTALS-Kyber .....	149
<i>Nashmin Alam (University of Florida), Tao Zhang (University of Florida), and Farimah Farahmandi (University of Florida)</i>	
Efficient Federated Learning through Distributed Model Pruning .....	155
<i>Mohammad Munzurul Islam (Wayne State University, USA) and Mohammed Alawad (Wayne State University, USA)</i>	

## TECHNICAL SESSION 5A: SYSTEM DESIGN AND SECURITY II

DAW-DMR: Divergence-Aware Warped DMR with Full Error Detection for GPGPUs .....	161
<i>Yukun Wei (Sun Yat-sen University, China), Mingyu Wang (Sun Yat-sen University, China), Haiqiu Huang (Sun Yat-sen University, China), Wangguang Wang (Sun Yat-sen University, China), and Zhiyi Yu (Sun Yat-sen University, China)</i>	
Embedding Power Signature Generation into Low Dropout Voltage Regulators for Enhancing IoT Security .....	167
<i>Ashish Mahanta (Southern Illinois University, USA) and Haibo Wang (Southern Illinois University, USA)</i>	
A Fine-Grained Dynamic Partitioning Against Cache-Based Timing Attacks via Cache Locking .....	173
<i>Nicolas Gaudin (UMR 6285, Lab-STICC, Université Bretagne-Sud, France), Pascal Cotret (UMR 6285, Lab-STICC, ENSTA Bretagne, France), Guy Gogniat (UMR 6285, Lab-STICC, Université Bretagne-Sud, France), and Vianney Lapôtre (UMR 6285, Lab-STICC, Université Bretagne-Sud, France)</i>	
Defending the Citadel: Fault Injection Attacks Against Dynamic Information Flow Tracking and Related Countermeasures .....	180
<i>William Pensec (Université Bretagne Sud, UMR 6285 Lab-STICC, France), Francesco Regazzoni (ALARI, University of Amsterdam - USI, Switzerland), Vianney Lapôtre (Université Bretagne Sud, UMR 6285 Lab-STICC, France), and Guy Gogniat (Université Bretagne Sud, UMR 6285 Lab-STICC, France)</i>	

## TECHNICAL SESSION 5B: VLSI FOR APPLIED AND FUTURE COMPUTING II

Energy-Efficient and Low-Latency Computation of Transcendental Functions in a Precision-Tunable PIM Architecture .....	186
<i>Gian Singh (Arizona State University, USA), Ayushi Dube (Arizona State University, USA), and Sarma Vrudhula (Arizona State University, USA)</i>	
In-Sensor Motion Recognition with Memristive System and Light Sensing Surfaces .....	192
<i>Hritom Das (The University of Tennessee, USA), Imran Fahad (The University of Tennessee, USA), Snb Tushar (The University of Tennessee, USA), Sk Hasibul Alam (The University of Tennessee, USA), Graham Buchanan (The University of Tennessee, USA), Danny Scott (The University of Tennessee, USA), Garrett S. Rose (The University of Tennessee, USA), and Sai Swaminathan (The University of Tennessee, USA)</i>	

SNN-ANN Hybrid Networks for Embedded Multimodal Monocular Depth Estimation .....	198
<i>Sadia Anjum Tumpa (Pennsylvania State University, USA), Anusha Devulapally (Pennsylvania State University, USA), Matthew Brehove (ChromoLogic LLC, USA), Espoir Kyubwa (ChromoLogic LLC, USA), and Vijaykrishnan Narayanan (Pennsylvania State University, USA)</i>	
DBFS: Dynamic Bitwidth-Frequency Scaling for Efficient Software-Defined SIMD .....	204
<i>Pengbo Yu (EPFL, Switzerland), Flavio Ponzina (UCSD, USA), Alexandre Levisse (EPFL, Switzerland), Dwaipayan Biswas (IMEC, Belgium), Giovanni Ansaloni (EPFL, Switzerland), David Atienza (EPFL, Switzerland), and Francky Catthoor (IMEC, Belgium)</i>	

## TECHNICAL SESSION 6A: DIGITAL CIRCUITS AND FPGA-BASED DESIGNS II

Optimizing LU Decomposition with RISC-V Based Hardware Acceleration .....	210
<i>Bindu Bhargavi Mekala (BITS Pilani-Hyderabad Campus, India), Sri Sai Harshith Grandhala (BITS Pilani-Hyderabad Campus, India), Sri Parameswaran (University of Sydney, Australia), and Soumya J (BITS Pilani-Hyderabad Campus, India)</i>	
Unfolded SiBM BCH Decoders for High-Throughput Low-Latency Applications .....	216
<i>Xu Wang (Chalmers University of Technology, Sweden), Christoffer Fougstedt (Ericsson Research, Sweden), Lars Svensson (Chalmers University of Technology, Sweden), and Per Larsson-Edefors (Chalmers University of Technology, Sweden)</i>	
Boosting Multiple Multipliers Packing on FPGA DSP Blocks via Truncation and Compensation-Based Approximation .....	222
<i>Behnam Ghavami (University of British Columbia, Canada; Simon Fraser University, Canada), Mahdi Sajadi (n/a), Lesley Shannon (Simon Fraser University, Canada), and Steve Wilton (University of British Columbia, Canada)</i>	
High Energy Efficiency Radix-4 Booth Multiplier with Zero Encoding Skipping Mechanism .....	228
<i>Xinyu Zhu (Beihang University, China), Hongge Li (Beihang University, China), Yinjie Song (Beihang University, China), Yuhao Chen (Beihang University, China), and Xiaoyu Guo (Beihang University, China)</i>	

## TECHNICAL SESSION 6B: VLSI FOR APPLIED AND FUTURE COMPUTING II

Dynamic Exit Selection for Comprehensive and Energy Efficient Gait-Based User Authentication on IoT Devices .....	234
<i>Pavlos Zouridakis (George Mason University, USA) and Sai Manoj Pudukotai Dinakarrao (George Mason University, USA)</i>	



Compressed Latent Replays for Lightweight Continual Learning on Spiking Neural Networks .....	240
<i>Alberto Dequino (Università di Bologna; Politecnico di Torino), Alessio Carpegna (Politecnico di Torino), Davide Nadalini (Università di Bologna; Politecnico di Torino), Alessandro Savino (Politecnico di Torino), Luca Benini (Università di Bologna; ETH Zurich), Stefano Di Carlo (Politecnico di Torino), and Francesco Conti (Università di Bologna)</i>	
Machine Learning Based Decoding of Heavy Hexagonal QECC for Asymmetric Quantum Noise ..	246
<i>Debasmita Bhounik (Advanced Computing and Microelectronics Unit, Indian Statistical Institute, India), Ritajit Majumdar (IBM Quantum, IBM India Research Lab), Dhiraj Madan (IBM Quantum, IBM India Research Lab), and Susmita Sur-Kolay (Advanced Computing and Microelectronics Unit, Indian Statistical Institute, India)</i>	
HO-FPIA: High-Order Field-Programmable Ising Arrays with In-Memory Computing .....	252
<i>Tinish Bhattacharya (University of California Santa Barbara, USA), George Higgins Hutchinson (University of California Santa Barbara, USA), Giacomo Pedretti (Hewlett Packard Labs, USA), and Dmitri Strukov (University of California Santa Barbara, USA)</i>	

## TECHNICAL SESSION 7A: EMERGING AND POST-CMOS TECHNOLOGIES II

Towards Thermally Reliable Photonic Links for Multicore Processors .....	260
<i>Yuxiang Fu (The Hong Kong University of Science and Technology), Xuanqi Chen (The Hong Kong University of Science and Technology), Jiaxu Zhang (The Hong Kong University of Science and Technology), Shixi Chen (The Hong Kong University of Science and Technology), and Jiang Xu (Microelectronics Thrust, The Hong Kong University of Science and Technology)</i>	
An Efficient and Scalable Clocking Assignment Algorithm for Multi-Threaded Multi-Phase Single Flux Quantum Circuits .....	266
<i>Robert S Aviles (University of Southern California, USA), Xi Li (University of Southern California, USA), Lei Lu (University of Southern California, USA), Zhaorui Ni (University of Southern California, USA), and Peter A Beerel (University of Southern California, USA)</i>	
Technology Mapping for Cryogenic CMOS Circuits .....	272
<i>Benjamin Hien (Technical University of Munich, Germany), Marcel Walter (Technical University of Munich, Germany; University of Bremen, Germany), Victor M. van Santen (Technical University of Munich, Germany), Florian Klemme (University of Stuttgart, Germany), Shivendra Singh Parihar (University of Stuttgart, Germany; IIT Kanpur, India), Girish Pahwa (University of California, USA), Yogesh S. Chauhan (IIT Kanpur, India), Hussam Amrouc (Technical University of Munich, Germany; Munich Institute of Robotics and Machine Intelligence, Germany), and Robert Wille (Technical University of Munich, Germany; Software Competence Center Hagenberg GmbH, Austria)</i>	

Automatic Validation and Design of Microfluidic Devices Following the ISO 22916 Standard .....	278
<i>Philipp Ebner (Johannes Kepler University Linz, Austria) and Robert Wille (Technical University of Munich, Germany; Software Competence Center Hagenberg GmbH, Austria)</i>	

## **SPECIAL SESSION 1: HARNESSING THE POWER OF TRUSTED AI IN IOT EDGE/CLOUD SYSTEM**

Embracing Privacy, Robustness, and Efficiency with Trustworthy Federated Learning on Edge Devices .....	284
<i>Minxue Tang (Duke University, USA), Jingwei Sun (Duke University, USA), Hai Li (Duke University, USA), and Yiran Chen (Duke University, USA)</i>	
Approximate Ternary Matrix Multiplication for Image Processing and Neural Networks .....	290
<i>Hemant Krishna Lavati (IIT Mandi, India) and Srinivasu Bodapati (IIT Mandi, India)</i>	
An Intelligent Memory Framework for Resource Constrained IoT Systems .....	296
<i>Prabuddha Chakraborty (University of Maine, USA) and Swarup Bhunia (University of Florida, USA)</i>	
Predicting Stress in Older Adults with RNN and LSTM from Time Series Sensor Data and Cortisol .....	300
<i>Md Saif Hassan Onim (University of Tennessee, USA) and Himanshu Thapliyal (University of Tennessee, USA)</i>	

## **SPECIAL SESSION 2: ASSURED AND TRUSTED SEMICONDUCTOR MICROELECTRONICS INTEGRATED CIRCUITS (ICS)**

Side-Channel and Fault Resistant ASCON Implementation: A Detailed Hardware Evaluation .....	307
<i>Aneesh Kandi (Indian Institute of Technology Madras, India), Anubhab Baksi (Nanyang Technological University, Singapore), Peizhou Gan (Nanyang Technological University, Singapore), Sylvain Guilley (Telecom Paris, Paris, France; Secure-IC, Cesson-Sevigne, France), Tomas Gerlich (Brno University of Technology, Czechia), Jakub Brier (TTControl GmbH, Austria), Anupam Chattopadhyay (Nanyang Technological University, Singapore), Ritu Ranjan Shrivastwa (Telecom Paris, Paris, France; Secure-IC, Cesson-Sevigne, France), Zdenek Martinasek (Brno University of Technology, Czechia), and Shivam Bhasin (Nanyang Technological University, Singapore)</i>	
Adversarial Attack Resilient ML-Assisted Hardware Trojan Detection Technique .....	313
<i>Mohammed Alkurdi (Wright State University, USA), Ashutosh Ghimire (Wright State University, USA), and Fathi Amsaad (Wright State University, USA)</i>	
1-D Robust Chaotic Maps Through Systematic Shifting and Halfway Shifted Product .....	319
<i>Md Sakib Hasan (University of Mississippi, USA), Mrityika Chowdhury (University of Mississippi, USA), Ziyi Niu (University of Mississippi, USA), Shuai Song (University of Mississippi, USA), and Anurag Dhungel (University of Mississippi, USA)</i>	

Splitting the Secrets: A Cooperative Trust Model for System-on-Chip Designs with Untrusted IPs .....	325
<i>Aritra Dasgupta (University of Florida, USA), Sudipta Paria (University of Florida, USA), Prabuddha Chakraborty (University of Maine, USA), and Swarup Bhunia (University of Florida, USA)</i>	

## SPECIAL SESSION 3: NEUROMORPHIC AND EDGE COMPUTING

Energy-Efficient Near-Sensor Event Detector Based on Multilevel Ga <sub>2</sub> O <sub>3</sub> RRAM .....	331
<i>Mehrdad Morsali (New Jersey Institute of Technology, USA), Sepehr Tabrizchi (University of Nebraska–Lincoln, USA), Ravi Teja Velpula (Texas Tech University, USA), Mano Bala Sankar Muthu (Texas Tech University, USA), Hieu Pham Trung Nguyen (Texas Tech University, USA), Mohsen Imani (University of California Irvine, USA), Arman Roohi (University of Nebraska–Lincoln, USA), and Shaahin Angizi (New Jersey Institute of Technology, USA)</i>	
Evaluation of Neuron Parameters on the Performance of Spiking Neural Networks and Neuromorphic Hardware .....	337
<i>Catherine Schuman (University of Tennessee, USA), Hritom Das (University of Tennessee, USA), Garrett S. Rose (University of Tennessee, USA), and James S. Plank (University of Tennessee, USA)</i>	
Multi-Objective Neural Architecture Search for In-Memory Computing .....	343
<i>Md Hasibul Amin (University of South Carolina, USA), Mohammadreza Mohammadi (University of South Carolina, USA), and Ramtin Zand (University of South Carolina, USA)</i>	
ResSen: Imager Privacy Enhancement Through Residue Arithmetic Processing in Sensors .....	349
<i>Nedasadat Taheri (University of Nebraska–Lincoln, USA), Sepehr Tabrizchi (University of Nebraska–Lincoln, USA), Deniz Najafi (Department of Electrical and Computer Engineering, New Jersey Institute of Technology, USA), Shaahin Angizi (Department of Electrical and Computer Engineering, New Jersey Institute of Technology, USA), and Arman Roohi (University of Nebraska–Lincoln, USA)</i>	

## SPECIAL SESSION 4: HARMONIZING HARDWARE SECURITY WITH EMERGING TECHNOLOGIES

HELP: Highly Efficient and Low-Latency Hardware Accelerator for Integer Polynomial Multiplication .....	355
<i>Pengzhou He (Villanova University, USA), Tianyou Bao (Villanova University, USA), Çetin Kaya Koç (NUAA, Igdir University, UCSB), and Jiafeng Xie (Villanova University, USA)</i>	
Exploring Security Solutions and Vulnerabilities for Embedded Non-Volatile Memories .....	361
<i>Zakia Tamanna Tisha (Auburn University, USA), Jeremy Muldavin (Aerocyonics Inc., USA), and Ujjwal Guin (Auburn University, USA)</i>	

Attacking Multi-Tenant FPGAs Without Manual Placement and Routing .....	367
<i>Md Toufiq Hasan Anik (University of Maryland, USA), Hasin Ishraq Reefat (University of Maryland, USA), Jean-Luc Danger (LTCL, Télécom Paris, France), Sylvain Guilley (LTCL, Télécom Paris, France; Secure-IC S.A.S., France), and Naghmeh Karimi (University of Maryland, USA)</i>	
A Survey of Side-Channel Attacks in Superconducting Quantum Computers .....	373
<i>Navnil Choudhury (University of Texas at Dallas, USA) and Kanad Basu (University of Texas at Dallas, USA)</i>	

## **SPECIAL SESSION 5: EMERGING TOPICS IN HARDWARE SECURITY: FROM LLM TO HETEROGENEOUS INTEGRATION**

HI-SST: Safeguarding SiP Authenticity through Secure Split-Test in Heterogeneous Integration .....	379
<i>Paul E. Calzada (University of Florida, USA), Md Sami Ul Islam Sami (University of Florida, USA), Jingbo Zhou (University of Florida, USA), Kimia Zamiri Azar (University of Florida, USA), Farimah Farahmandi (University of Florida, USA), and Mark Tehranipoor (University of Florida, USA)</i>	
LLMs and the Future of Chip Design: Unveiling Security Risks and Building Trust .....	385
<i>Zeng Wang (New York University, USA), Lilas Alrahis (New York University Abu Dhabi, United Arab Emirates), Likhitha Mankali (New York University, USA), Johann Knechtel (New York University Abu Dhabi, United Arab Emirates), and Ozgur Sinanoglu (New York University Abu Dhabi, United Arab Emirates)</i>	
Self-HWDebug: Automation of LLM Self-Instructing for Hardware Security Verification .....	391
<i>Mohammad Akyash (University of Central Florida, USA) and Hadi Mardani Kamali (University of Central Florida, USA)</i>	
IP Security in Structured ASIC: Challenges and Prospects .....	397
<i>Rasheed Almaawzan (University of Florida), Sudipta Paria (University of Florida), Aritra Dasgupta (University of Florida), Kostas Amberiadis (National Institute of Standards and Technology), and Swarup Bhunia (University of Florida)</i>	

## **SPECIAL SESSION 6: EMERGING DEVICES IN MACHINE LEARNING ACCELERATION**

PristiQ: A Co-Design Framework for Preserving Data Security of Quantum Learning in the Cloud .....	403
<i>Zhepeng Wang (George Mason University), Yi Sheng (George Mason University), Nirajan Koirala (University of Notre Dame), Kanad Basu (University of Texas at Dallas), Taeho Jung (University of Notre Dame), Cheng-Chang Lu (Qradle Inc.), and Weiwen Jiang (George Mason University)</i>	

Scaling Analog Photonic Accelerators for Byte-Size, Integer General Matrix Multiply (GEMM) Kernels .....	409
<i>Oluwaseun Adewunmi Alo (University of Kentucky, USA), Sairam Sri Vatsavai (University of Kentucky, USA), and Ishan Thakkar (University of Kentucky, USA)</i>	
A Memristive Reconfigurable Neuromorphic Array for Neuro-Inspired Dynamic Architectures ....	415
<i>Hritom Das (The University of Tennessee, USA), Nishith N. Chakraborty (The University of Tennessee, USA), Manu Rathore (The University of Tennessee, USA), Sk Hasibul Alam (The University of Tennessee, USA), Catherine D. Schuman (The University of Tennessee, USA), and Garrett S. Rose (The University of Tennessee, USA)</i>	
SegmentAI: A Neural Net Framework For Optimized Multiclass Image Segmentation Via FPGA ..	421
<i>Uchechukwu Leo Udeji (University of Massachusetts Lowell, USA) and Martin Margala (University of Louisiana at Lafayette, USA)</i>	

## **SPECIAL SESSION 7: EMERGING FRONTIERS IN CPS AND IOT SECURITY**

CONFUSE: Confusion-Based Federated Unlearning with Saliency Exploration .....	427
<i>Syed Irfan Ali Meerza (University of Tennessee, USA), Amir Sadovnik (Oak Ridge National Laboratory, USA), and Jian Liu (University of Tennessee, USA)</i>	
DT-IoMT: A Digital Twin Reference Model for Secure Internet of Medical Things .....	433
<i>Md Rafiul Kabir (University of Florida, USA) and Sandip Ray (University of Florida, USA)</i>	
Low-Power and Computing-Free Privacy Design for IoT Systems .....	439
<i>Hui Sun (North Carolina State University, USA), Kyle Mooney (University of South Alabama, USA), Mario Pinon (University of South Alabama, USA), Tingxiang Ji (North Carolina State University, USA), Hritom Das (University of Tennessee, USA), Na Gong (University of South Alabama, USA), and Jianqing Liu (North Carolina State University, USA)</i>	
Exploring the Correlation Between DRAM Latencies and Rowhammer Attacks .....	445
<i>Md Sadik Awal (Florida International University, USA) and Md Tauhidur Rahman (Florida International University, USA)</i>	

## **SPECIAL SESSION 8: EMERGING SENSING, COMPUTING, AND TELEMETRY FOR IOT EDGE DEVICES**

Long-Term Predictive Analytics of Continuous Glucose Sensing for Enhanced Glycemic Control...	451
<i>Md Maruf Hossain Shuvo (University of Texas at El Paso, USA), Twisha Titirsha (University of Missouri, USA), Giuseppe Oliva (Magna Græcia University, Italy), Salvatore A. Pullano (Magna Græcia University, Italy), and Syed Kamrul Islam (University of Missouri, USA)</i>	

Machine Learning Intervened RIS-Based RF Interference Management For IoT .....	457
<i>Sakib Reza (The University of Texas at Dallas, USA), Sanjay Das (The University of Texas at Dallas, USA), Shamik Kundu (The University of Texas at Dallas, USA), Kanad Basu (The University of Texas at Dallas, USA), and Ifana Mahbub (The University of Texas at Dallas, USA)</i>	
A Low-Cost Minimally-Processed Inkjet-Printed Nonlinear Element for Reservoir Computing .....	463
<i>Shahrin Akter (University of Missouri, USA) and Mohammad Rafiqul Haider (University of Missouri, USA)</i>	

## **SPECIAL SESSION 9: ROBUSTNESS OF EDGE COMPUTING ENVIRONMENT**

Energy-Efficient Power Analysis Attack Resilient Adiabatic MTJ-Based Nonvolatile CLB .....	469
<i>Milad Tanavardi Nasab (University of Tennessee, USA), Wu Yang (University of Tennessee, USA), and Himanshu Thapliyal (University of Tennessee, USA)</i>	
Hardware-Efficient ECC Processor Design using Non-Homogeneous Split Hybrid Karatsuba Multiplier .....	475
<i>Pruthvi Parate (International Institute of Information Technology Bangalore), Alwin Shaju (International Institute of Information Technology Bangalore), Sanampudi Gopala Krishna Reddy (International Institute of Information Technology Bangalore), Vasanthi D R (International Institute of Information Technology Bangalore), and Madhav Rao (International Institute of Information Technology Bangalore)</i>	
Optimal Application Allocation and Wireless User Association for Robust Edge Computing .....	481
<i>Terry N. Guo (Tennessee Technological University, USA)</i>	
A Survey of Edge Computing Privacy and Security Threats and Their Countermeasures .....	484
<i>Ahmed Shafee (Adams State University, USA), Tasneem A. Awaad (Ain Shams University, Egypt), and Ahmed Moro (Siemens Digital Industries Software, Lifecycle Collaboration Software Segment, Egypt)</i>	

## **SPECIAL SESSION 10: SUSTAINABLE COMPUTING FROM EDGE TO DATA CENTER**

System Support for Environmentally Sustainable Computing in Data Centers .....	490
<i>Fan Chen (Indiana University)</i>	
SCARIF: Towards Carbon Modeling of Cloud Servers with Accelerators .....	496
<i>Shixin Ji (University of Pittsburgh), Zhuoping Yang (University of Pittsburgh), Xingzhen Chen (University of Pittsburgh), Stephen Cahoon (University of Pittsburgh), Jingtong Hu (University of Pittsburgh), Yiyu Shi (University of Notre Dame), Alex Jones (University of Pittsburgh), and Peipei Zhou (University of Pittsburgh)</i>	

Improving the Sustainability of Solid-State Drives by Prolonging Lifetime .....	502
<i>Zhaokang Ke (University of Minnesota, Twin Cities), Dingyi Kang (University of Texas at Dallas), Bo Yuan (Rutgers University), David Du (University of Minnesota, Twin Cities), and Bingzhe Li (University of Texas at Dallas)</i>	
Resource-Efficient Adaptive-Network Inference Framework with Knowledge Distillation-Based Unified Learning .....	508
<i>Rebati Gaire (University of Nebraska–Lincoln, USA), Sepehr Tabrizchi (University of Nebraska–Lincoln, USA), and Arman Roohi (School of Computing, University of Nebraska–Lincoln, USA)</i>	
Water-Wise Computing: Addressing Data Center Water Consumption for a Sustainable Future ....	514
<i>Mohammad A. Islam (University of Texas at Arlington)</i>	
Carbon-Aware Design of DNN Accelerators: Bridging Performance and Sustainability .....	515
<i>Aikaterini Maria Panteleaki (Southern Illinois University, USA) and Iraklis Anagnostopoulos (Southern Illinois University, USA)</i>	

## SPECIAL SESSION 11: SMART CYBER-PHYSICAL SYSTEMS

TinyML for ECG Biometrics on Resource Constrained Devices .....	521
<i>Yogeswar Reddy Thota (University of Texas at Dallas, USA) and Tooraj Nikoubin (University of Texas at Dallas, USA)</i>	
WAFER: Wearable, Ambient-Aware Adversarial Fall Event Detection System using a RISC-V SoC Architecture .....	527
<i>Tamonash Bhattacharyya (Indian Institute of Engineering Science and Technology, India), Akanksha Lohia (Indian Institute of Engineering Science and Technology, India), Prasun Ghosal (Indian Institute of Engineering Science and Technology, India), and Himanshu Thapliyal (University of Tennessee, USA)</i>	
Design Approaches and Consideration for a Reliable and Efficient Monolithic 3D Integration.....	533
<i>Madhava Sarma Vemuri (North Dakota State University, USA) and Umamaheswara Rao Tida (North Dakota State University, USA)</i>	
Pasteables: A Flexible, Stick-and-Peel Smart Sensing Platform for Edge Applications .....	539
<i>Reiner Dizon-Paradis (University of Florida, USA), Aritra Dasgupta (University of Florida, USA), Rohan Reddy Kalavakonda (University of Florida, USA), and Swarup Bhunia (University of Florida, USA)</i>	
Quantum Machine Learning for Anomaly Detection in Consumer Electronics .....	544
<i>Sounak Bhowmik (University of Tennessee, USA) and Himanshu Thapliyal (University of Tennessee, USA)</i>	
Integration of Memristive Encoders for On-Device Automation of Low-Power Wearable Energy Management Systems .....	551
<i>Shekhar Suman Borah (The University of Texas at Tyler, USA), Prabha Sundaravadivel (The University of Texas at Tyler, USA), Mustafa Hannoun (The University of Texas at Tyler, USA), and Premananda Indic (The University of Texas at Tyler, USA)</i>	

## SPECIAL SESSION 12: FRONTIERS OF COMPUTING ARCHITECTURE AND SYSTEM DESIGN WITH BEYOND MOORE DEVICES

Multi-GHz Zeptojoule Computing using Emerging Adiabatic Superconductor Circuits .....	557
<i>Christopher Ayala (Yokohama National University, Japan), Nobuyuki Yoshikawa (Yokohama National University, Japan), Yu Hoshika (Yokohama National University, Japan), and Yuto Omori (Yokohama National University, Japan)</i>	
Scalable Superconductor Ising Machine for Combinatorial Optimization Problems .....	565
<i>Beyza Zeynep Ucpinar (University of Southern California, USA), Sasan Razmkhah (University of Southern California, USA), Mehdi Kamal (University of Southern California, USA), and Massoud Pedram (University of Southern California, USA)</i>	
EMspice 2.0: Multiphysics Electromigration Analysis Tool for Beyond Moore ICs .....	571
<i>Subed Lamichhane (University of California), Mohammad Amir Kavousi (University of California), and Sheldon X.-D. Tan (University of California)</i>	
Skyrmion-Based Multi-Valued CPU Design .....	577
<i>Korinna Frangias (University of California, USA), Mi-Young Im (Lawrence Berkeley National Laboratory, USA), Hee-Sung Han (Lawrence Berkeley National Laboratory, USA), and Dilip Vasudevan (Lawrence Berkeley National Laboratory, USA)</i>	
Harnessing Approximate Computing for Machine Learning .....	585
<i>Salar Shakibhamedan (TU Wien), Amin Aminifar (Heidelberg University), Luke Vassallo (Heidelberg University), and Nima Taherinejad (Heidelberg University)</i>	
From Device to Application - Integrating RRAM Accelerator Blocks into Large AI Systems .....	592
<i>Markus Fritscher (IHP Microelectronics, Germany; BTU Cottbus-Senftenberg, Germany), Christian Wenger (IHP Microelectronics, Germany; BTU Cottbus-Senftenberg, Germany), and Milos Krstic (IHP Microelectronics, Germany; University of Potsdam, Germany)</i>	

## QUANTUM WORKSHOP 1

Extended Abstract: Quantum-Accelerated Transient Stability Assessment for Power Systems .....	593
<i>Jianing Chen (The Pennsylvania State University, USA) and Yan Li (The Pennsylvania State University, USA)</i>	
Residue Number System (RNS) Based Distributed Quantum Addition .....	595
<i>Bhaskar Gaur (University of Tennessee, USA), Travis S. Humble (Oak Ridge National Laboratory, USA), and Himanshu Thapliyal (University of Tennessee, USA)</i>	
Design Automation Challenges and Benefits of Dynamic Quantum Circuit in Present NISQ Era and Beyond .....	601
<i>Abhoy Kole (DFKI GmbH, Germany), Kamalika Datta (University of Bremen / DFKI GmbH, Germany), and Rolf Drechsler (University of Bremen / DFKI GmbH, Germany)</i>	



Can ML-Based Reliability Models Span Quantum Hardware Boundaries? .....	607
<i>Georgios Ioannou (City College of New York, City University of New York, USA), Gopika Kizhuvettil (City College of New York, City University of New York, USA), Mohammad Walid Charrwi (City College of New York, City University of New York, USA), and Samah Mohamed Saeed (City College of New York, City University of New York, USA)</i>	
Visual Analytics of Performance of Quantum Computing Systems and Circuit Optimization .....	613
<i>Junghoon Chae (Oak Ridge National Laboratory, USA), Chad Steed (Oak Ridge National Laboratory, USA), and Travis Humble (Oak Ridge National Laboratory, USA)</i>	

## QUANTUM WORKSHOP 2

Anomaly Detection for Real-World Cyber-Physical Security using Quantum Hybrid Support Vector Machines .....	619
<i>Tyler Cultice (University of Tennessee, USA), Md Saif Hassan Onim (University of Tennessee, USA), Annarita Giani (GE Vernova Advanced Research Center, USA), and Himanshu Thapliyal (University of Tennessee, USA)</i>	
Two Exact Quantum Signal Processing Results .....	625
<i>Bjorn K. Berntson (Riverlane, United Kingdom) and Christoph Sünderhauf (Riverlane, United Kingdom)</i>	
Efficacious Qubit Mappings for Quantum Simulations of the $^{12}\text{C}$ Rotational Band .....	627
<i>Darin Mumma (Louisiana State University, USA), Zhonghao Sun (Quantum Science Center, Oak Ridge National Laboratory, USA), Alexis Mercenne (Louisiana State University, USA), Kristina Launey (Louisiana State University, USA), Soorya Rethinasamy (Cornell University, USA; Louisiana State University, USA; Hearne Institute for Theoretical Physics and Center for Computation and Technology, Louisiana State University, USA), and James Sauls (Louisiana State University, USA; Hearne Institute for Theoretical Physics and Center for Computation and Technology, Louisiana State University, USA)</i>	
A Novel Quantum Generalized Neighbor Interpolation Design For Image Transformations .....	632
<i>Israel Koiku (University of North Texas, USA) and Edgard Muñoz-Coreas (University of North Texas, USA)</i>	

## QUANTUM WORKSHOP 3

Transfer Learning Based Hybrid Quantum Neural Network Model for Surface Anomaly Detection .....	634
<i>Sounak Bhowmik (University of Tennessee, USA) and Himanshu Thapliyal (University of Tennessee, USA)</i>	
Mathematical Model for SWAP Gate Minimization on NISQ Hardware .....	640
<i>Samuel Bringman (St. Vincent College, USA), Anthony Wilkie (University of Tennessee Knoxville, USA), Rebekah Herrman (University of Tennessee Knoxville, USA), and James Ostrowski (University of Tennessee Knoxville, USA)</i>	

Trojan Taxonomy in Quantum Computing .....	644
<i>Subrata Das (The Pennsylvania State University, USA) and Swaroop Ghosh (The Pennsylvania State University, USA)</i>	
Qubit and T-Count Optimized Quantum Circuit Design for Fixed Precision Square Root .....	650
<i>Afrin Sultana (University of North Texas, USA) and Edgard Muñoz-Coreas (University of North Texas, USA)</i>	

## POSTER SESSION 1: VLSI FOR APPLIED AND FUTURE COMPUTING

ICE TEA: Insertion of Custom Early Exits for Time-, Energy- & Anomaly-Aware Neural Networks .....	656
<i>Matthias Stammner (Karlsruhe Institute of Technology (KIT), Germany), Julian Höfer (Karlsruhe Institute of Technology (KIT), Germany), Patrick Schmidt (Karlsruhe Institute of Technology (KIT), Germany), Tanja Harbaum (Karlsruhe Institute of Technology (KIT), Germany), and Jürgen Becker (Karlsruhe Institute of Technology (KIT), Germany)</i>	
Exploration of Unary Arithmetic-Based Matrix Multiply Units for Low Precision DL Accelerators .....	661
<i>Prabhu Vellaisamy (Carnegie Mellon University), Harideep Nair (Carnegie Mellon University), Di Wu (University of Central Florida), Shawn Blanton (Carnegie Mellon University), and John Paul Shen (Carnegie Mellon University)</i>	
Hardware-Application Co-Design to Evaluate the Performance of an STDP-Based Reservoir Computer .....	666
<i>Hritom Das (The University of Tennessee, USA), Karan P. Patel (The University of Tennessee, USA), Shelah O. Ameli (The University of Tennessee, USA), Nishith N. Chakraborty (The University of Tennessee, USA), Catherine D. Schuman (The University of Tennessee, USA), and Garrett S. Rose (The University of Tennessee, USA)</i>	
Maximizing Efficiency of SNN-Based Reservoir Computing via NoC-Assisted Dimensionality Reduction .....	671
<i>Manu Rathore (The University of Tennessee, USA) and Garrett S. Rose (The University of Tennessee, USA)</i>	
Meta-Heuristic Optimization of CNNs with Approximate Error Distributed Multipliers .....	675
<i>Saket Gurjar (IIIT-Bangalore, India), Aamod B K (IIIT-Bangalore, India), Varad Bharadiya (IIIT-Bangalore, India), Bindu G Gowda (IIIT-Bangalore, India), and Madhav Rao (IIIT-Bangalore, India)</i>	

## POSTER SESSION 1: COMPUTER-AIDED DESIGN AND VERIFICATION

ChIRAAG: ChatGPT Informed Rapid and Automated Assertion Generation .....	680
<i>Bhabesh Mali (Indian Institute of Technology Guwahati, India), Karthik Maddala (Indian Institute of Technology Guwahati, India), Vatsal Gupta (Indian Institute of Technology Guwahati, India), Sweeya Reddy (Indian Institute of Technology Guwahati, India), Chandan Karfa (Indian Institute of Technology Guwahati, India), and Ramesh Karri (New York University, USA)</i>	

Event-Based Power Analysis Integrated with Timing Characterization and Logic Simulation .....	684
<i>Katayoon Basharkhah (University of Tehran, Iran) and Zainalabedin Navabi (University of Tehran, Iran)</i>	
PACE: MLP-Based Fast and Accurate Per-Cycle Chip Power Modelling .....	689
<i>Cem Benar (New Jersey Institute of Technology, USA), George Phan (Futurewei Technologies, USA), Sylvia Chan (Futurewei Technologies, USA), Zongfang Lin (Futurewei Technologies, USA), Yat Fai Lam (Futurewei Technologies, USA), and Robert Chu (Futurewei Technologies, USA)</i>	

## POSTER SESSION 1: CIRCUITS, RELIABILITY, AND FAULT-TOLERANCE

Soft Error Assessment of UAV Control Algorithms Running in Resource-Constrained Microprocessors .....	694
<i>Alex Hanneman (Loughborough University, United Kingdom), Jonas Gava (Universidade Federal do Rio Grande do Sul, Brazil), Paulo Vancin (Pontifical Catholic University of Rio Grande do Sul (PUCRS), Brazil), Aqsa Kk Kaim-Khani (Loughborough University, United Kingdom), Sam Amiri (Loughborough University, United Kingdom), Rafael Garibotti (Universidade Federal do Rio Grande do Sul, Brazil), Fernando Moraes (Pontifical Catholic University of Rio Grande do Sul (PUCRS), Brazil), Ney Calazans (Universidade Federal do Rio Grande do Sul, Brazil), Ricardo Reis (Universidade Federal do Rio Grande do Sul, Brazil), and Luciano Ost (Loughborough University, United Kingdom)</i>	
A 1.7 GHz Tuning Range LC-VCO with Varactor Array and Switched Cross-Coupled Core .....	699
<i>Raphael R. N Souza (Eldorado - Unicamp, Brazil), Agord M. Pinto (Eldorado - Unicamp, Brazil), Roberto L. de Orio (TU Wien, Austria), Leandro T. Manêra (University of Campinas, Brazil), and Eduardo R. de Lima (Eldorado Institute, Brazil)</i>	
Design and Analysis of an Electronically Tunable VDTA-Based Quadrature Oscillator .....	704
<i>Shekhar Suman Borah (The University of Texas at Tyler, USA), Mourina Ghosh (IIIT Guwahati, India), Bal Chand Nagar (NIT Patna, India), and Prabha Sundaravadivel (The University of Texas at Tyler, USA)</i>	
A 3-Segment Interpolating String DAC with Low-Cost Built-In-Self-Test Capabilities .....	708
<i>Isaac Bruce (Iowa State), Emmanuel Nti Darko (Iowa State University), Ekaniyere Oko Odion (Iowa State University), Kushagra Bhatheja (Iowa State University), Matthew Crabb (Iowa State University), and Degang Chen (Iowa State University)</i>	
Unveiling Proactive Recovery's Preventative Impact on NAND Flash Wearout .....	712
<i>Muhammed Ceylan Morgul (University of Virginia, USA), Xinfei Guo (Shanghai Jiao Tong University, China), and Mircea Stan (University of Virginia, USA)</i>	
Parametric Fault Diagnosis of Analog Circuits using Adaptive Boosting .....	717
<i>Supriyo Srimani (IEST, India), Kasturi Ghosh (Brainware University, India), and Hafizur Rahaman (IEST, India)</i>	
Structural Testing in MEDA Based Biochips : A New Technique using Diagonal Route .....	721
<i>Pranab Roy (J.K.L.U, India), Sarit Chakrabarty (Govt. College of Engineering and Leather Technology, India), Tanmoy Biswas (WBSU, India), and Habibur Rahaman (I.I.T, India)</i>	

## POSTER SESSION 1: EMERGING AND POST-CMOS TECHNOLOGIES AND SPECIAL SESSIONS

Compact 6T-SRAM using Bottom-Gate Transistor in FD-SOI Process for Monolithic-3D Integration .....	725
<i>Madhava Sarma Vemuri (North Dakota State University), Tanvir Ahmed (North Dakota State University), and Umamaheswara Rao Tida (North Dakota State University)</i>	
Quantum Anomalous Hall Effect Ternary Content Addressable Memory .....	730
<i>Madison Ashbach (North Dakota State University, USA), Md Mazharul Islam (University of Tennessee, USA), Shamiul Alam (University of Tennessee, USA), Ahmedullah Aziz (University of Tennessee, USA), and Sumitha George (North Dakota State University, USA)</i>	
Compact Multiplexer Design with Multi-Threshold Ferroelectric FETs .....	735
<i>Sanwar Ahmed Ovy (North Dakota State University, USA), Md Ashraful Islam Romel (North Dakota State University, USA), Yi Xiao (Pennsylvania State University, USA), Yixin Xu (Pennsylvania State University, USA), Kai Ni (University of Notre Dame, USA), and Sumitha George (North Dakota State University, USA)</i>	
An Inkjet-Printed Flexible Memristor Device for Echo State Networks .....	740
<i>Tasnim Zaman Adry (University of Missouri, USA), Shahrin Akter (University of Missouri, USA), Sazia Eliza (University of Missouri, USA), Steven D. Gardner (University of Alabama at Birmingham, USA), and Mohammad Rafiqul Haider (University of Missouri, USA)</i>	
Reliability Analysis of Phase Change Memory-Based Neuromorphic Circuits .....	745
<i>Twisha Titirsha (University of Missouri, USA), Md Maruf Hossain Shuvo (University of Texas at El Paso, USA), and Syed Kamrul Islam (University of Missouri, USA)</i>	

## POSTER SESSION 2: DIGITAL CIRCUITS AND FPGA-BASED DESIGNS

MOHSKM Meta-Heuristic Optimization Driven Hardware-Efficient Heterogeneous-Split Karatsuba Multipliers for Large-Bit Operations .....	749
<i>Saketh Gajawada (International Institute of Information Technology Bangalore, India), Dantu Nandini Devi (International Institute of Information Technology Bangalore, India), and Madhav Rao (International Institute of Information Technology Bangalore, India)</i>	
Hybrid Stochastic Computing of Linear Time $O(N)$ and Its In-Memory Computing for High Performances .....	753
<i>Yuhao Chen (Beihang University, China), Hongge Li (Beihang University, China), Yinjie Song (Beihang University, China), and Xinyu Zhu (Beihang University, China)</i>	

## POSTER SESSION 2: SYSTEM DESIGN AND SECURITY

QA-NoCs: Quantitative Analysis for Trojan Detection in Network-on-Chips .....	757
<i>Padmaja Bhamidipati (University of Cincinnati, USA) and Ranga Vemuri (University of Cincinnati, USA)</i>	
Microplumber: Finding Hidden Sources of Power-Based SCL in Microcontrollers .....	762
<i>Arna Roy (Worcester Polytechnic Institute) and Patrick Schaumont (Worcester Polytechnic Institute)</i>	

## POSTER SESSION 2: LATE BREAKING RESEARCH

An Experimental Study of Dynamic Task Graph Parallelism for Large-Scale Circuit Analysis Workloads .....	766
<i>Cheng-Hsiang Chiu (University of Wisconsin-Madison, USA) and Tsung-Wei Huang (University of Wisconsin-Madison, USA)</i>	
Incremental Critical Path Generation for Dynamic Graphs .....	771
<i>Che Chang (University of Wisconsin at Madison, USA), Cheng-Hsiang Chiu (University of Wisconsin at Madison, USA), Boyang Zhang (University of Wisconsin at Madison, USA), and Tsung-Wei Huang (University of Wisconsin at Madison, USA)</i>	
Natural Language Processing Meets Hardware Trojan Detection: Automating Security of FPGAs ..	775
<i>Vaishnavi More (California State University Fullerton, USA), Aaditya Chaudhari (California State University Fullerton, USA), Barnaboss Puli (California State University Fullerton, USA), Vasavi Vuppala (California State University Fullerton, USA), Jaya Dofe (California State University Fullerton, USA), and Wafi Danesh (The State University of New York at New Paltz, NY, USA)</i>	
Investigate the Effects of Laser Attack on Intelligence of the AV Perception .....	779
<i>Abhijeet Solanki (Tennessee Tech University, USA), Syed Rafay Hasan (Tennessee Tech University, USA), and Terry Guo (Tennessee Tech University, USA)</i>	
A Variation-Aware and Energy-Efficient Spintronic True Random Number Generator .....	783
<i>Saeed Mehri (Shahid Beheshti University, Iran), Arefe Amirany (University of Kashan, Iran), Milad Tanavardi Nasab (University of Tennessee, USA), Kian Jafari (Université de Sherbrooke, Canada), and Mohammad Hossein Moaiyeri (Shahid Beheshti University, Iran)</i>	
Navigating the Challenges of Statistical Fault Injection in SRAM-FPGA .....	787
<i>Trishna Rajkumar (KTH Royal Institute of Technology, Sweden) and Johnny Öberg (KTH Royal Institute of Technology, Sweden)</i>	
BatchSim: Parallel RTL Simulation using Inter-Cycle Batching and Task Graph Parallelism .....	789
<i>Jie Tong (University of Wisconsin-Madison, USA), Liangliang Chang (Arizona State University, USA), Umit Yusuf Ogras (University of Wisconsin-Madison, USA), and Tsung-Wei Huang (University of Wisconsin-Madison, USA)</i>	

## POSTER SESSION 2: STUDENT RESEARCH FORUM

Low-Precision Vectorized Arithmetic Unit Designs for Deep Learning .....	794
<i>Jing Zhang (National University of Defence Technology, China), Libo Huang (National University of Defence Technology, China), and Hui Guo (National University of Defence Technology, China)</i>	
FPGA-Based Intruder Detection Systems for Aerial Robots .....	798
<i>Maliha Kabir (The University of Texas at Tyler, USA), Roberto Gomez Gonzalez (The University of Texas at Tyler, USA), Troy Pulaski (The University of Texas at Tyler, USA), Parker Wilmoth (The University of Texas at Tyler, USA), and Prabha Sundaravadivel (The University of Texas at Tyler, USA)</i>	
Embedding Environmental Intelligence in Low-Cost Drones .....	802
<i>Roberto Gomez Gonzalez (The University of Texas at Tyler, USA), Miguel Gomez Gonzalez (The University of Texas at Tyler, USA), Luis Trevino (The University of Texas at Tyler, USA), and Prabha Sundaravadivel (The University of Texas at Tyler, USA)</i>	

## POSTER SESSION 2: SPECIAL SESSIONS

Advancing PUF Security: Machine Learning-Assisted Modeling Attacks .....	805
<i>Niraj Prasad Bhatta (Wright State University, USA) and Fathi Amsaad (Wright State University, USA)</i>	
Automated Generation of Dual Rail Adiabatic Gates from Binary Decision Diagrams .....	809
<i>Joseph Clark (University of Tennessee, USA), Elijah Raffel (University of Tennessee, USA), and Himanshu Thapliyal (University of Tennessee, USA)</i>	
Enhancing Supply Chain Security: Machine Learning for Manufacturer Identification of SRAM PUFs .....	812
<i>Harshdeep Singh (Wright State University) and Fathi Amsaad (Wright State University)</i>	
Physically Unclonable and Reconfigurable Circuits for IP Protection: Opportunities and Challenges .....	817
<i>Mrittika Chowdhury (University of Mississippi), Mahmudul Hasan (University of Kansas), Tamzidul Hoque (University of Kansas), and Md Sakib Hasan (University of Mississippi)</i>	
Federated Learning: A Paradigm Shift in Cybersecurity for Smart Grids .....	821
<i>Owen O'Connor (Tennessee Technological University, USA) and Tarek Elfouly (Tennessee Technological University, USA)</i>	
Advancing IoT Security Through Run-Time Monitoring & Post-Execution Verification .....	825
<i>Mahsa Dehghani (Independent Researcher), Mehdi Elahi (North Carolina A&amp;T State University), Mahdi Fazeli (Halmstad University, Sweden), and Ahmad Patooghy (North Carolina A&amp;T State University)</i>	
<b>Author Index .....</b>	<b>831</b>