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TECHNICAL PAPERS

In-Person USA Central Time (UTC-5)

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Jose M. De La Rosa, *IMSE-CNM*

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Place: Room 2
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¹*Imperial College London, United Kingdom;* ²*UK Dementia Research Institute, United Kingdom;* ³*University of Southampton, United Kingdom*

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¹*The University of Texas at Dallas, United States;* ²*University of Texas at Austin, United States*

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Place: Room 1
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Place: Room 2
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Place: Room 3
Chair(s): Sandro Carrara, *EPFL, Lausanne*
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¹Politecnico di Milano, Italy; ²Università di Ferrara, Italy; ³IHP Microelectronics, Germany

B1L-05 Technologies for Electric and Autonomous Vehicles I (In-Person)

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

Place: Room 5

Chair(s): Mohammed Ismail, *Wayne State University, USA*

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Seyedeh Masoumeh Navidi¹, Hamza Al Maharmeh¹, Samad Parekh², Ali Wehbi³,

Mohammad Alhawari¹, Mohammed Ismail

¹Wayne State University, United States; ²Synopsys Inc., United States; ³GlobalFoundries, United States

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B1L-05.2 TDD-Based Asymmetrical Ethernet Physical Layer for Automotive Applications 336

Kamal Dalmia¹, Claude R. Gauthier²

¹Aviva Links Inc., United States; ²NXP Semiconductors, United States

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B1L-05.3 Design of a LiDAR Point Cloud Data Processing System for Power Line Extraction on FPGA 341

Xuecheng Wang¹, Xinjian Wang², Yizheng Wei², Milin Zhang¹

¹Tsinghua University, China; ²Qianxun Spatial Intelligence Inc., China

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Rakesh Shrestha, Dohyun Kim, Junghwan Choi, Shiho Kim

Yonsei University, Korea

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B1L-05.5 Holistic Approaches to Memory Solutions for the Autonomous Driving Era 351

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Yongkee Kwon, Il Park, Hyun Ahn, Seonyong Cha, Jinkook Kim

SK hynix Inc., Korea

B2L-01 Unconventional Computing Techniques for Emerging Technology Applications I (In-Person)

Time: Tuesday, May 31 (10:50-12:00)

Place: Room 1

Chair(s): Ronald Tetzlaff, *TU Dresden, Germany*

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B2L-01.1 Stochastic Computing in Beyond Von-Neumann Era: Processing Bit-Streams in Memristive Memory

Mohsen Riahi Alam¹, M. Hassan Najafi¹, Nima TaheriNejad², Raju Gottumukkala¹

¹University of Louisiana at Lafayette, United States; ²Technische Universität Wien, Austria

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B2L-01.2 Hardware Implementation of Stochastic Computing-Based Morphological Neural Systems 356

Josep L. Rossello^{1,2}, Joan Font-Rosselló^{1,2}, Christian F. Frasser¹, Alejandro Morán¹,

E.S. Skibinsky-Gitlin¹, V. Canals^{1,2}, Miquel Roca^{1,2}

¹University of Balearic Islands, Spain; ²Balearic Islands Health Research Institute, Spain

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B2L-01.3 Evaluation of Dual Mode Logic under Cryogenic Temperatures 361

Inbal Stanger¹, Noam Roknian¹, Yonatan Shoshan¹, Zafir Levy¹, Yoav Weizman¹,

Edoardo Charbon², Adam Teman¹, Alexander Fish¹

¹Bar-Ilan University, Israel; ²École Polytechnique Fédérale de Lausanne, Switzerland

B2L-02 Hardware Architectures and Design Methodologies for Edge Intelligence I (In-Person)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 2
Chair(s): Tokunbo Ogunfunmi, Santa Clara University

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Wooyoung Jo, Sangjin Kim, Juhyoung Lee, Soyeon Um, Zhiyong Li, Hoi-Jun Yoo
Korea Advanced Institute of Science and Technology, Korea

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B2L-02.2 A Fast Compressed Hardware Architecture for Deep Neural Networks 370
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Santa Clara University, United States

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Y. Xiong¹, J. Li¹, D. Blaauw², H.-S. Kim², T. Mudge², R. Stanley Dreslinski², C. Chakrabarti¹
¹Arizona State University, United States; ²University of Michigan, United States

B2L-03 Neural Systems Based on Emerging Device and Circuit Technologies I (In-Person)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 3
Chair(s): Alex James, Clootrack Pvt Ltd.

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Filippo Moro¹, E. Esmanhotto¹, T. Hirtzlin¹, N. Castellani¹, A. Trabelsi¹, T. Dalgaty¹, G. Molas¹, F. Andrieu¹, S. Brivio², S. Spiga², G. Indiveri³, M. Payvand³, E. Vianello¹
¹CEA-Leti, France; ²National Research Council's Institute for Microelectronics and Microsystems CNR-IMM, Italy; ³Institute of Neuroinformatics, University of Zürich and ETH Zürich, Switzerland

11:04

B2L-03.2 Fundamental Limits on the Computational Accuracy of Resistive Crossbar-Based In-Memory Architectures 384
Saion K. Roy¹, Ameya Patil², Naresh R. Shanbhag¹
¹University of Illinois at Urbana-Champaign, United States; ²Amazon Lab126, United States

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B2L-03.3 Interconnect Parasitics and Partitioning in Fully-Analog In-Memory Computing Architectures 389
Md Hasibul Amin, Mohammed Elbity, Ramtin Zand
University of South Carolina, United States

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B2L-03.4 RS3DPlace: Monolithic 3D IC Placement Using Reinforcement Learning and Simulated Annealing 394
Abdullah Mansoor, Malgorzata Chrzanowska-Jeske
Portland State University, United States

B2L-04 Algorithms and Hardware for Low-Complexity Biomedical Signal Processing (In-Person)

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Place: Room 4
Chair(s): Tanwei Yan, *Texas A&M University*

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B2L-04.1 Video Decoder Improvements with Near-Data Speculative Motion Compensation Processing 399

Garrenlus de Souza¹, José Rodrigo Azambuja¹, Bruno Zatt², Marco A. Zanata³, Sergio Bampi¹, Felipe Sampaio⁴
¹*Universidade Federal do Rio Grande do Sul, Brazil;* ²*Universidade Federal de Pelotas, Brazil;*
³*Federal University of Paraná, Brazil;* ⁴*Federal Institute of Rio Grande do Sul, Brazil*

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B2L-04.2 Coupling Convolution, Transformer and Graph Embedding for Motor Imagery Brain-Computer Interfaces 404

Zexu Wu, Biao Sun, Xinshan Zhu
Tianjin University, China

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Weihang Li, Liang Chang, Jiajing Fan, Xin Zhao, Hengtan Zhang, Shuisheng Lin, Jun Zhou
University of Electronic Science and Technology of China, China

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B2L-04.4 Antidictionary-Based Cardiac Arrhythmia Classification for Smart ECG Sensors 414

Julien Duforest¹, Benoît Larras¹, Antoine Frappé¹, Chacko John Deepu², Olev Märtens³
¹*Univ. Lille, CNRS, Centrale Lille, Junia, Univ. Polytechnique Hauts-de-France, UMR 8520 - IEMN, France;*
²*University College Dublin, Ireland;* ³*Tallinn University of Technology Institute of Electronics, Estonia*

B2L-05 Multimedia Systems and Applications I (In-Person)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 5
Chair(s): Wu Liu, *JD.COM*

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B2L-05.1 Part-Level Action Parsing via a Pose-Guided Coarse-to-Fine Framework 419

Xiaodong Chen¹, Xinchun Liu², Wu Liu², Kun Liu², Dong Wu², Yongdong Zhang¹, Tao Mei²
¹*University of Science and Technology of China, China;* ²*JD.com, Inc., China*

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B2L-05.2 Anime Character Recognition Using Intermediate Features Aggregation 424

Edwin Arkel Rios¹, Min-Chun Hu², Bo-Cheng Lai¹
¹*National Yang Ming Chiao Tung University, Taiwan;* ²*National Tsing Hua University, Taiwan*

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Iago Storch¹, Daniel Palomino², Sergio Bampi¹
¹*Universidade Federal do Rio Grande do Sul, Brazil;* ²*Universidade Federal de Pelotas, Brazil*

B3L-01 RF Circuits and Systems (In-Person)

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

Place: Room 1

Chair(s): Jorge Fernandes, *INESC-ID / IST*
Aatmesh Shrivastava, *Northeastern University College of Engineering*

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B3L-01.1 A 0.2 dBm 225 GHz Frequency Quadrupler with 330° Phase Control in 130 nm SiGe BiCMOS 434

Luca Steinweg, Florian Protze, Paolo Valerio Testa, Corrado Carta, Frank Ellinger
Technische Universität Dresden, Germany

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B3L-01.2 Compact N-Way Doherty Power Combiners for mm-Wave 5G Transmitters 438

Anil Kumar Kumaran¹, Hossein Mashad Nemati², Leo C.N. de Vreede¹, Morteza S. Alavi¹
¹*Delft University of Technology, The Netherlands*; ²*Huawei Technologies, Sweden*

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B3L-01.3 Enabling Software-Defined RF Convergence with a Novel Coarse-Scale Heterogeneous Processor 443

D.W. Bliss¹, T. Ajayi^{1,2}, A. Akoglu¹, I. Aliyev¹, T. Basaklar³, L. Belayneh², D. Blaauw², J. Brunhaver¹,
C. Chakrabarti¹, L. Chang¹, K.-Y. Chen², M.-H. Chen², X. Chen¹, A.R. Chiriyath¹, A. Daftardar²,
R. Dreslinski², A. Dutta¹, A.J. Farcas⁴, Y. Fu¹, A. Goksoy³, X. He², Md. S. Hassan¹, A. Herschfelt¹,
J. Holtom¹, H.-S. Kim², A.N. Krishnakumar³, Y. Li¹, O. Ma¹, J. Mack¹, S. Mallik², S.K. Mandal³,
R. Marculescu⁴, B. McCall¹, T. Mudge², U.Y. Ogras³, V. Pandey³, S. Siddiqui¹, Y.-H. Sun²,
A. Venkataramani¹, X. Wei², B.R. Willis¹, H. Yu¹, Y. Yue²
¹*Arizona State University, United States*; ²*University of Michigan, United States*;
³*University of Wisconsin-Madison, United States*; ⁴*The University of Texas at Austin, United States*

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B3L-01.4 Integration of Reconfigurable RF Manifolds with Software Defined Systems 448

C.L.A. Cerny
Air Force Research Laboratory, United States

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Silvio Waldmann, Helia Ordouei, Friedel Gerfers
Technische Universität Berlin, Germany

B3L-02 Hardware Security for IoT and Cyber-Physical Systems (In-Person)

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

Place: Room 2

Chair(s): Mohammed Niamat, *University of Toledo*
Ricardo Reis, *Federal University of Rio Grande do Sul*

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B3L-02.1 Soft Error Reliability Assessment of Lightweight Cryptographic Algorithms for IoT Edge Devices 457

Vinicius da Rocha¹, Nicolas Moura¹, Jonas Gava², Vitor Bandeira², Luciano Ost³, Ricardo Reis², Rafael Garibotti¹
¹*Pontifical Catholic University of Rio Grande do Sul, Brazil*; ²*Universidade Federal do Rio Grande do Sul, Brazil*;
³*Loughborough University, United Kingdom*

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Tarek Idriss¹, Alex Gavin¹, Adrian Gabales¹, Haytham Idriss², Magdy Bayoumi²
¹*Western Washington University, United States*; ²*University of Louisiana at Lafayette, United States*

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<i>Place:</i>	Room 3		
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B3L-04 Learning-Based Video Coding and Processing (In-Person)

Time: Tuesday, May 31 (13:30-15:00)
Place: Room 4
Chair(s): Nam Ling, *Santa Clara University, USA*

13:30

- B3L-04.1** **An Attention Based CNN with Temporal Hierarchical Deployment for AVS3 Inter In-Loop Filtering** 501
Yibing Fu, Shen Wang, Chen Zhu, Li Song, Wenjun Zhang
Shanghai Jiao Tong University, China

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- B3L-04.2** **Complexity Reduction of Learned In-Loop Filtering in Video Coding** 506
Woody Bayliss¹, Luka Murn², Ebroul Izquierdo¹, Qianni Zhang¹, Marta Mrak¹
¹*Queen Mary University of London, United Kingdom*; ²*BBC, United Kingdom*

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Leibniz Universität Hannover, Germany

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- B3L-04.4** **A Lightweight Model with Separable CNN and LSTM for Video Prediction** 516
Mareeta Mathai, Ying Liu, Nam Ling
Santa Clara University, United States

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- B3L-04.5** **A Template Matching Based Extension for Merge with Motion Vector Difference** 521
Mehdi Salehifar, Yuwen He, Kai Zhang, Na Zhang, Li Zhang
Bytedance Inc., United States

B3L-05 Energy-Efficient Solutions for Future Devices I (In-Person)

Time: Tuesday, May 31 (13:30-15:00)
Place: Room 5
Chair(s): Ronald Tetzlaff, *TU Dresden, Germany*

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- B3L-05.1** **Fast & Efficient Hysteretic Power Supplies for IoT Microsensors: Analysis & Design with Insight** 526
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Georgia Institute of Technology, United States

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- B3L-05.2** **A Highly Efficient Fully Integrated Active Rectifier for Ultrasonic Wireless Power Transfer** 531
Xinling Yue, Zhelun Chen, Yiwei Zou, Sijun Du
Delft University of Technology, The Netherlands

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- B3L-05.3** **A 50% Ripple Reduction Hybrid Multiphase Interleaving SC Converter with Bottom-Plate Charge Sharing** 536
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Indian Institute of Technology Hyderabad, India

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		Xianguang Li ¹ , Keping Wang ¹ , Yixin Zhou ² , Hao Zhang ³ <i>¹Tianjin University, China; ²Southeast University, China; ³Nanjing Research Institute of Electronics Technology, China</i>	
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	B4L-01	Oversampling Converters (In-Person)	
	<i>Time:</i>	Tuesday, May 31 (16:30-18:00)	
	<i>Place:</i>	Room 1	
	<i>Chair(s):</i>	Jose M. De La Rosa, <i>IMSE-CNM</i> Edoardo Bonizzoni, <i>University of Pavia</i>	
16:30	B4L-01.1	A Robust Hybrid CT/DT 0-2 MASH DSM with Passive Noise-Shaping SAR ADC	551
		Ke Li ¹ , Sai-Weng Sin ¹ , Liang Qi ² , Weibing Zhao ³ , Guoxing Wang ² , R.P. Martins ^{1,4} <i>¹University of Macau, Macau; ²Shanghai Jiao Tong University, China; ³Amicro Semiconductor Co., Ltd., China; ⁴Universidade de Lisboa, Macau</i>	
16:48	B4L-01.2	A 2-0 MASH Delta-Sigma ADC with Sub-Sampling SAR ADC	556
		Anne Engerer, Antonios Nikas, Matthias Voelker <i>Fraunhofer Institute For Integrated Circuits IIS, Germany</i>	
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17:42	B4L-01.5	Automated Design of Sigma-Delta Modulators with FIR Feedback	571
		Johannes Wagner, Mohamed A. Mokhtar, Maurits Ortmanns <i>Universität Ulm, Germany</i>	
	B4L-02	Memory and Compute-in-Memory Circuits and Architectures I (In-Person)	
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	<i>Chair(s):</i>	Mohsin M. Jamali, <i>The University of Texas Permian Basin</i> Ioannis Savidis, <i>Drexel University</i>	
16:30	B4L-02.1	SciMA: A Generic Single-Cycle Compute-in-Memory Acceleration Scheme for Matrix Computations	576
		Sepehr Tabrizchi ¹ , Shaahin Angizi ² , Arman Roohi ¹ <i>¹University of Nebraska-Lincoln, United States; ²New Jersey Institute of Technology, United States</i>	

16:48	B4L-02.2	Reliability Improvement in RRAM-Based DNN for Edge Computing	581
		Md. Oli-Uz-Zaman ¹ , Saleh Ahmad Khan ¹ , Geng Yuan ² , Yanzhi Wang ² , Zhiheng Liao ³ , Jingyan Fu ³ , Caiwen Ding ⁴ , Jinhui Wang ¹ ¹ University of South Alabama, United States; ² Northeastern University, United States; ³ North Dakota State University, United States; ⁴ University of Connecticut, United States	
17:06	B4L-02.3	A 12TOPS/W Computing-in-Memory Accelerator for Convolutional Neural Networks	586
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17:42	B4L-02.5	Reliability-Improved Read Circuit and Self-Terminating Write Circuit for STT-MRAM in 16 nm FinFET	595
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<i>Time:</i>		Tuesday, May 31 (16:30-18:00)	
<i>Place:</i>		Room 3	
<i>Chair(s):</i>		Juan Antonio Leñero-Bardallo, <i>University of Seville</i> Ricardo Carmona Galán, <i>Institute of Microelectronics of Seville</i>	
16:30	B4L-03.1	Toward a Highly Scalable Smart System for Small Animal Body Sensing and Tracking Using an Inductive Multi-Resonator Array	600
		Reepa Saha, Sahaj Anilbhai Patel, Abidin Yildirim, S. Abdollah Mirbozorgi University of Alabama at Birmingham, United States	
16:48	B4L-03.2	A Wide-Range Low-Cost Temperature to Digital Converter Independent of Device Models	605
		Mona Ganji, Marampally Saikiran, Degang Chen Iowa State University, United States	
17:06	B4L-03.3	A Machine Learning Smartphone-Based Sensing for Driver Behavior Classification	610
		Sara Ben Brahim ¹ , Hakim Ghazzai ² , Hichem Besbes ¹ , Yehia Massoud ² ¹ University of Carthage, Tunisia; ² King Abdullah University of Science and Technology, Saudi Arabia	
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		Sylmarie Dávila-Montero, Sina Parsnejad, Ehsan Ashoori, Derek Goderis, Andrew J. Mason Michigan State University, United States	
17:42	B4L-03.5	A Versatile In-Ear Biosensing System for Continuous Brain and Health Monitoring	620
		Akshay Paul, Min Lee, Yuchen Xu, Stephen Deiss, Gert Cauwenberghs University of California, San Diego, United States	

B4L-04 Recent Progress in Theory and Applications of Memristive Technologies Toward a New Era in Electronic VII (In-Person)

Time: Tuesday, May 31 (16:30-18:00)
Place: Room 4
Chair(s): Alejandro Linares-Barranco, *University of Seville*

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B4L-04.1 Spatiotemporal Spike Pattern Detection with Second-Order Memristive Synapses 625
Yuting Wu, Sangmin Yoo, Fan-Hsuan Meng, Wei D. Lu
University of Michigan, Ann Arbor, United States

16:48
B4L-04.2 Experimental and Theoretical Analysis of Stateful Logic in Passive and Active Crossbar Arrays for Computation-in-Memory 629
Christopher Bengel¹, Hsin-Yu Chen², Henriette Padberg¹, Stefan Wiefels³, Qing-Tai Zhao⁴, Fengben Xi⁴, Vikas Rana², Rainer Waser^{1,2,3}, Stephan Menzel³
¹*RWTH Aachen, Germany*; ²*Peter Grünberg Institut 10, Forschungszentrum Jülich GmbH, Germany*; ³*Peter Grünberg Institute PGI-7, Forschungszentrum Jülich GmbH, Germany*; ⁴*Peter Grünberg Institute PGI-9, Forschungszentrum Jülich GmbH, Germany*

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B4L-04.3 A Fully Memristive Spiking Neural Network with Unsupervised Learning 634
Peng Zhou¹, Dong-Uk Choi¹, Jason K. Eshraghian^{2,3}, Sung-Mo Kang¹
¹*University of California, Santa Cruz, United States*; ²*University of Michigan, United States*; ³*University of Western Australia, Australia*

17:24
B4L-04.4 Equilibrium Propagation and (Memristor-Based) Oscillatory Neural Networks 639
Gianluca Zoppo, Francesco Marrone, Michele Bonnin, Fernando Corinto
Politecnico di Torino, Italy

B4L-05 Energy Harvesting I (In-Person)

Time: Tuesday, May 31 (16:30-18:00)
Place: Room 5
Chair(s): Hiroo Sekiya, *Chiba University*

16:30
B4L-05.1 A PV-Assisted 10-mV Startup Boost Converter for Thermoelectric Energy Harvesting 644
Yansong Liang¹, Ruizhi Wang¹, Zhongsheng Chen², Sijun Du¹
¹*Delft University of Technology, The Netherlands*; ²*Hunan University of Technology, China*

16:48
B4L-05.2 High-Voltage Triboelectric Energy Harvesting Using Multi-Shot Energy Extraction in 70 V BCD Process
Madhav Pathak, Shuo Xie, Cheng Huang, Ratnesh Kumar
Iowa State University, United States

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B4L-05.3 A Reconfigurable Cold-Startup SSHI Rectifier with 4X Lower Input Amplitude Requirement for Piezoelectric Energy Harvesting 649
Xinling Yue¹, Yiwei Zou¹, Zhelun Chen¹, Junrui Liang², Sijun Du¹
¹*Delft University of Technology, The Netherlands*; ²*ShanghaiTech University, China*

C1L-01 Analog Signal Processing Circuits (In-Person)

Time: Wednesday, June 1 (8:00-9:30)
Place: Room 1
Chair(s): Jerald Yoo, *National University of Singapore*
Matthew Johnston, *Oregon State University*

8:00

C1L-01.1 Fully Differential Power-Efficient AB Miller Op-Amp for a Wide Range of Capacitive and Resistive Loads 654
Anindita Paul¹, Jaime Ramirez-Angulo², Héctor Vázquez-Leal³, Jesús Huerta-Chua², Alejandro Diaz-Sánchez⁴
¹*Oregon Institute of Technology, United States*; ²*Tecnológico Nacional de México, Mexico*;
³*Universidad Veracruzana, Mexico*; ⁴*INAOE, Mexico*

8:18

C1L-01.2 A Compact 0.0054mm² Multipurpose Analog Frontend for Ultrasound Digitizers in 40nm CMOS
K. Pelzers, H. Xin, E. Cantatore, P. Harpe
Eindhoven University of Technology, The Netherlands

8:36

C1L-01.3 An 12th-Order Active-RC Bandpass Filter with Programmable Bandwidth and Center Frequency for Synthetic Aperture Radar Application 659
Ting Guo, Kai Tang, Zhongyuan Fang, Yuanjin Zheng
Nanyang Technological University, Singapore

8:54

C1L-01.4 Analog Correlator by a Dynamically-Reconfigured Switched-Capacitor Circuit 663
Fuminori Kobayashi
Kyushu Institute of Technology, Japan

9:12

C1L-01.5 Hardware Security Vulnerability in Analog Signal Chain Filters 667
Kwabena Oppong Banahene, Matthew R. Strong, Bryce Gadogbe, Degang Chen, Randall L. Geiger
Iowa State University, United States

C1L-02 Reconfigurable Architectures, Design Automation and 3D ICs (In-Person)

Time: Wednesday, June 1 (8:00-9:30)
Place: Room 2
Chair(s): Ricardo Reis, *Federal University of Rio Grande do Sul*

8:00

C1L-02.1 A Templated VHDL Architecture for Terabit/s P4-Programmable FPGA-Based Packet Parsing 672
Parisa Mashreghi-Moghadam, Tarek Ould-Bachir, Yvon Savaria
Polytechnique Montréal, Canada

8:18

C1L-02.2 MinAC: Minimal-Area Approximate Compressor Design Based on Exact Synthesis for Approximate Multipliers 677
Xuan Wang¹, Weikang Qian^{1,2}
¹*University of Michigan-Shanghai Jiao Tong University Joint Institute, China*; ²*Shanghai Jiao Tong University, China*

8:36

C1L-02.3 Artificial Neural Network Based Post-CTS QoR Report Prediction 682
Arpit Jain, Pabitra Das, Amit Acharyya
Indian Institute of Technology Hyderabad, India

8:54
C1L-02.4 **A 0.45 pJ/Bit 20 Gb/s/Wire Parallel Die-to-Die Interface with Rotary Traveling Wave Oscillators** 687
Ragh Kuttappa, Baris Taskin
Drexel University, United States

9:12
C1L-02.5 **Resonant Rotary Clock Synchronization with Active and Passive Silicon Interposer** 692
Ragh Kuttappa¹, Baris Taskin¹, Vinayak Honkote², Satish Yada², Jainaveen Sundaram², Dileep Kurian²,
Tanay Karnik², Anuradha Srinivasan²
¹*Drexel University, United States*; ²*Intel Labs, United States*

C1L-03 **Deep Learning Systems I (In-Person)**
Time: Wednesday, June 1 (8:00-9:30)
Place: Room 3
Chair(s): Óscar Pereira-Rial, *University of Santiago de Compostela*

8:00
C1L-03.1 **DLPrPPG: Development and Design of Deep Learning Platform for Remote Photoplethysmography** 697
Bo-Rong Yan¹, Edwin Arkel Rios¹, Wen-Hsien Lee², Bo-Cheng Lai¹
¹*National Yang Ming Chiao Tung University, Taiwan*; ²*Kaohsiung Medical University, Taiwan*

8:18
C1L-03.2 **Design of a 5-Bit Signed SRAM-Based In-Memory Computing Cell for Deep Learning Models** 702
Ó. Pereira-Rial, D. García-Lesta, V.M. Brea, P. López, D. Cabello
Universidad de Santiago de Compostela, Spain

8:36
C1L-03.3 **A 4-Bit Integer-Only Neural Network Quantization Method Based on Shift Batch Normalization** 707
Qingyu Guo¹, Xiaoxin Cui¹, Jian Zhang², Aifei Zhang², Xinjie Guo², Yuan Wang¹
¹*Peking University, China*; ²*Beijing Zhicun WITIN Technology Corporation Limited, China*

8:54
C1L-03.4 **A Non-Conventional Sum-and-Max Based Neural Network Layer for Low Power Classification** 712
Luciano Prono¹, Mauro Mangia², Fabio Pareschi^{1,2}, Riccardo Rovatti², Gianluca Setti^{1,2}
¹*Politecnico di Torino, Italy*; ²*Università di Bologna, Italy*

9:12
C1L-03.5 **A 120dB Programmable-Range On-Chip Pulse Generator for Characterizing Ferroelectric Devices** 717
Shyam Narayanan¹, Erika Covi², Viktor Havel², Charlotte Frenkel¹, Suzanne Lancaster², Quang Duong²,
Stefan Slesazek², Thomas Mikolajick², Melika Payvand¹, Giacomo Indiveri¹
¹*Institute of Neuroinformatics, University of Zürich and ETH Zürich, Switzerland*; ²*NaMLab gGmbH, Germany*

C1L-04 **Signal Detection, Compression and Reconstruction (In-Person)**
Time: Wednesday, June 1 (8:00-9:30)
Place: Room 4
Chair(s): Wenfeng Zhao, *Binghamton University SUNY*

8:00
C1L-04.1 **Car Traffic Monitoring Using Discrete Frequency Chirp Bluetooth Radar** 722
Gerrit Maus, Jöran Schirmer, René Ahrens, Stefan Janicke, Dieter Brückmann
Universität Wuppertal, Germany

8:18	C1L-04.2	Exploiting a Blink of Measurement Saturation Towards Hardware-Efficient Compressed Sensing Encoder Design	727
		Yunxiang Zhang ¹ , Jian Xu ² , Miao Hu ¹ , Wenfeng Zhao ¹ <i>¹Binghamton University, United States; ²Zhejiang University, China</i>	
8:36	C1L-04.3	An Attention-Based Network for Single Image HDR Reconstruction	732
		Mohamed Dafaallah, Hui Yuan, Shiqi Jiang, Ye Yang <i>Shandong University, China</i>	
8:54	C1L-04.4	Joint Representation Learning for Anomaly Detection in Surveillance Videos	737
		Savath Saypadith, Takao Onoye <i>Osaka University, Japan</i>	
	C1L-05	Wireless and Wireline Communications I (In-Person)	
	<i>Time:</i>	Wednesday, June 1 (8:00-9:30)	
	<i>Place:</i>	Room 5	
	<i>Chair(s):</i>	Tanwei Yan, <i>Texas A&M University</i>	
8:00	C1L-05.1	Design of a mmWave Digital Baseband Receiver Integrated with WOLA-CP-OFDM Technique	742
		Kang-Lun Chiu, Hsun-Wei Chan, Hsuan-Ping Chiu, Chun-Yi Liu, Chih-Wei Jen, Shyh-Jye Jou <i>National Yang Ming Chiao Tung University, Taiwan</i>	
8:18	C1L-05.2	LO Synchronization Scheme via Full-Duplex Transceiver for Distributed Beamforming in Wireless Ad Hoc Networks	747
		Olalekan Afuye, Shimin Huang, Ken Ho, Alyosha Molnar, Alyssa Apsel <i>Cornell University, United States</i>	
8:36	C1L-05.3	PAM-4/6/8 Performance and Power Analysis for Next Generation 224Gbit/s Links	752
		Urs Hecht ¹ , Enne Wittenhagen ¹ , Halil Cirit ² , Saman Behtash ³ , Srinivas Venkataram ² , Friedel Gerfers ¹ <i>¹Technische Universität Berlin, Germany; ²Meta Inc., United States; ³Exsilica Corporation, United States</i>	
8:54	C1L-05.4	An 8GHz Communication/Ranging IR-UWB Transmitter with Asymmetric Pulse Shaping and Frequency Hopping for Fine Ranging and Enhanced Link Margin	757
		Su Han, Bowen Wang, Woogeun Rhee, Zhihua Wang <i>Tsinghua University, China</i>	
	C2L-01	Application Specific Analog Circuits (In-Person)	
	<i>Time:</i>	Wednesday, June 1 (14:00-15:30)	
	<i>Place:</i>	Room 1	
	<i>Chair(s):</i>	Ayman Fayed, <i>Ohio State University</i>	
14:00	C2L-01.1	Digital-to-Analog Converters to Benchmark the Matching Performance of a New Zero-Cost Transistor	761
		Paul Devoge ^{1,2,3} , Hassan Aziza ² , Philippe Lorenzini ³ , Alexandre Malherbe ¹ , Franck Julien ¹ , Abderrezak Marzaki ¹ , Arnaud Regnier ¹ , Stephan Niel ¹ <i>¹STMicroelectronics, France; ²IM2NP, Aix-Marseille Université, France; ³University of Cote d'Azur, France</i>	

- 14:18
C2L-01.2 **A 0.5 V, 0.13 nW, 4-Transistor Over Temperature Protection Circuit for SoCs** 765
 Indranil Bhattacharjee, Mohith Amara, Gajendranath Chowdary
Indian Institute of Technology Hyderabad, India
- 14:36
C2L-01.3 **Programmable Refractory Period Implementations in a Mixed-Signal Integrate-and-Fire Neuron** 770
 Nishith N. Chakraborty, Garrett S. Rose
University of Tennessee Knoxville, United States
- 14:54
C2L-01.4 **Noise Optimization of a Resistively-Driven Ring Oscillator for VCO-Based ADCs** 775
 Jonas Borgmans, Pieter Rombouts
Ghent University, Belgium
- 15:12
C2L-01.5 **A Fast Reference-Tracking Buck Converter for 5G Power Amplifier Supply Modulator** 780
 Qizhun Zhou
University of Science and Technology of China, China
- C2L-02** **TCAS Papers: Mixed Mode Design Techniques (In-Person)**
Time: Wednesday, June 1 (14:00-15:30)
Place: Room 2
Chair(s): Jose Silva-Martinez, Texas A&M University
- 14:00
C2L-02.1 **AI-Managed Cognitive Radio Digitizers**
 José M. de la Rosa
Instituto de Microelectrónica de Sevilla and Universidad de Sevilla, Spain
- 14:18
C2L-02.2 **An Interference Tolerant Synchronization Scheme for Wireless Communication Systems Based on Direct Sequence Spread Spectrum**
 Jian Shao¹, Aydin Ilker Karsilayan¹, Jose Silva-Martinez¹, Christopher T. Rodenbeck²
¹Texas A&M University, United States; ²United States Naval Research Laboratory, United States
- 14:36
C2L-02.3 **A Single-MOSFET Analog High Resolution-Targeted (SMART) Multiplier for Machine Learning Classification**
 Farid Kenarangi, Inna Partin-Vaisband
University of Illinois at Chicago, United States
- 14:54
C2L-02.4 **Multiple Potential Well Precision Oscillators**
 Gary L. Viviani
Montana Technological University / Vivatronx, United States
- 15:12
C2L-02.5 **A 96-Mb 3D-Stacked SRAM Using Inductive Coupling with 0.4-V Transmitter, Termination Scheme and 12:1 SerDes in 40-nm CMOS**
 Kota Shiba¹, Tatsuo Omori¹, Kodai Ueyoshi², Shinya Takamaeda-Yamazaki¹, Masato Motomura³,
 Mototsugu Hamada¹, Tadahiro Kuroda¹
¹The University of Tokyo, Japan; ²Katholieke Universiteit Leuven, Belgium; ³Tokyo Institute of Technology, Japan

C2L-03 Neuromorphic Applications (In-Person)

Time: Wednesday, June 1 (14:00-15:30)

Place: Room 3

Chair(s): Juan Antonio Leñero-Bardallo, CSIC

14:00

C2L-03.1 On the Application of Quanta Imaging Acquisition to Spiking Luminance Sensors 784

R.J. Méndez-Romero, J.A. Leñero-Bardallo, Á. Rodríguez-Vázquez

CSIC, Universidad de Sevilla, Spain

14:18

C2L-03.2 Bio-Inspired Acoustic Sensor with Gain Adaptation Enhancing Dynamic Range and Onset Detection 789

Steve Durstewitz, Claudia Lenk, Martin Ziegler

Technische Universität Ilmenau, Germany

14:36

C2L-03.3 Mobile-URSONet: An Embeddable Neural Network for Onboard Spacecraft Pose Estimation 794

Julien Posso, Guy Bois, Yvon Savaria

Polytechnique Montréal, Canada

14:54

C2L-03.4 Selective Input Sparsity in Spiking Neural Networks for Pattern Classification 799

Alexander J. Leigh, Moslem Heidarpur, Mitra Mirhassani

University of Windsor, Canada

15:12

C2L-03.5 Fusing Frame and Event Vision for High-Speed Optical Flow for Edge Application 804

Ashwin Sanjay Lele, Arijit Raychowdhury

Georgia Institute of Technology, United States

C2L-04 Nonlinear Systems and Complex Networks I (In-Person)

Time: Wednesday, June 1 (14:00-15:30)

Place: Room 4

Chair(s): Zbigniew Gallas, AGH University of Science and Technology

14:00

C2L-04.1 Towards Wave Digital Modeling of Neural Pathways Using Two-Port Coupling Networks 809

Karlheinz Ochs, Bakr Al Beattie

Ruhr-University Bochum, Germany

14:18

C2L-04.2 Modeling Compute Storage Quality of Service and Latency Using Sigmoid Functions 813

Sterling Hansen, Morgan Githinji, Etienne Elie, Charles Anyimi

Intel Corporation, United States

14:36

C2L-04.3 Estimation of Inertia in Power Grids with Turbine Governors 819

Valentina Baruzzi, Matteo Lodi, Alberto Oliveri, Marco Storaice

Università di Genova, Italy

C2L-05 Neural Network-Based Video Coding I (In-Person)

Time: Wednesday, June 1 (14:00-15:30)

Place: Room 5

Chair(s): Li Zhang, *Bytedance Inc., San Diego*

14:00

C2L-05.1 VISTRA3: Video Coding with Deep Parameter Adaptation and Post Processing 824

Chen Feng, Duolikun Danier, Charlie Tan, Fan Zhang, David Bull

University of Bristol, United Kingdom

14:18

C2L-05.2 Learned Video Compression for YUV 4:2:0 Content Using Flow-Based Conditional Inter-Frame Coding 829

Yung-Han Ho, Chih-Hsuan Lin, Peng-Yu Chen, Mu-Jung Chen, Chih-Peng Chang,

Wen-Hsiao Peng, Hsueh-Ming Hang

National Yang Ming Chiao Tung University, Taiwan

14:36

C2L-05.3 Improvements to a Temporal Filter for Video Coding 834

Jack Enhorn, Christopher Hollmann, Rickard Sjöberg, Kenneth Andersson, Per Wennersten

Ericsson AB, Sweden

C3L-01 Interface and Biasing Circuits (In-Person)

Time: Wednesday, June 1 (16:00-17:30)

Place: Room 1

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

Jerald Yoo, *National University of Singapore*

16:00

C3L-01.1 A Digitally-Controlled Fully Differential Low Noise Current Source 839

Maximilian Scherzer^{1,2}, Mario Auer²

¹*Austrian Academy of Sciences, Austria;* ²*Graz University of Technology, Austria*

16:18

C3L-01.2 Ultra-Low-Power IoT 30 nW 474 mV 19 ppm/°C Voltage Reference and 2 nA 470 ppm/°C Current Reference 843

Darshan Shetty¹, Christoph Steffan¹, Wolfgang Bösch², Jasmin Grosinger²

¹*Infineon Technologies Austria AG, Austria;* ²*Technische Universität Graz, Austria*

16:36

C3L-01.3 An Enhanced Start-Up Circuit Eliminating All Trojan States in Self-Biased Reference Generators 848

Baijie Zhang, Jue Wang, Xu Cheng, Jun Han, Xiaoyang Zeng

Fudan University, China

16:54

C3L-01.4 Power Efficient Echo-Cancellation Based Hybrid for Full-Duplex Chip-to-Chip Interconnects 852

Prema Kumar Govindaswamy¹, Nijwm Wary², Vijaya Sankara Rao Pasupureddi²

¹*University of Hyderabad, India;* ²*Indian Institute of Technology Bhubaneswar, India*

17:12

C3L-01.5 A Low-Power Half-Rate Charge-Steering Hybrid for Full-Duplex Chip-to-Chip Interconnects 857

Prema Kumar Govindaswamy¹, Nijwm Wary², Vijaya Sankara Rao Pasupureddi²

¹*University of Hyderabad, India;* ²*Indian Institute of Technology Bhubaneswar, India*

C3L-02 Experimental Teaching Systems I (In-Person)

Time: Wednesday, June 1 (16:00-17:30)
Place: Room 2
Chair(s): Jamali Mohsin, *The University of Texas Permian Basin*

16:00

C3L-02.1 The System of Personalized Learning Resource Recommendation and Experimental Teaching Based on Collaborative Filtering 862
Bin Sun, Hua Tan, Dongxiao Yang, Yu Zhang, Yefei Wu, Xinyu Jin
Zhejiang University, China

16:18

C3L-02.2 Research and Practice of Grain Depot Ecological Precision Measurement and Control Experimental Teaching System Based on 5G Edge Calculation 867
Bin Sun¹, Hongtuo Han¹, Yuncheng Jin¹, Yusun Zhou², Ziyuan Wang³, Xinyu Jin¹
¹*Zhejiang University, China*; ²*Zhejiang University City College, China*; ³*Polytechnic Institute of Zhejiang University, China*

C3L-03 Circuits and Systems for Non-Contact Sensing Applications I (In-Person)

Time: Wednesday, June 1 (16:00-17:30)
Place: Room 3
Chair(s): Elisabetta Moiselto, *University of Pavia, Italy*

16:00

C3L-03.1 A Novel CMOS-SOI High-Responsivity Thermopile for Thermal Sensing Applications 871
Elisabetta Moiselto¹, Michele Vaiana², Maria Eloisa Castagna², Antonella La Malfa², Giuseppe Bruno², Edoardo Bonizzoni¹, Piero Malcovati¹
¹*Università degli Studi di Pavia, Italy*; ²*STMicroelectronics, Italy*

16:18

C3L-03.2 Dynamic Tuning of Sensitivity and Bandwidth of High-Q Transducers via Nested Phase Modulations 876
Aidan Fitzpatrick, Ajay Singhvi, Amin Arbabian
Stanford University, United States

16:36

C3L-03.3 A One-Point Exponential Trimming Technique for an Effective Suppression of Process Spread in BJT-Based Temperature Processing Circuits 881
Antonio Aprile¹, Michele Folz², Daniele Gardino², Piero Malcovati¹, Edoardo Bonizzoni¹
¹*Università degli Studi di Pavia, Italy*; ²*TDK InvenSense, Italy*

C3L-04 Signal Separation and Nonlinear Processing (In-Person)

Time: Wednesday, June 1 (16:00-17:30)
Place: Room 4
Chair(s): Mrityunjy Chakraborty, *Indian Institute of Technology Kharagpur, India*

16:00

C3L-04.1 Dual Square Root Unscented Kalman Filter Based Single Channel Blind Source Separation Methodology 885
Rashi Dutt¹, Amit Acharyya¹, Israr Sheikh²
¹*Indian Institute of Technology Hyderabad, India*; ²*Intel Corporation, India*

16:18
C3L-04.2 **Real-Time Power Amplifier Impairment Assessment Using Nonlinear Polynomial with Memory** 890
Ibrahim Fatungase, J.-F. Bousquet
Dalhousie University, Canada

16:36
C3L-04.3 **Real-Time FPGA Implementation of a Second Order Volterra Filter for Ultrasound Nonlinear Imaging** 895
Abhishek Sahoo, Emad S. Ebbini
University of Minnesota, United States

C3L-05 TCAS Papers: Memristors (In-Person)

Time: Wednesday, June 1 (16:00-17:30)
Place: Room 5
Chair(s): Samuel Palermo, *Texas A&M University*

16:00
C3L-05.1 **SIXOR: Single-Cycle In-Memristor XOR**
Nima TaheriNejad
Technische Universität Wien, Austria

16:18
C3L-05.2 **Analog Solutions of Discrete Markov Chains via Memristor Crossbars**
Gianluca Zoppo¹, Anil Korkmaz², Francesco Marrone¹, Samuel Palermo², Fernando Corinto¹, R. Stanley Williams²
¹Politecnico di Torino, Italy; ²Texas A&M University, United States

16:36
C3L-05.3 **Analog Neural Computing with Super-Resolution Memristor Crossbars**
A.P. James¹, L.O. Chua²
¹Digital University Kerala, India; ²University of California, Berkeley, United States

Virtual USA Central Time (UTC-5)

A1uL-01 Nyquist Data Converters (Virtual USA)

Time: Monday, May 30 (8:00-9:30)
Place: Room 1
Chair(s): Taimur Rabuske, *INESC-ID Lisboa*
Lei Zhang, *Tsinghua University*

8:00
A1uL-01.1 **Concurrent Effect of Redundancy and Switching Algorithms in SAR ADCs** 900
Luca Ricci, Lorenzo Scaletti, Gabriele Bè, Luca Bertulesi, Salvatore Levantino,
Carlo Samori, Andrea Bonfanti
Politecnico di Milano, Italy

8:18
A1uL-01.2 **Integrated Foreground Calibration for a High Speed Time Interleaved SAR Converter** 905
Leonhard Klein, Matthias Voelker
Fraunhofer Institute For Integrated Circuits IIS, Germany

8:36	A1uL-01.3 An Input Folding High Speed Cyclic ADC for Column-Parallel Readout in CMOS Image Sensors	910
	Amandeep Kaur ¹ , Mukul Sarkar ² <i>¹Indian Institute of Technology Jodhpur, India; ²Indian Institute of Technology Delhi, India</i>	
8:54	A1uL-01.4 An Overshoot Voltage Reduction Technique with Improved Speed for Zero-Crossing Detector in Pipeline ADCs	915
	Cerin Ninan Kunnatharayil, Umut Baris Gogebakan, Omer Ceylan, Yasar Gurbuz <i>Sabanci University, Turkey</i>	
9:12	A1uL-01.5 Rail-to-Rail Digital to Analog Converter with Shared Binary Weighted Resistive Load Interpolation	920
	Wei Wang, Sameer Sonkusale <i>Tufts University, United States</i>	
A1uL-02	Data Path and Arithmetic Circuits and Systems II (Virtual USA)	
<i>Time:</i>	Monday, May 30 (8:00-9:30)	
<i>Place:</i>	Room 2	
<i>Chair(s):</i>	Joseph Cavallaro, <i>Rice University</i> Naeem Abbasi, <i>Qualcomm</i>	
8:00	A1uL-02.1 Sensitivity to Threshold Voltage Variations of Exact and Incomplete Prefix Addition Trees	924
	Kleanthis Papachatzopoulos, Vassilis Paliouras <i>University of Patras, Greece</i>	
8:18	A1uL-02.2 Unified Posit/IEEE-754 Vector MAC Unit for Transprecision Computing	
	Luís Crespo, Pedro Tomás, Nuno Roma, Nuno Neves <i>INESC-ID, Instituto Superior Técnico, Universidade de Lisboa, Portugal</i>	
8:36	A1uL-02.3 A 0.9-Nyquist-Band Digital Timing Mismatch Correction for Time-Interleaved ADCs Achieving Delay Tuning Range of 0.12-Sample-Period	929
	Ilia Kempfi, Okko Järvinen, Marko Kosunen, Vishnu Unnikrishnan, Kari Stadius, Jussi Rynänen <i>Aalto University, Finland</i>	
8:54	A1uL-02.4 Implementation of High Performance IEEE 754-Posit Conversion Hardware	934
	Brett Mathis, James E. Stine <i>Oklahoma State University, United States</i>	
A1uL-03	Neuro and Neural Implant Circuits and Systems (Virtual USA)	
<i>Time:</i>	Monday, May 30 (8:00-9:30)	
<i>Place:</i>	Room 3	
<i>Chair(s):</i>	Timir Datta, <i>Feinstein Institutes</i> Wei Tang, <i>New Mexico State University</i>	
8:00	A1uL-03.1 A 512-Channel Neural Signal Acquisition ASIC for High-Density Electrophysiology	938
	Aikaterini Papadopoulou, John Hermiz, Carl Grace, Peter Denes <i>Lawrence Berkeley National Laboratory, United States</i>	

8:18	A1uL-03.2 Inverter-Based Pseudo-Differential Reconfigurable Pixel Circuit Array for Multimodal and High-Density Neural Recordings	943
	Taeju Lee, Minkyu Je <i>Korea Advanced Institute of Science and Technology, Korea</i>	
8:36	A1uL-03.3 Towards a Fully Implantable Closed-Loop Opto-Electro Stimulation Interface for Motor Neuron Disease Treatment	947
	Fangqi Liu, Dai Jiang, Andreas Demosthenous <i>University College London, United Kingdom</i>	
8:54	A1uL-03.4 A High-Voltage ASIC for Ultrasound Neuromodulation with a Piezoelectric Transducer	951
	Hesam Sadeghi Gougheri ¹ , Mehdi Kiani ² <i>¹Feric, United States; ²Pennsylvania State University, United States</i>	
9:12	A1uL-03.5 A Reconfigurable 13.56MHz Wireless Powered CMOS Integrated Nerve Stimulator	956
	Yonatan Kifle, J. Jacob Wikner <i>Linköping University, Sweden</i>	
A1uL-04	Memristive and CNT Circuits and Systems II (Virtual USA)	
<i>Time:</i>	Monday, May 30 (8:00-9:30)	
<i>Place:</i>	Room 4	
<i>Chair(s):</i>	Eby Friedman, <i>University of Rochester</i> Christos Papavassiliou, <i>Imperial College London</i>	
8:00	A1uL-04.1 HYPERLOCK: In-Memory Hyperdimensional Encryption in Memristor Crossbar Array	960
	Jack Cai ¹ , Amirali Amirsoleimani ² , Roman Genov ¹ <i>¹University of Toronto, Canada; ²York University, Canada</i>	
8:18	A1uL-04.2 Hybrid CMOS/Memristor Front-End for Multiunit Activity Processing	965
	Jiaqi Wang, Alexander Serb, Shiwei Wang, Themistoklis Prodromakis <i>University of Southampton, United Kingdom</i>	
8:36	A1uL-04.3 Offset Rejection in a DC-Coupled Hybrid CMOS/Memristor Neural Front-End	970
	Jiaqi Wang, Alexander Serb, Shiwei Wang, Themistoklis Prodromakis <i>University of Southampton, United Kingdom</i>	
8:54	A1uL-04.4 Beneficial Role of Noise in Hf-Based Memristors	975
	Rosana Rodriguez ¹ , Javier Martin-Martinez ¹ , Emili Salvador ¹ , Albert Crespo-Yepes ¹ , Enrique Miranda ¹ , Montserrat Nafria ¹ , Antonio Rubio ² , Vasileios Ntinias ² , Georgios Ch. Sirakoulis ³ , Montserrat Nafria ¹ <i>¹Universitat Autònoma de Barcelona, Spain; ²Universitat Politècnica de Catalunya, Spain; ³Democritus University of Thrace, Greece</i>	
9:12	A1uL-04.5 Design of a New Memristive-Based Architecture Using VTM Method	980
	Farzad Mozafari ¹ , Majid Ahmadi ¹ , Arash Ahmadi ² <i>¹University of Windsor, Canada; ²Carleton University, Canada</i>	

A1uL-05 Wireline and Optical Communications (Virtual-USA)

Time: Monday, May 30 (8:00-9:30)
Place: Room 5
Chair(s): Jiafeng Xie, *Villanova University*
Wei Xing Zheng, *Western Sydney University*

8:00

A1uL-05.1 A 14-Gb/s PAM4 Reference-Less Half-Baud-Rate CDR 985

M. Noormohammadi Khiarak, B. Gosselin
¹*Rambus Canada Inc., Canada;* ²*Université Laval, Canada*

8:18

A1uL-05.2 Circuit Bandwidth Requirements for NRZ and PAM4 Signals 990

Mahdi Forghani, Behzad Razavi
University of California, Los Angeles, United States

8:36

A1uL-05.3 Single-Event Transient Tolerant Optical Receiver Using Triple Modular Redundancy 995

Sami Sattar, Glenn Cowan
Concordia University, Canada

8:54

A1uL-05.4 A Hybrid CMOS Photonic 25Gbps Microring Transmitter with a -0.5-1.2V Direct-Coupled Drive 1000

Shubham Mishra, Md. Jubayer Shawon, Anuar Dorzhigulov, Vishal Saxena
University of Delaware, United States

9:12

A1uL-05.5 Phase Noise Integration Limits for Jitter Calculation 1005

Yu Zhao, Behzad Razavi
University of California, Los Angeles, United States

A1uL-06 Technologies for Electric and Autonomous Vehicles II (Virtual USA)

Time: Monday, May 30 (8:00-9:30)
Place: Room 6
Chair(s): Mohammed Ismail, *Wayne State University, USA*

8:00

A1uL-06.1 Electrical Architecture and In-Vehicle Networking: Challenges and Future Trends 1009

Haysam M. Kadry^{1,2}, Ajeya Gupta¹, James Martin Lawlis¹, Matthew Volpone¹
¹*Ford Motor Company, United States;* ²*Wayne State University, United States*

8:18

A1uL-06.2 Video Deep Learning Classification for Autonomous Vehicle Navigation 1014

Fathi M. Salem
Michigan State University, United States

8:36

A1uL-06.3 Automotive Sensor Infrastructure – Challenges and Opportunities 1018

Sai Prasanth Velusamy¹, Mahmoud Yousef Ghannam¹, Haysam M. Kadry^{1,2}
¹*Ford Motor Company, United States;* ²*Wayne State University, United States*

8:54

A1uL-06.4 In-Vehicle Network Standards – Overview and Implementation Examples 1023

Helia Ordouei, Friedel Gerfers, Silvio Waldmann
Technische Universität Berlin, Germany

9:12

- A1uL-06.5 Total Ionization Dose Measurement Onboard a 1U CubeSat in Low Earth Orbit** 1028
Akihiro Oboshi¹, Tomoaki Murase¹, Hirokazu Masui¹, Shu Wei², Joseph Chang³, Mengu Cho^{1,3}
¹Kyushu Institute of Technology, Japan; ²Zero-Error Systems Pte Ltd, Singapore;
³Nanyang Technological University, Singapore

A2uL-01 SoC and Security Circuits (Virtual USA)

Time: Monday, May 30 (11:20-12:30)

Place: Room 1

Chair(s): Arindam Sanyal, *Arizona State University*
Alfredo Arnaud, *Universidad Católica del Uruguay*

11:20

- A2uL-01.1 Transfer Learning for Reuse of Analog Circuit Sizing Models Across Technology Nodes** 1033
Zhengfeng Wu, Ioannis Savidis
Drexel University, United States

11:34

- A2uL-01.2 Optimal Distribution of High-Speed Clocks on Transceiver Chips** 1038
Makar Chand Snai, Behzad Razavi
University of California, Los Angeles, United States

11:48

- A2uL-01.3 Metalization Enhanced Latch-Based PUF with 1.29% Native Instability** 1043
Meysam Asghari, Beomsoo Park, Marino Guzman, Nima Maghari
University of Florida, United States

12:02

- A2uL-01.4 Reconfigurable Analog Array for Hardware Security** 1047
Ziyi Chen, Ioannis Savidis
Drexel University, United States

A2uL-02 Neuromorphic Systems II (Virtual USA)

Time: Monday, May 30 (11:20-12:30)

Place: Room 2

Chair(s): Ali Dabbous, *Istituto Italiano di Tecnologia, Università di Genova*

11:20

- A2uL-02.1 Object Contact Shape Classification Using Neuromorphic Spiking Neural Network with STDP Learning** 1052
Ali Dabbous^{1,2}, Ali Ibrahim¹, Mohamad Alameh¹, Maurizio Valle¹, Chiara Bartolozzi²
¹Università di Genova, Italy; ²Istituto Italiano di Tecnologia, Italy

11:34

- A2uL-02.2 Towards Hardware Implementation of WTA for CPG-Based Control of a Spiking Robotic Arm** 1057
A. Linares-Barranco¹, E. Piñero-Fuentes¹, S. Canas-Moreno¹, A. Ríos-Navarro¹, Maryada², Chenxi Wu²,
Jingyue Zhao², D. Zendrikov², G. Indiveri²
¹University of Seville, Spain; ²University of Zürich, Switzerland; ³ETH Zürich, Switzerland

11:48

- A2uL-02.3 Subthreshold CMOS Implementation of the Izhikevich Neuron Model** 1062
Karthi Srinivasan¹, Glenn Cowan²
¹Indian Institute of Technology Madras, India; ²Concordia University, Canada

- 12:02
A2uL-02.4 EchoWrite-SNN: Acoustic Based Air-Written Shape Recognition Using Spiking Neural Networks 1067
 Arun M. George, Andrew Gigie, A. Anil Kumar, Sounak Dey, Arpan Pal, K. Aditi
TCS Research, India
- A2uL-03 Lab on a Chip and Biosensing Instrumentation (Virtual USA)**
Time: Monday, May 30 (11:20-12:30)
Place: Room 3
Chair(s): Pamela Abshire, *University of Maryland College Park*
 Pantelis Georgiou, *Imperial College London*
- 11:20
A2uL-03.1 A Linear Weighted Neuromorphic ISFET Array with Offset Compensation 1072
 Tianyang Yao, Prateek Tripathi, Lewis Keeble, Nicolas Moser, Pantelis Georgiou
Imperial College London, United Kingdom
- 11:34
A2uL-03.2 Deep Neural Network Based Cell Segmentation for Lab-on-CMOS Systems Using Realtime Microscopy 1077
 Nathan Renegar, Utku Noyan, Pamela Abshire
University of Maryland College Park, United States
- 11:48
A2uL-03.3 CMOS Ring-Oscillator-Based Electrochemical Capacitance Imager with Frequency-Division-Multiplexed Readout 1082
 Ashwin Krishnan, Peter M. Levine
University of Waterloo, Canada
- 12:02
A2uL-03.4 Circuit Modeling of rGO-Doped Scaffolds for Spinal Cord Regeneration Based on Transient and AC Analyses 1087
 Latifah Al-Maghrabi^{1,2,3}, Patrícia Martins^{1,3}, Daniela Silva¹, Guilherme Gil^{1,3}, Nathalie Barroca¹, Olatz Murua⁴,
 Beatriz Olalde⁴, Luís Alves^{1,3}, Paulo Pedreiras^{1,3}, Pedro Fonseca^{1,3}, Philip Leduc², Paula Marques¹
¹*Universidade de Aveiro, Portugal;* ²*Carnegie Mellon University, United States;* ³*Instituto de Telecomunicações, Portugal;* ⁴*TECNALIA Basque Research and Technology Alliance, Spain*
- A2uL-04 Recent Progress in Theory and Applications of Memristive Technologies Toward a New Era in Electronic III (Virtual USA)**
Time: Monday, May 30 (11:20-12:30)
Place: Room 4
Chair(s): Alon Ascoli, *TU Dresden, Germany*
- 11:20
A2uL-04.1 A Tool for Emulating Neuromorphic Architectures with Memristive Models and Devices 1092
 Jinqi Huang, Spyros Stathopoulos, Alex Serb, Themis Prodromakis
University of Southampton, United Kingdom
- 11:34
A2uL-04.2 Physics-Based Modeling of a Bi-Layer Al₂O₃/Nb₂O₅ Analog Memristive Device 1097
 Richard Schroedter¹, Eter Mgeladze², Melanie Herzig², Alon Ascoli¹, Stefan Slesazeck²,
 Thomas Mikolajick^{1,2}, Ronald Tetzlaff¹
¹*Technische Universität Dresden, Germany;* ²*NaMLab gGmbH, Germany*

- 11:48
A2uL-04.3 Switching Dynamics in Finite Time in Memristor Chua's Circuit 1102
 Mauro Di Marco¹, Mauro Forti¹, Riccardo Moretti¹, Luca Pancioni¹, Giacomo Innocenti², Alberto Tesi²
¹Università degli Studi di Siena, Italy; ²Università degli Studi di Firenze, Italy
- 12:02
A2uL-04.4 Design Space Exploration of Dense and Sparse Mapping Schemes for RRAM Architectures 1107
 Corey Lammie¹, Jason K. Eshraghian², Chenqi Li³, Amirali Amirsoleimani⁴, Roman Genov³,
 Wei D. Lu², Mostafa Rahimi Azghadi¹
¹James Cook University, Australia; ²University of Michigan, Ann Arbor, United States;
³University of Toronto, Canada; ⁴York University, Canada
- A2uL-05 Millimeter Wave and Broadband Communications (Virtual USA)**
Time: Monday, May 30 (11:20-12:30)
Place: Room 5
Chair(s): Vassilis Paliouras, University of Patras
 Glenn Cowan, Concordia University
- 11:20
A2uL-05.1 A 19.1 – 46.5 GHz Broadband Efficient Power Amplifier in 22nm CMOS FD-SOI for mm-Wave 5G ... 1112
 Jill Mayeda¹, Clint Sweeney¹, Donald Y.C. Lie¹, Jerry Lopez^{1,2}
¹Texas Tech University, United States; ²Noise Figure Research, United States
- 11:34
A2uL-05.2 X-to-K Band 6-Bit Bidirectional Common Chain SiGe BiCMOS for Multi-Band Arrays 1117
 Can Çalışkan, Melik Yazici, Yasar Gurbuz
 Sabanci University, Turkey
- 11:48
A2uL-05.3 Energy Efficiency Tradeoffs for Sub-THz Multi-User MIMO Base Station Receivers 1122
 Benjamin W. Domae, Christopher Chen, Danijela Cabric
 University of California, Los Angeles, United States
- 12:02
A2uL-05.4 Broadband Conductor Backed-CPW with Substrate-Integrated Coaxial Line to SIW Transition for C-Band
 Anil Kumar Nayak¹, Igor M. Filanovsky¹, Kambiz Moez¹, Amalendu Patnaik²
¹University of Alberta, Canada; ²Indian Institute of Technology Roorkee, India
- 12:16
A2uL-05.5 Triple-Mode Low-Power 20 Gb/s SST Driver for Short Reach Interconnects 1127
 Sara Mahran¹, Odile Liboiron-Ladouceur², Glenn Cowan¹
¹Concordia University, Canada; ²McGill University, Canada
- A2uL-06 Self Correcting Logic and Digital Late Breaking News I (Virtual USA)**
Time: Monday, May 30 (11:20-12:30)
Place: Room 6
Chair(s): Nathan Neihart, Iowa State University
- 11:20
A2uL-06.1 Common Mode Control Loop for Current Mode Logic-Based Circuits in FD-SOI Technology 1132
 Marco A. Saif^{1,2}, Mohamed Dessouky¹, Hassan Aboushady²
¹Ain Shams University, Egypt; ²Sorbonne University, France

11:34	A2uL-06.2	A Second-Order Passive Noise-Shaping SAR ADC with 4× Passive Gain and a Two-Input-Pair Comparator	1134
		Hanyu Wang, Gabor C. Temes <i>Oregon State University, United States</i>	
11:48	A2uL-06.3	A 78nW, 814mV/875nA All-in-One Voltage and Current Reference Using Darlington Pair	1136
		Yongyan Wang ¹ , Yu Qi ¹ , Hossein Miri Lavasani ² ¹ Case Western Reserve University, China; ² Case Western Reserve University, United States;	
12:02	A2uL-06.4	Silicon-Proven Clockless Wave-Propagated Pipelining for High-Throughput, Energy-Efficient Processing	1138
		Yehuda Kra, Adam Teman <i>Bar-Ilan University, Israel</i>	
	A3uL-01	Wearable, Portable and Physiological Circuit and Systems (Virtual USA)	
	<i>Time:</i>	Monday, May 30 (15:10-16:20)	
	<i>Place:</i>	Room 1	
	<i>Chair(s):</i>	Vighnesh Das, <i>Biotronik</i>	
15:10	A3uL-01.1	A 0.35-μm Subthreshold CMOS ASIC for a Smart Contact Lens Eye-Tracker	1140
		Loïc Massin, Fabrice Seguin, Vincent Nourrit, Emmanuel Daniel, Camilla Kärnfelt, Jean-Louis de Bougrenet de la Tocnaye, Cyril Lahuec <i>IMT Atlantique, France</i>	
15:24	A3uL-01.2	A Photoplethysmography Analog Front-End Model for Rapid Design of Personalized Healthcare Hardware	1145
		Peng Wang, Benton H. Calhoun <i>University of Virginia, United States</i>	
15:38	A3uL-01.3	Tampering Attack Detection in Analog to Feature Converter for Wearable Biosensor	1150
		Xiaochen Tang, Shanshan Liu, Wenjie Che, Wei Tang <i>New Mexico State University, United States</i>	
	A3uL-02	Cryptography and Hardware Security II (Virtual USA)	
	<i>Time:</i>	Monday, May 30 (15:10-16:20)	
	<i>Place:</i>	Room 2	
	<i>Chair(s):</i>	Danella Zhao, <i>Old Dominion University</i> Dur-e-Shahwar Kundi, <i>Queen's University Belfast</i>	
15:10	A3uL-02.1	An Accelerated GPU Library for Homomorphic Encryption Operations of BFV Scheme	1155
		Enes Recep Türkoğlu, Ali Şah Özcan, Can Ayduman, Ahmet Can Mert, Erdiñç Öztürk, Erkay Savaş <i>Sabancı University, Turkey</i>	
15:24	A3uL-02.2	Hardware Implementation of High-Performance Polynomial Multiplication for KEM Saber	1160
		Yazheng Tu ¹ , Pengzhou He ¹ , Chiou-Yng Lee ² , Danai Chasaki ¹ , Jiafeng Xie ¹ ¹ Villanova University, United States; ² Lunghwa University of Science and Technology, Taiwan	

15:38	A3uL-02.3	Resource-Efficient FPGA Implementation of Advanced Encryption Standard	1165
		Useok Lee, Ho Keun Kim, Young Jun Lim, Myung Hoon Sunwoo <i>Ajou University, Korea</i>	
15:52	A3uL-02.4	Lightweight and CCA2-Secure Hardware Implementation of Binary Ring-LWE	1170
		Karim Shahbazi, Seok-Bum Ko <i>University of Saskatchewan, Canada</i>	
	A3uL-03	Circuits and Systems for Non-Contact Sensing Applications II (Virtual USA)	
	<i>Time:</i>	Monday, May 30 (15:10-16:20)	
	<i>Place:</i>	Room 3	
	<i>Chair(s):</i>	Elisabetta Moisello, <i>University of Pavia, Italy</i>	
15:10	A3uL-03.1	New Sensing Systems for Securing Virtual Walls at Outdoor Based on True Differential Digital TMOS	1175
		Tanya Blank ¹ , Igor Brouk ¹ , Sharon Bar-Lev ¹ , Gavriel Amar ² , Maxim Meltsin ¹ , Alex Katz ² , Michele Vaiana ³ , Maria Eloisa Castagna ³ , Antonella La Malfa ³ , Giuseppe Bruno ³ , Yael Nemirovsky ¹ ¹ <i>Technion - Israel Institute of Technology, Israel</i> ; ² <i>TODOS Technologies LTD, Israel</i> ; ³ <i>STMicroelectronics, Italy</i>	
15:24	A3uL-03.2	Thermopyle-Based Contactless Temperature Sensors for Low-Power Applications	1180
		Michele Vaiana, Pierpaolo Lombardo, Paolo Pesenti, Giuseppe Spinella, Maria Eloisa Castagna, Marco Sapienza, Antonella La Malfa, Rosario Cariola, Marco Ippolito, Giuseppe Bruno <i>STMicroelectronics, Italy</i>	
	A3uL-04	Recent Progress in Theory and Applications of Memristive Technologies Toward a New Era in Electronic VI (Virtual USA)	
	<i>Time:</i>	Monday, May 30 (15:10-16:20)	
	<i>Place:</i>	Room 4	
	<i>Chair(s):</i>	Esteban Tlelo Cuautle, <i>INAOE, Mexico</i>	
15:10	A3uL-04.1	Performance Analysis of Memristive-CNN Based on a VCM Device Model	1184
		Yongmin Wang ¹ , Alon Ascoli ² , Ronald Tetzlaff ² , Vikas Rana ¹ , Stephan Menzel ³ ¹ <i>Peter Grünberg Institut 10, Forschungszentrum Jülich GmbH, Germany</i> ; ² <i>Technische Universität Dresden, Germany</i> ; ³ <i>Peter Grünberg Institute PGI-7, Forschungszentrum Jülich GmbH, Germany</i>	
15:24	A3uL-04.2	Towards Simplified Physics-Based Memristor Modeling of Valence Change Mechanism Devices	
		Vasileios Ntinis ¹ , Alon Ascoli ¹ , Ioannis Messaris ¹ , Yongmin Wang ² , Vikas Rana ² , Stephan Menzel ³ , Ronald Tetzlaff ¹ ¹ <i>Technische Universität Dresden, Germany</i> ; ² <i>Peter Grünberg Institut 10, Forschungszentrum Jülich GmbH, Germany</i> ; ³ <i>Peter Grünberg Institute PGI-7, Forschungszentrum Jülich GmbH, Germany</i>	
15:38	A3uL-04.3	Purely Spintronic Leaky Integrate-and-Fire Neurons	1189
		Wesley H. Brigner ¹ , Naimul Hassan ¹ , Xuan Hu ¹ , Christopher H. Bennett ² , Felipe Garcia-Sanchez ³ , Matthew J. Marinella ² , Jean Anne C. Incorvia ⁴ , Joseph S. Friedman ¹ ¹ <i>The University of Texas at Dallas, United States</i> ; ² <i>Sandia National Laboratories, United States</i> ; ³ <i>Universidad de Salamanca, Spain</i> ; ⁴ <i>The University of Texas at Austin, United States</i> ; ⁵ <i>Arizona State University, United States</i>	

15:52	A3uL-04.4	Analog Acceleration of the Power Method Using Memristor Crossbars	1194
		Anil Korkmaz ¹ , Gianluca Zoppo ² , Francesco Marrone ² , Fernando Corinto ² , R. Stanley Williams ¹ , Samuel Palermo ¹ <i>¹Texas A&M University, United States; ²Politecnico di Torino, Italy</i>	
	A3uL-05	Late Breaking News II (Virtual USA)	
	<i>Time:</i>	Monday, May 30 (15:10-16:20)	
	<i>Place:</i>	Room 5	
	<i>Chair(s):</i>	Nathan Neihart, Iowa State University	
15:10	A3uL-05.1	High-Density Digital RRAM-Based Memory with Bit-Line Compute Capability	1199
		Shady Agwa, Yihan Pan, Thomas Abbey, Alexander Serb, Themis Prodromakis <i>University of Southampton, United Kingdom</i>	
15:24	A3uL-05.2	ACHS Optimizations on 3D Interconnect Arrangements	1201
		Daniel Iparraguirre ¹ , José G. Delgado-Frías ² <i>¹Intel Corporation, United States; ²Washington State University, United States</i>	
15:38	A3uL-05.3	Level Shifters for Charge Constrained Applications	1203
		Kushagra Bhatheja, Matthew Strong, Degang Chen <i>Iowa State University, United States</i>	
15:52	A3uL-05.4	Self-Correcting Flip-Flops for Triple Modular Redundant Logic in a 12-nm Technology	1205
		Lawrence T. Clark ^{1,2} , Alen Duvnjak ¹ , Clifford Young-Sciortino ¹ , Matthew Cannon ³ , John Brunhaver ¹ , Sapan Agarwal ³ , Jereme Neuendank ¹ , Donald Wilson ¹ , Hugh Barnaby ¹ , Matthew Marinella ^{1,3} <i>¹Arizona State University, United States; ²LTC Design LLC, United States; ³Sandia National Laboratories, United States</i>	
	A3uL-06	Deep Learning Applications (Virtual USA)	
	<i>Time:</i>	Monday, May 30 (15:10-16:20)	
	<i>Place:</i>	Room 6	
	<i>Chair(s):</i>	Balaji Arumugam, State University of New York at Buffalo	
15:10	A3uL-06.1	Multimodal Attentive Learning for Real-Time Explainable Emotion Recognition in Conversations	1210
		Balaji Arumugam, Sreyasee Das Bhattacharjee, Junsong Yuan <i>State University of New York at Buffalo, United States</i>	
15:24	A3uL-06.2	Individual Weighting of Unlabeled Data Points via Confidence-Awareness in Semi-Supervised Learning	1215
		Farzin Ghorban, Nesreen Hasan, Jörg Velten, Anton Kummert <i>Universität Wuppertal, Germany</i>	
15:38	A3uL-06.3	Hyper-Parameter Tuning for Progressive Learning and its Application to Network Cyber Security	1220
		Rupesh Raj Karn ¹ , Matthew Ziegler ² , Jinwook Jung ² , Ibrahim M. Elfadel ¹ <i>¹Khalifa University, U.A.E.; ²IBM T. J. Watson Research Center, United States</i>	

B1uL-01 Sigma-Delta Converters (Virtual USA)

Time: Tuesday, May 31 (8:00-9:30)
Place: Room 1
Chair(s): Lei Zhang, *Tsinghua University*
Degang Chen, *Iowa State University*

8:00

B1uL-01.1 Optimal Reconfiguration Instant in $\Sigma\Delta$ Modulators 1225
Pablo Vera¹, Dietmar Straeusnigg², Victor Medina¹, Luis Hernandez¹, Susana Paton¹
¹*Universidad Carlos III de Madrid, Spain;* ²*Infineon Technologies Austria AG, Austria*

8:18

B1uL-01.2 A 3rd Order CT- $\Sigma\Delta$ Modulator with a Hybrid Loop Filter Employing Passive and Continuous-Time Delay Based Integrators 1230
Jiu Xiong, Jennifer Zhao, Jin Liu, Hoi Lee
The University of Texas at Dallas, United States

8:36

B1uL-01.3 Passive Third Order Continuous-Time $\Delta\Sigma$ Modulator with Q Enhancement Technique 1234
Hang Hu, Vladimir Vesely, Un-Ku Moon
Oregon State University, United States

8:54

B1uL-01.4 A Current-Mode $\Sigma\Delta$ Modulator with FIR Feedback and DC Servo Loop for an Improved Dynamic Range 1239
Ayman Mohamed, Lars Baumgärtner, Jianyu Zhao, Denis Djekic, Jens Anders
University of Stuttgart, Germany

9:12

B1uL-01.5 Ultra-Low OSR Calibration Free MASH Noise Shaping SAR ADC 1244
Hang Hu, Vladimir Vesely, Un-Ku Moon
Oregon State University, United States

B1uL-02 Digital Circuits and Systems for Machine Learning (Virtual USA)

Time: Tuesday, May 31 (8:00-9:30)
Place: Room 2
Chair(s): Arindam Sanyal, *Arizona State University*
Tawfiq Musah, *Ohio State University*

8:00

B1uL-02.1 Reduce Computing Complexity of Deep Neural Networks through Weight Scaling 1249
Mohammed F. Tolba^{1,2}, Hani Saleh¹, Mahmoud Al-Qutayri¹, Baker Mohammad¹
¹*Khalifa University, U.A.E.;* ²*Nile University, Egypt*

8:18

B1uL-02.2 Wavelet Transform Assisted Neural Networks for Human Activity Recognition 1254
Roshwin Sengupta¹, Ilia Polian¹, John P. Hayes²
¹*Universität Stuttgart, Germany;* ²*University of Michigan, United States*

8:36

B1uL-02.3 A Mixed Precision, Multi-GPU Design for Large-Scale Top-K Sparse Eigenproblems 1259
Francesco Sgherzi, Alberto Parravicini, Marco D. Santambrogio
Politecnico di Milano, Italy

- 8:54
B1uL-02.4 A High-Performance RNS LSTM Block 1264
 Vasileios Sakellariou¹, Vassilis Paliouras², Ioannis Kouretas², Hani Saleh¹, Thanos Stouraitis¹
¹Khalifa University, U.A.E.; ²University of Patras, Greece
- 9:12
B1uL-02.5 Mitigating Asynchronous QDI Drawbacks on MAC Operators with Approximate Multipliers 1269
 Rodrigo N. Wuerdig¹, Marcos L.L. Sartori², Brunno A. Abreu¹, Sergio Bampi¹, Ney L.V. Calazans²
¹Universidade Federal do Rio Grande do Sul, Brazil; ²Pontifical Catholic University of Rio Grande do Sul, Brazil
- B1uL-03 Filter Design and Image Processing (Virtual USA)**
Time: Tuesday, May 31 (8:00-9:30)
Place: Room 3
Chair(s): Oscar Gustafsson, *Linköping University*
 Xin Lou, *ShanghaiTech University*
- 8:00
B1uL-03.1 Minimax Design of M-D Sparse FIR Filters with Arbitrary Frequency Response Using SOCP
 Ashira L. Jayaweera^{1,2}, Darukeesan Pakiyarajah³, Chamira U.S. Edussooriya^{1,4}
¹University of Moratuwa, Sri Lanka; ²University of Maryland College Park, United States; ³University of Jaffna, Sri Lanka; ⁴Florida International University, United States
- 8:18
B1uL-03.2 Weighted Least-Squares Design of 2-D IIR Filters with Arbitrary Frequency Response Using Iterative Second-Order Cone Programming 1274
 Darukeesan Pakiyarajah¹, Nadeeshan D.K. Dissanayake², Chamira U.S. Edussooriya^{2,4},
 Chamith Wijenayake³, Arjuna Madanayake⁴
¹University of Jaffna, Sri Lanka; ²University of Moratuwa, Sri Lanka; ³University of Queensland, Australia;
⁴Florida International University, United States
- 8:36
B1uL-03.3 Fast Reconstruction of Three-Quarter Sampling Measurements Using Recurrent Local Joint Sparse Deconvolution and Extrapolation
 Simon Grosche, Andy Regensky, Alexander Sinn, Jürgen Seiler, André Kaup
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
- 8:54
B1uL-03.4 Classification of Alzheimer's Disease from MRI Data Using a Lightweight Deep Convolutional Model 1279
 Emimal Jabason, M. Omair Ahmad, M.N.S. Swamy
Concordia University, Canada
- 9:12
B1uL-03.5 DSegAN: A Deep Light-Weight Segmentation-Based Attention Network for Image Restoration 1284
 Alireza Esmaeilzahi, M. Omair Ahmad, M.N.S. Swamy
Concordia University, Canada
- B1uL-04 Deep Learning Systems II (Virtual USA)**
Time: Tuesday, May 31 (8:00-9:30)
Place: Room 4
Chair(s): Inna Partin-Vaisband, *University of Illinois Chicago*
- 8:00
B1uL-04.1 Histogram-Equalized Quantization for Logic-Gated Residual Neural Networks 1289
 Van Thien Nguyen, William Guicquero, Gilles Sicard
CEA-Leti, France

8:18	B1uL-04.2	A Morphological Fingerprint Minutiae Annotation Algorithm for Deep Learning Datasets	1294
		Hongtian Zhao, Shibao Zheng <i>Shanghai Jiao Tong University, China</i>	
8:36	B1uL-04.3	PRUNIX: Non-Ideality Aware Convolutional Neural Network Pruning for Memristive Accelerators ..	1299
		Ali Al-shaarawy ¹ , Amirali Amirsoleimani ² , Roman Genov ¹ ¹ <i>University of Toronto, Canada;</i> ² <i>York University, Canada</i>	
8:54	B1uL-04.4	LiteLSTM Architecture for Deep Recurrent Neural Networks	1304
		Nelly Elsayed ¹ , Zag Elsayed ¹ , Anthony S. Maida ² ¹ <i>University of Cincinnati, United States;</i> ² <i>University of Louisiana at Lafayette, United States</i>	
	B1uL-05	Wireless and Wireline Communications IV (Virtual USA)	
	<i>Time:</i>	Tuesday, May 31 (8:00-9:30)	
	<i>Place:</i>	Room 5	
	<i>Chair(s):</i>	Joseph Cavallaro, <i>Rice University</i>	
8:00	B1uL-05.1	Analysis of Deep Learning Models Towards High Performance Digital Predistortion for RF Power Amplifiers	1309
		Rajesh Kudupudi, Fariborz Lohrabi Pour, Dong Sam Ha, Sook Shin Ha, Keyvan Ramezanzpour <i>Virginia Polytechnic Institute and State University, United States</i>	
8:18	B1uL-05.2	Noise Analysis of a Solar Cell-Based Receiver for Simultaneous Energy Harvesting and Data Reception	1314
		Archana Dharanipragada, Walter D. Leon-Salas <i>Purdue University, United States</i>	
8:36	B1uL-05.3	Design of a 10-Bit, 2GS/s Current-Steering Digital-to-Analog Converter with On-Line Current Calibration	1319
		Athanasios Stefanou, Kostas Siozios, Alkiviadis Hatzopoulos <i>Aristotle University of Thessaloniki, Greece</i>	
8:54	B1uL-05.4	Nyquist VCO-Based ADC with Programmable Pulse Shaping Filter for Mitigation of Blockers	1323
		Leidy Mabel Alvero-Gonzalez, Eric Gutierrez <i>Universidad Carlos III de Madrid, Spain</i>	
9:12	B1uL-05.5	Controller Area Network (CAN) Bus Transceiver with Authentication Support	1328
		Xianshan Wen, Ruobing Hua, Jianye Liu, Tao Fu, Liang Fang, Xiaoran Wang, Mitch Thornton, Ping Gui <i>Southern Methodist University, United States</i>	

B1uL-06 Smart Sensors and Sensory Systems I (Virtual USA)

Time: Tuesday, May 31 (8:00-9:30)
Place: Room 6
Chair(s): Walter Leon-Salas, *Purdue University*
Bo Wang, *Hamad Bin Khalifa University*

8:00

B1uL-06.1 Privacy-Preserving Social Distance Monitoring on Microcontrollers with Low-Resolution Infrared Sensors and CNNs 1332
Chen Xie¹, Francesco Daghero¹, Yukai Chen¹, Marco Castellano², Luca Gandolfi²,
Andrea Calimera¹, Enrico Macii¹, Massimo Poncino¹, Daniele Jahier Pagliari¹
¹*Politecnico di Torino, Italy*; ²*STMicroelectronics, Italy*

8:18

B1uL-06.2 A Low Power, High Count Rate Radiation Detection Chip Using a Current Subtraction Technique 1337
Samuel J. Murray, Joseph Schmitz, Sina Balkir, Michael W. Hoffman
University of Nebraska-Lincoln, United States

8:36

B1uL-06.3 Amplitude and Phase Estimation of Backscatter Tag-to-Tag Channel 1342
Abeer Ahmad, Xiao Sha, Akshay Athalye, Samir Das, Petar Djurić, Milutin Stanačević
State University of New York at Stony Brook, United States

8:54

B1uL-06.4 A Portable Electrochemical Impedance Spectroscopy Lab-on-Chip System for Biosensing Applications 1347
Xuanjie Ye, Jiajun Li, Tianxiang Jiang, Bingxuan Li, Jie Chen
University of Alberta, Canada

B2uL-01 Feeding the Next Billion, Smart Agriculture and Food Technology (Virtual USA)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 1
Chair(s): Colleen Josephson, *University of California Santa Cruz*

10:50

B2uL-01.1 Optimizing a Multispectral-Images-Based DL Model, through Feature Selection, Pruning and Quantization 1352
Julio Torres-Tello^{1,2}, Seok-Bum Ko¹
¹*University of Saskatchewan, Canada*; ²*Universidad de las Fuerzas Armadas ESPE, Ecuador*

11:04

B2uL-01.2 Scheduling Problems for Robotics in Precision Agriculture 1357
Stefano Carpin
University of California, Merced, United States

11:18

B2uL-01.3 A Thermoacoustic Imaging System for Non-Invasive and Non-Destructive Root Phenotyping
Ajay Singhvi, Aidan Fitzpatrick, Johannes Daniel Scharwies, José R. Dinneny, Amin Arbabian
Stanford University, United States

11:32

B2uL-01.4 Early Characterization of Soil Microbial Fuel Cells 1362
Gabriel Marcano¹, Colleen Josephson², Pat Pannuto¹
¹*University of California, San Diego, United States*; ²*University of California, Santa Cruz, United States*

B2uL-02 Intelligent Sensors, Emerging Memories and Edge AI Accelerators (Virtual USA)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 2
Chair(s): Deepu John, *University College Dublin*

10:50
B2uL-02.1 Hardware Accelerator Design for Healthcare Applications: Review and Perspectives 1367
Jai Narayan Tripathi, Binod Kumar, Dinesh Junjariya
Indian Institute of Technology Jodhpur, India

11:04
B2uL-02.2 SCOLAR: A Spiking Digital Accelerator with Dual Fixed Point for Continual Learning 1372
Vedant Karia, Fatima Tuz Zohora, Nicholas Soures, Dhireesha Kudithipudi
The University of Texas at San Antonio, United States

B2uL-03 Power Electronics Circuit II (Virtual USA)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 3
Chair(s): Zhenyu Shan, *Beihang University*

10:50
B2uL-03.1 Impact of Modular Multilevel Converters Impedances on the AC/DC Power System Stability 1377
Davide del Giudice, Federico Bizzarri, Daniele Linaro, Angelo Maurizio Brambilla
Politecnico di Milano, Italy

11:04
B2uL-03.2 A New Submodule Structure with Parallel Capacitor Connection in Modular Multilevel Converters 1382
G. Veera Bharath¹, Ghanshyamsinh Gohil², Poras T. Balsara¹
¹The University of Texas at Dallas, United States; ²Hitachi ABB Power Grids, United States

B2uL-04 Hardware for Neural Networks (Virtual USA)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 4
Chair(s): Lizeth Gonzalez Carabarin, *Eindhoven University of Technology*

10:50
B2uL-04.1 An Efficient FPGA Implementation for Real-Time and Low-Power UAV Object Detection 1387
Guoqing Li^{1,2}, Jingwei Zhang¹, Meng Zhang¹, Henk Corporaal²
¹Southeast University, China; ²Eindhoven University of Technology, The Netherlands

11:04
B2uL-04.2 Structured and Tiled-Based Pruning of Deep Learning Models Targeting FPGA Implementations ... 1392
Lizeth Gonzalez-Carabarin¹, Alexandre Schmid², Ruud J.G. van Sloun¹
¹Eindhoven University of Technology, The Netherlands; ²École Polytechnique Fédérale de Lausanne, Switzerland

11:18
B2uL-04.3 A Dynamic Charge-Transfer-Based Crossbar with Low Sensitivity to Parasitic Wire-Resistance 1397
Pengcheng Xu¹, Lei Zhang^{1,2}, Ferdinand Pscheidl^{1,2}, David Borggreve¹, Frank Vanselow¹, Ralf Brederlow²
¹Fraunhofer Microsystems and Solid State Technologies EMFT, Germany; ²Technical University of Munich, Germany

B2uL-05 Radio-Frequency and Millimeter-Wave Integrated Circuits (Virtual USA)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 5
Chair(s): Paolo Crovetto, *Politecnico di Torino*
Oscar Moreira, *Texas A&M University*

10:50
B2uL-05.1 Relaxation Digital-to-Analog Converter with Radix-Based Digital Correction 1402
Roberto Rubino, Francesco Musolino, Paolo Crovetto
Politecnico di Torino, Italy

11:04
B2uL-05.2 Look Ahead CLS in Pipelined SAR ADCs 1407
Morgan Thomas, Marino De Jesus Guzman, Nima Maghari
University of Florida, United States

11:18
B2uL-05.3 Software-Defined Cognitive Radar Implementation for Spectrum Management Using MATLAB 1412
Jacqueline A. Fairley¹, Joshua Phillips¹, Mike Baden¹, William L. Melvin¹, Anson Dixon², Edwin Culpepper²
¹*Georgia Tech Research Institute, United States*; ²*Air Force Research Laboratory, United States*

11:32
B2uL-05.4 Ultra-Wideband Software Defined Radio Platform and Heterogeneous Fabric 1417
Helen L.N. Liu, Dan Pritsker, Benjamin Esposito, Gregory Nash
Intel Corporation, United States

B2uL-06 Sensory Circuits and Systems I (Virtual USA)

Time: Tuesday, May 31 (10:50-12:00)
Place: Room 6
Chair(s): Tobi Delbruck, *University of Zurich and ETH Zurich*
Wei Tang, *New Mexico State University*

10:50
B2uL-06.1 A Reconfigurable 5-Channel Ring-Oscillator-Based TDC for Direct Time-of-Flight 3D Imaging
Foad Arvani, Tony Chan Carusone
University of Toronto, Canada

11:04
B2uL-06.2 A Phase-Encoded Voice Features Extraction Circuit Using Digital Mixers and Analog Filters Based on Ring Oscillators 1420
Ruben Garvi, Eric Gutierrez, Victor Medina, Luis Hernandez
Universidad Carlos III de Madrid, Spain

11:18
B2uL-06.3 A DC to 12.5 MHz Fully Integrated and Galvanically Isolated Shunt-Resistor Current Sensor 1425
Diego Felix¹, Christian Cojocar², Rony Amaya¹
¹*Carleton University, Canada*; ²*Huada Semiconductor, Canada*

11:32
B2uL-06.4 A 2-Tap Macro-Pixel-Based Indirect ToF CMOS Image Sensor for Multi-Frequency Demodulation .. 1430
Peyman F. Shahandashti¹, P. López¹, V.M. Brea¹, D. García-Lesta¹, Miguel Heredia-Conde²
¹*CiTIUS, Universidad de Santiago de Compostela, Spain*; ²*University of Siegen, Germany*

B3uL-01 DACs and TDCs (Virtual USA)

Time: Tuesday, May 31 (13:30-15:00)
Place: Room 1
Chair(s): Degang Chen, *Iowa State University*
Taimur Rabuske, *INESC-ID Lisboa*

13:30

B3uL-01.1 Improved Analysis of Current-Steering DACs Using Equivalent Timing Errors 1435

Daniel Beauchamp^{1,2}, Keith M. Chugg²
¹Jariet Technologies, United States; ²University of Southern California, United States

13:48

B3uL-01.2 A Multiplying Digital to Analog Converter Insensitive to Component Mismatch 1440

Amandeep Kaur
Indian Institute of Technology Jodhpur, India

14:06

B3uL-01.3 A Diode-Based D-2D DAC Architecture with Leakage Current Compensation for Ultra-Low Power Application 1445

Jesse Coulon, Jin Liu
The University of Texas at Dallas, United States

14:24

B3uL-01.4 Metastability Correction Techniques for TSPC-DFF with Applications in Vernier TDC 1449

Fei Yuan
Ryerson University, Canada

14:42

B3uL-01.5 Design of Cyclic-Coupled Ring Oscillators with Guaranteed Maximal Phase Resolution 1453

Okko Järvinen, Vishnu Unnikrishnan, Ilia Kempfi, Kari Stadius, Marko Kosunen, Jussi Ryyänen
Aalto University, Finland

B3uL-02 Memory and Compute-in-Memory Circuits and Architectures IV (Virtual USA)

Time: Tuesday, May 31 (13:30-15:00)
Place: Room 2
Chair(s): Tawfiq Musah, *Ohio State University*
Arindam Sanyal, *Arizona State University*

13:30

B3uL-02.1 Non von-Neumann Anomaly Detection in Multi-Channel Time-Series Using Charge Trap Transistor Crossbars 1457

Ahish Shylendra, Priyesh Shukla, Amit Ranjan Trivedi
University of Illinois at Chicago, United States

13:48

B3uL-02.2 Write-Verify Scheme for IGZO DRAM in Analog in-Memory Computing 1462

Michele Caselli^{1,2,3}, Subhali Subhechha², Peter Debacker², Arindam Mallik², Diederik Verkest²
¹Katholieke Universiteit Leuven, Belgium; ²imec, Belgium; ³University of Parma, Italy

14:06

B3uL-02.3 A Trim Bit One Time Programmable EPROM with Aggressively Reduced Area, Enhanced Functionality, and Extra Features 1467

Xiaowei Deng, Yunchen Qiu, David Toops, George Jamison
Texas Instruments Inc., United States

14:24	B3uL-02.4 Optimization of DRAM Based PIM Architecture for Energy-Efficient Deep Neural Network Training	1472
	Chirag Sudarshan, Mohammad Hassani Sadi, Christian Weis, Norbert Wehn <i>Technische Universität Kaiserslautern, Germany</i>	
14:42	B3uL-02.5 Maximising Parallel Memory Access for Low Latency FPGA Designs	1477
	Stewart Denholm, Wayne Luk <i>Imperial College London, United Kingdom</i>	
	B3uL-03 Power IC Design IV (Virtual USA)	
	<i>Time:</i> Tuesday, May 31 (13:30-15:00)	
	<i>Place:</i> Room 3	
	<i>Chair(s):</i> Zhenyu Shan, <i>Beihang University</i>	
13:30	B3uL-03.1 A 10-mV-Startup-Voltage Thermoelectric Energy Harvesting System with a Piezoelectric Starter	1482
	Ruizhi Wang, Yansong Liang, Sijun Du <i>Delft University of Technology, The Netherlands</i>	
13:48	B3uL-03.2 Power-Aware Computing on GPGPU Systems Using ML Classification Techniques	1487
	Furat Al-Obaidy, Farah Mohammadi <i>Ryerson University, Canada</i>	
14:06	B3uL-03.3 A Half-Bridge GaN Driver with Real-Time Digital Calibration for VGS Ringing Regulation and Slew-Rate Optimization in 180nm BCD	1492
	Si Yuan Sim ¹ , Junmin Jiang ² , Cheng Huang ¹ <i>¹Iowa State University, United States; ²Southern University of Science and Technology, China</i>	
14:24	B3uL-03.4 A Scalable Single-Input-Multiple-Output DC/DC Converter with Enhanced Load Transient Response and Security for Low-Power SoCs	1497
	Xingye Liu, Paul Ampadu <i>Virginia Polytechnic Institute and State University, United States</i>	
	B3uL-04 Multimedia Systems and Applications IV (Virtual USA)	
	<i>Time:</i> Tuesday, May 31 (13:30-15:00)	
	<i>Place:</i> Room 4	
	<i>Chair(s):</i> Jiande Sun, <i>Shandong Normal University</i>	
13:30	B3uL-04.1 Fake Satellite Image Detection via Parallel Subspace Learning (PSL)	1502
	Hong-Shuo Chen ¹ , Kaitai Zhang ¹ , Shuowen Hu ² , Suya You ² , C.-C. Jay Kuo ¹ <i>¹University of Southern California, United States; ²Army Research Laboratory, United States</i>	
13:48	B3uL-04.2 A Wireless Wearable Sensor for Pointing and Arm-Gesture Recognition	1507
	Timothy K. Horiuchi, Dilan Cruz-Flores, Parshva Patel <i>University of Maryland, United States</i>	

14:06	B3uL-04.3	C-NMT: A Collaborative Inference Framework for Neural Machine Translation	1512
		Yukai Chen, Roberta Chiaro, Enrico Macii, Massimo Poncino, Daniele Jahier Pagliari <i>Politecnico di Torino, Italy</i>	
14:24	B3uL-04.4	Does Video Compression Impact Tracking Accuracy?	1517
		Takehiro Tanaka, Alon Harell, Ivan V. Bajić <i>Simon Fraser University, Canada</i>	
	B3uL-05	Nonlinear Systems and Complex Networks III (Virtual USA)	
	<i>Time:</i>	Tuesday, May 31 (13:30-15:00)	
	<i>Place:</i>	Room 5	
	<i>Chair(s):</i>	Marco Storace, <i>Università di Genova</i>	
13:30	B3uL-05.1	Behavioral Model of an Amorphous-Core Inductor Working Up to Partial Saturation	1522
		Alberto Oliveri ¹ , Matteo Lodi ¹ , Cinzia Beatrice ² , Enzo Ferrara ² , Marco Storace ¹ , Fausto Fiorillo ² ¹ <i>Università di Genova, Italy</i> ; ² <i>Istituto Nazionale di Ricerca Metrologica, Italy</i>	
13:48	B3uL-05.2	Reliable Comparison for Power Amplifiers Nonlinear Behavioral Modeling Based on Regression Trees and Random Forest	1527
		Daniel Santiago Aguila-Torres ¹ , Jose Alejandro Galaviz-Aguilar ² , José Ricardo Cárdenas-Valdez ¹ ¹ <i>Instituto Tecnológico de Tijuana, Tecnológico Nacional de México, Mexico</i> ; ² <i>Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico</i>	
14:06	B3uL-05.3	Forget Partitions? Not Yet	1531
		Matteo Lodi ¹ , Francesco Sorrentino ² , Marco Storace ¹ ¹ <i>Università di Genova, Italy</i> ; ² <i>University of New Mexico, United States</i>	
14:24	B3uL-05.4	Phase-Change Memory in Neural Network Layers with Measurements-Based Device Models	1536
		Carmine Paolino ¹ , Alessio Antolini ² , Fabio Pareschi ^{1,2} , Mauro Mangia ² , Riccardo Rovatti ² , Eleonora Franchi Scarselli ² , Gianluca Setti ^{1,2} , Roberto Canegallo ³ , Marcella Carissimi ³ , Marco Pasotti ³ ¹ <i>Politecnico di Torino, Italy</i> ; ² <i>Università di Bologna, Italy</i> ; ³ <i>STMicroelectronics, Italy</i>	
	B3uL-06	Non-Traditional Areas in Digital Circuits and Systems (Virtual USA)	
	<i>Time:</i>	Tuesday, May 31 (13:30-15:00)	
	<i>Place:</i>	Room 6	
	<i>Chair(s):</i>	Ettore Napoli, <i>Università degli Studi di Salerno</i> Joseph Cavallaro, <i>Rice University</i>	
13:30	B3uL-06.1	Low-Complexity Pseudo Direct Learning Digital Pre-Distortion Architecture for Nonlinearity and Memory Effect of Power Amplifier in mmWave Baseband Transmitter	1541
		Shen-Zhe Lu, Nai-Cheng Xue, Hung-Chih Liu, Chih-Wei Jen, Shyh-Jye Jou <i>National Yang Ming Chiao Tung University, Taiwan</i>	
13:48	B3uL-06.2	3-Stage Pipelined Hierarchical SRAMs with Burst Mode Read in 65nm LSTP CMOS	1546
		Mukesh Kumar Srivastav ¹ , Rimjhim ¹ , Roshan Mishra ¹ , Anuj Grover ¹ , Kedar Janardan Dhori ² , Harsh Rawat ² ¹ <i>Indraprastha Institute of Information Technology Delhi, India</i> ; ² <i>STMicroelectronics, India</i>	

14:06	B3uL-06.3 Fair Scheduling through Collaborative Filtering on Multicore Systems	1551
	Ourania Spantidi ¹ , Theodoros Marinakis ² , Iraklis Anagnostopoulos ¹ <i>¹Southern Illinois University, United States; ²NVIDIA Corporation, United States</i>	
14:24	B3uL-06.4 A 65nm Compute-in-Memory 7T SRAM Macro Supporting 4-Bit Multiply and Accumulate Operation by Employing Charge Sharing	1556
	Dinesh Kushwaha ¹ , Aditya Sharma ¹ , Neha Gupta ¹ , Ritik Raj ¹ , Ashish Joshi ² , Jwalant Mishra ³ , Rajat Kohli ³ , Sandeep Miryala ⁴ , Rajiv Joshi ⁵ , Sudeb Dasgupta ¹ , Anand Bulusu ¹ <i>¹Indian Institute of Technology Roorkee, India; ²Intel Technology India Pvt. Ltd., India; ³NXP Semiconductor Bangalore, India; ⁴Brookhaven National Laboratory, United States; ⁵IBM T. J. Watson Research Center, United States</i>	
14:42	B3uL-06.5 1T1R In-Memory Compute for Winner Takes All Application in Kohonen Neural Networks	1561
	Aya Mouallem, Hussein Fadlallah, Lina Bacha, Dana El Hajj, Rachid Jamil, Dana Bazazo, Rouwaida Kanj <i>American University of Beirut, Lebanon</i>	
	B4uL-01 Testing, Verification and Design Tools (Virtual USA)	
	<i>Time:</i> Tuesday, May 31 (16:30-18:00)	
	<i>Place:</i> Room 1	
	<i>Chair(s):</i> Alfredo Arnaud, <i>Universidad Católica del Uruguay</i> Elkim Roa-Fuentes, <i>Universidad Industrial de Santander</i>	
16:30	B4uL-01.1 Analogue Circuits Real-Time Emulation Based on Wave Digital Filter	1566
	Abdulaziz Alshaya, Saleh Komies, Lijie Xie, Jiawei Shen, Christos Papavassiliou <i>Imperial College London, United Kingdom</i>	
16:48	B4uL-01.2 Speeding-Up Complex RF IC Sizing Optimizations with a Process, Voltage and Temperature Corner Performance Estimator Based on ANNs	1570
	Pedro Vaz ^{1,2} , António Gusmão ^{1,2} , Nuno Horta ^{1,2} , Nuno Lourenço ^{1,3} , Ricardo Martins ¹ <i>¹Instituto de Telecomunicações, Portugal; ²Instituto Superior Técnico, Universidade de Lisboa, Portugal; ³Universidade de Évora, Portugal</i>	
17:06	B4uL-01.3 Design Automation of CMOS Op-Amps Using Statistical Geometric Programming	1575
	Sangjukta R. Chowdhury, Sumit Bhardwaj, Jennifer Kitchen <i>Arizona State University, United States</i>	
17:24	B4uL-01.4 Robust Built-In Defect-Detection for Low Drop-Out Regulators Using Digital Mismatch Injection	1580
	Marampally Saikiran, Mona Ganji, Degang Chen <i>Iowa State University, United States</i>	
17:42	B4uL-01.5 A Parasitic Resistance Extraction Tool Leveraged by Image Processing	1585
	Diogo Dias ¹ , João Goes ¹ , Tiago Costa ² <i>¹NOVA Universidade Nova de Lisboa, Portugal; ²Delft University of Technology, The Netherlands</i>	

B4uL-02 Reconfigurable Architectures, SoC and Testing (Virtual USA)

Time: Tuesday, May 31 (16:30-18:00)
Place: Room 2
Chair(s): Magdy El-Moursy, *Electronics Research Institute*
Emre Salman, *Stony Brook University*

16:30

B4uL-02.1 Reliability Assessment of Many-Core Dynamic Thermal Management 1590
Alzemiro Silva¹, Iaçanã Weber¹, André Luís del Mestre Martins², Fernando Gehm Moraes¹
¹Pontifical Catholic University of Rio Grande do Sul, Brazil; ²Sul-Rio-Grandense Federal Institute, Brazil

16:48

B4uL-02.2 Improving the Performance of RISC-V Softcores on FPGA by Exploiting PVT Variability and DVFS 1595
Endri Taka¹, George Lentaris^{1,2}, Dimitrios Soudris¹
¹National Technical University of Athens, Greece; ²University of West Attica, Greece

17:06

B4uL-02.3 Using HLS for Designing a Parametric Optical Flow Hierarchical Algorithm in FPGAs 1600
Ilias Bournias, Roselyne Chotin, Lionel Lacassagne
Sorbonne University, France

17:24

B4uL-02.4 Power Delivery for Ultra-Large-Scale Applications on Si-IF 1605
Yousef Safari, Anja Kroon, Boris Vaisband
McGill University, Canada

17:42

B4uL-02.5 The Impact of Logic Gates Susceptibility in Overall Circuit Reliability Analysis 1610
Matheus F. Pontes¹, Ingrid F.V. Oliveira¹, Rafael B. Schvitz², Leomar S. Rosa Jr.¹, Paulo F. Butzen³
¹Universidade Federal de Pelotas, Brazil; ²Universidade Federal do Rio Grande, Brazil;
³Universidade Federal do Rio Grande do Sul, Brazil

B4uL-03 Non-Invasive Biomedical Circuits and Systems (Virtual USA)

Time: Tuesday, May 31 (16:30-18:00)
Place: Room 3
Chair(s): Jennifer Blain Christen, *Arizona State University*
Shahriar Mirabbasi, *University of British Columbia*

16:30

B4uL-03.1 Power and Accuracy Optimization for Luminescent Transcutaneous Oxygen Measurements 1615
Burak Kahraman¹, Ian Costanzo¹, Neal Kurfis², Guixue Bu², Jiayuan Wang², Foroohar Foroozan², Ulkuhan Guler¹
¹Worcester Polytechnic Institute, United States; ²Analog Devices, Inc., United States

16:48

B4uL-03.2 A 385µW Photoplethysmography-Based Vitals Monitoring SoC with 110dB Current-to-Digital Converter 1620
Sameen Minto, Sarmad Salman, Wala Saadeh
Lahore University of Management Sciences, Pakistan

17:06

B4uL-03.3 An ASIC Interface for CMUTs-Based Biosensors with High Voltage Boosting and Oscillator 1625
Yihe Zhao^{1,2}, Gian Luca Barbruni², Zhikang Li¹, Libo Zhao¹, Zhuangde Jiang¹, Christian Enz², Sandro Carrara²
¹Xi'an Jiaotong University, China; ²École Polytechnique Fédérale de Lausanne, Switzerland

17:24

B4uL-03.4 Collaborative Clustering Based on Adaptive Laplace Modeling for Neuroimaging Data Analysis 1630

Hangfan Liu^{1,2}, Karl Li¹, Jon B. Toledo³, Mohamad Habes^{1,2}
¹University of Texas Health Science Center at San Antonio, United States;
²University of Pennsylvania, United States; ³University of Florida, United States

17:42

B4uL-03.5 Real-Time Sepsis Prediction Using Fusion of On-Chip Analog Classifier and Electronic Medical Record 1635

Sudarsan Sadasivuni¹, Monjoy Saha², Sumukh Prashant Bhanushali⁴, Imon Banerjee³, Arindam Sanyal⁴
¹State University of New York at Buffalo, United States; ²Emory University, United States;
³Mayo Clinic, United States; ⁴Arizona State University, United States

B4uL-04 Approximate Computing Crossing Design (Virtual USA)

Time: Tuesday, May 31 (16:30-18:00)
Place: Room 4
Chair(s): Jorge Castro-Godínez, Costa Rica Institute of Technology

16:30

B4uL-04.1 ART-MAC: Approximate Rounding and Truncation Based MAC Unit for Fault-Tolerant Applications 1640

Vishesh Mishra¹, Divy Pandey¹, Saurabh Singh¹, Sagar Satapathy^{2,3}, Kaustav Goswami⁴,
Babita Jajodia¹, Dip Sankar Banerjee²
¹Indian Institute of Information Technology Guwahati, India; ²Indian Institute of Technology Jodhpur, India;
³Synopsys India Pvt. Ltd., India; ⁴University of California Davis, United States

16:48

B4uL-04.2 AxLEAP: Enabling Low-Power Approximations through Unified Power Format 1645

Sagar Satapathy^{1,4}, Saurabh Singh², Kaustav Goswami³, Vishesh Mishra², Divy Pandey², Dip Sankar Banerjee¹
¹Indian Institute of Technology Jodhpur, India; ²Indian Institute of Information Technology Guwahati, India;
³University of California Davis, United States; ⁴Synopsys India Pvt. Ltd., India

17:06

B4uL-04.3 ConfAx: Exploiting Approximate Computing for Configurable FPGA CNN Acceleration at the Edge 1650

Guilherme Korol¹, Michael Guilherme Jordan¹, Mateus Beck Rutzig², Antonio Carlos Schneider Beck¹
¹Universidade Federal do Rio Grande do Sul, Brazil; ²Universidade Federal de Santa Maria, Brazil

17:24

B4uL-04.4 AxRSU: Approximate Radix-4 Squarer Unit 1655

Morgana M.A. da Rosa¹, Guilherme Paim⁴, Jorge Castro-Godínez², Eduardo A. C. da Costa³,
Rafael I. Soares¹, Sergio Bampi⁴
¹Federal University of Pelotas Brazil; ²Instituto Tecnológico de Costa Rica, Costa Rica;
³Catholic University of Pelotas, Brazil; ⁴Federal University of Rio Grande do Sul, Brazil

B4uL-05 Nonlinear Systems and Complex Networks IV (Virtual USA)

Time: Tuesday, May 31 (16:30-18:00)
Place: Room 5
Chair(s): Ljiljana Trajković, Simon Fraser University

16:30

B4uL-05.1 Comparison of Virtual Network Embedding Algorithms for Data Center Networks 1660

Hardeep Kaur Takhar, Ana Laura Gonzalez Rios, Ljiljana Trajković
Simon Fraser University, Canada

16:48

B4uL-05.2 Efficient Sound Event Localization and Detection in the Quaternion Domain

Christian Brignone, Gioia Mancini, Eleonora Grassucci, Aurelio Uncini, Danilo Comminiello
Sapienza University of Rome, Italy

17:06

B4uL-05.3 A CMOS Compatible Bistable Resistively-Coupled Ising Machine-BRIM 1665

Yiqiao Zhang, Richard Afoakwa, Uday Kumar Reddy Vengalam, Michael Huang, Zeljko Ignjatovic
University of Rochester, United States

17:24

B4uL-05.4 A Low-Complexity Method to Address Process Variability in True Random Number Generators Based on Digital Nonlinear Oscillators 1670

T. Addabbo¹, A. Fort¹, M. Mugnaini¹, R. Moretti¹, V. Vignoli¹, D. Papini²
¹*Università degli Studi di Siena, Italy*; ²*Università degli Studi di Udine, Italy*

B4uL-06 Energy Efficient and Reconfigurable Hardware (Virtual USA)

Time: Tuesday, May 31 (16:30-18:00)

Place: Room 6

Chair(s): Oscar Moreira, *Texas A&M University*

16:30

B4uL-06.1 A Resource-Saving Energy-Efficient Reconfigurable Hardware Accelerator for BERT-Based Deep Neural Network Language Models Using FFT Multiplication 1675

Rodrigue Rizk, Dominick Rizk, Frederic Rizk, Ashok Kumar, Magdy Bayoumi
University of Louisiana at Lafayette, United States

16:48

B4uL-06.2 An Economic Uniqueness-Improved Reliable Reconfigurable RO PUF for IoT Security 1680

Dominick Rizk, Rodrigue Rizk, Frederic Rizk, Ashok Kumar
University of Louisiana at Lafayette, United States

17:06

B4uL-06.3 A Cost-Efficient Reversible-Based Reconfigurable Ring Oscillator Physical Unclonable Function 1685

Frederic Rizk, Dominick Rizk, Rodrigue Rizk, Ashok Kumar
University of Louisiana at Lafayette, United States

17:24

B4uL-06.4 An Open-Source Co-Processor for Solving Lotka-Volterra Equations 1690

Andrew Hollabough, Dwaipayam Chakraborty
Rowan University, United States

17:42

B4uL-06.5 An Implementation of a Low Complexity Integer Carrier Frequency Offset Estimator for OFDM 1695

Daniel Garcia Urdaneta, Claudio Ferreira Dias, Fabio Kelm Pereira, Leonardo Sulato de Moraes, André Távora, Eduardo Rodrigues De Lima
Eldorado Research Institute, Brazil

C1uL-01 PLL Circuits (Virtual USA)

Time: Wednesday, June 1 (8:00-9:30)
Place: Room 1
Chair(s): Igor Filanovsky, *University of Alberta*
Elkim Roa-Fuentes, *Universidad Industrial de Santander*

8:00

C1uL-01.1 A Dual VCO Based L5/S Band PLL with Extended Range Divider for IRNSS Application 1699
Rizwan Shaik Peerla¹, Purushothama Chary¹, Ashudeb Dutta¹, Bibhu Datta Sahoo²
¹Indian Institute of Technology Hyderabad, India; ²Indian Institute of Technology Kharagpur, India

8:18

C1uL-01.2 A Radiation-Hardened Frequency-Locked Loop On-Chip Oscillator with 33.6ppm/°C Stability for Space Applications 1704
F. Passos¹, R. Vieira¹, A. Canelas¹, R. Póvoa^{1,2}, N. Lourenço¹, N. Horta¹, J. Guilherme^{1,3}
¹Instituto de Telecomunicações, Portugal; ²Escola Superior Nautica Infante D. Henrique, Portugal;
³Escola Superior de Tecnologia de Tomar, Portugal

8:36

C1uL-01.3 Reference Spur Reduction in Sampled-Loop Filter PLLs by Oversampling 1709
Chembiyan Thambidurai, Preetham N. Reddy, Raghurama Gunaje
Birla Institute of Technology and Science, Pilani, India

8:54

C1uL-01.4 A Low-Ripple Resistor-Less Hybrid Loop Filter Based PLL in 3nm FinFET 1714
Ping Lu, Charlie Boecker, Bupesh Pandita, Minhan Chen, Sheethal Nayak
Microsoft Corporation, United States

9:12

C1uL-01.5 Design Considerations for Time-Modulated Injection-Locked Phase Interpolators and Rotators 1719
Yi Fan Zhang¹, Joshua Liang², Tony Chan Carusone¹
¹University of Toronto, Canada; ²Alphawave IP, Canada

C1uL-02 Hardware Security and Design Automation (Virtual USA)

Time: Wednesday, June 1 (8:00-9:30)
Place: Room 2
Chair(s): Malgorzata Chrzanowska-Jeske, *Portland State University*
Naeem Abbasi, *Qualcomm*

8:00

C1uL-02.1 Mitigating EM Side-Channel Attacks with Dynamic Delay Insertion and Data Bus Inversion 1724
Minmin Jiang¹, Eleni Maragkoudaki¹, Vasilis F. Pavlidis^{1,2}
¹University of Manchester, United Kingdom; ²Aristotle University of Thessaloniki, Greece

8:18

C1uL-02.2 A Hierarchical Parallel Discrete Gaussian Sampler for Lattice-Based Cryptography 1729
Sirui Shen¹, Wenqing Song¹, Xinyu Wang¹, Xinyu Shao¹, Yuxiang Fu¹, Zhonghai Lu², Li Li¹
¹Nanjing University, China; ²KTH Royal Institute of Technology, Sweden

8:36

C1uL-02.3 Synthesis of Coupling Capacitance Based Hidden State Transitions for Sequential Logic Locking 1734
Pratik Shrestha, Ioannis Savidis
Drexel University, United States

8:54	C1uL-02.4 Modernizing Hardware Circuits through High-Level Synthesis	1739
	Md Imtiaz Rashid, Qilin Si, Benjamin Carrion Schaefer <i>The University of Texas at Dallas, United States</i>	
9:12	C1uL-02.5 Standard Cell and Supergates Designs: An Electrical Comparison on 4-Input Logic Functions	1744
	Henrique Kessler, Marcelo Porto, Leomar da Rosa Jr., Vinícius V. Camargo <i>Universidade Federal de Pelotas, Brazil</i>	
	C1uL-03 Biomedical Circuits and Systems (Virtual USA)	
	<i>Time:</i> Wednesday, June 1 (8:00-9:30)	
	<i>Place:</i> Room 3	
	<i>Chair(s):</i> Aydin Karsilayan, <i>Texas A&M University, USA</i>	
8:00	C1uL-03.1 Power Efficient Wireless Sensor Node through Edge Intelligence	1749
	Abhishek Priyadarshan Damle, Sook Shin Ha, Zhuqing Zhao, Barbara Roqueto dos Reis, Robin White, Dong Sam Ha <i>Virginia Polytechnic Institute and State University, United States</i>	
8:18	C1uL-03.2 Surfing the Wavefront of Genome Alignment	1754
	Beatrice Branchini, Giulia Gerometta, Luisa Cicolini, Alberto Zeni, Emanuele Del Sozzo, Marco D. Santambrogio <i>Politecnico di Milano, Italy</i>	
8:36	C1uL-03.3 Ultra-Thin and Skin-Conformable Strain Sensors Fabricated by Inkjet Printing for Soft Wearable Electronics	1759
	Arshad Khan, Shawkat Ali, Saleem Khan, Amine Bermak <i>Hamad Bin Khalifa University, Qatar</i>	
8:54	C1uL-03.4 An Adaptive ASIC for Closed-Loop Low-Power Pulse-Based Ultrasonic Data Transmission	1763
	Zeinab Kashani, Mehdi Kiani <i>Pennsylvania State University, United States</i>	
9:12	C1uL-03.5 An Accurate EEG-Based Deep Learning Classifier for Monitoring Depth of Anesthesia	1768
	Muhammad Ibrahim Dutt, Wala Saadeh <i>Lahore University of Management Sciences, Pakistan</i>	
	C1uL-04 Education in Circuits and Systems (Virtual USA)	
	<i>Time:</i> Wednesday, June 1 (8:00-9:30)	
	<i>Place:</i> Room 4	
	<i>Chair(s):</i> Ljiljana Trajković, <i>Simon Fraser University</i> Wolfgang Mathis, <i>Leibniz University Hannover</i>	
8:00	C1uL-04.1 RemEduLa – Remote Education Laboratory for FPGA Design Technology	1773
	Christopher Blochwitz, Philipp Grothe, Sven Dreier, Waiel Aljnabi, Rainer Buchty, Mladen Berekovic <i>University of Lübeck, Germany</i>	

8:18

- C1uL-04.2 Framework to Benchmark CNNs (FaBCNN) for Processing Real-Time HD Video Streams on FPGAs** 1778
Travis Sandefur, Syed Rafay Hasan
Tennessee Technological University, United States

8:36

- C1uL-04.3 A Mostly-Online CAS Teaching Experience** 1783
C. Wijenayake¹, K. Wickremasinghe², G. Abarajithan², A. Madanayake³, C. Edussooriya^{2,3}, K. Samarasinghe²
¹*University of Queensland, Australia;* ²*University of Moratuwa, Sri Lanka;*
³*Florida International University, United States*

8:54

- C1uL-04.4 On a Generalization of Tellegen's Theorem to Quantum Circuits** 1788
Ibrahim M. Elfadel
Khalifa University, U.A.E.

9:12

- C1uL-04.5 Educational Project on the Design of a Demonstrator with Automatic Pressure Measurement** 1793
Ming Zhang¹, Arnaud Bournel¹, Jean-Luc Raimbault¹, Nicolas Llaser², Nicolas Louis²,
Josué Malatchoumy², Daniel Gruat²
¹*CNRS, Université Paris Saclay, France;* ²*LPO Dorian, France*

C1uL-05 Algorithms and Hardware for Low-Complexity Visual Signal Processing (Virtual USA)

Time:

Wednesday, June 1 (8:00-9:30)

Place:

Room 5

Chair(s):

Guilherme Ribeiro Corrêa, *Federal University of Pelotas (UFPel), Brazil*

8:00

- C1uL-05.1 A High-Throughput Design for the H.266/VVC Low-Frequency Non-Separable Transform** 1798
Jones Goebel, Vitor Costa, Luciano Agostini, Bruno Zatt, Marcelo Porto
Universidade Federal de Pelotas, Brazil

8:18

- C1uL-05.2 Multiple Transform Selection Hardware Design for 4K@60fps Real-Time Versatile Video Coding** 1803
Bianca Silveira¹, Luiz Neto¹, Daniel Palomino¹, Cláudio Diniz², Guilherme Corrêa¹
¹*Universidade Federal de Pelotas, Brazil;* ²*Universidade Federal do Rio Grande do Sul, Brazil*

8:36

- C1uL-05.3 Mode-Adaptive Subsampling of SAD/SSE Operations for Intra Prediction Cost Reduction** 1808
Marcel Corrêa^{1,2}, Nuno Roma³, Daniel Palomino¹, Guilherme Corrêa¹, Luciano Agostini¹
¹*Universidade Federal de Pelotas, Brazil;* ²*Instituto Federal de Educação, Ciência e Tecnologia Sul-riograndense, Brazil;* ³*INESC-ID, Instituto Superior Técnico, Universidade de Lisboa, Portugal*

8:54

- C1uL-05.4 Improving Content-Aware Video Streaming in Congested Networks with In-Network Computing** 1813
Leonardo Gobatto¹, Mateus Saquetti¹, Cláudio Diniz¹, Bruno Zatt², Weverton Cordeiro¹, José R. Azambuja¹
¹*Universidade Federal do Rio Grande do Sul, Brazil;* ²*Universidade Federal de Pelotas, Brazil*

9:12

- C1uL-05.5 A Near Sensor Edge Computing System for Point Cloud Semantic Segmentation** 1818
Lin Bai, Yiming Zhao, Xinming Huang
Worcester Polytechnic Institute, United States

C1uL-06 Circuits for Machine Learning and Hardware Security II and Edge Intelligence (Virtual USA)

Time: Wednesday, June 1 (8:00-9:30)
Place: Room 6
Chair(s): Paul Gratz, *Texas A&M University*

8:00

C1uL-06.1 Tiny ci-SAR A/D Converter for Deep Neural Networks in Analog In-Memory Computation 1823
Michele Caselli^{1,2,3}, Debjyoti Bhattacharjee², Arindam Mallik², Peter Debacker², Diederik Verkest²
¹*Katholieke Universiteit Leuven, Belgium*; ²*imec, Belgium*; ³*University of Parma, Italy*

8:18

C1uL-06.2 Hybrid CMOS-RRAM Spiking CNNs with Time-Domain Max-Pooling and Integrator Re-Use 1828
Anuar Dorzhigulov, Shubham Mishra, Vishal Saxena
University of Delaware, United States

8:36

C1uL-06.3 Towards Enabling Dynamic Convolution Neural Network Inference for Edge Intelligence 1833
Adewale Adeyemo, Travis Sandefur, Tolulope A. Odetola, Syed Rafay Hasan
Tennessee Technological University, United States

8:54

C1uL-06.4 Efficient Fine-Tuning of BERT Models on the Edge 1838
Danilo Vucetic, Mohammadreza Tayaranian, Maryam Ziaeefard, James J. Clark, Brett H. Meyer, Warren J. Gross
McGill University, Canada

C2uL-01 RF Receiver Circuits (Virtual USA)

Time: Wednesday, June 1 (14:00-15:30)
Place: Room 1
Chair(s): Elkim Roa-Fuentes, *Universidad Industrial de Santander*
Arindam Sanyal, *Arizona State University*

14:00

C2uL-01.1 Super-Regenerative Receiver for OFDM Communication 1843
F. Xavier Moncunill-Geniz, Jordi Bonet-Dalmau, Francisco del Águila-López, Ilker Demirkol, Pere Palà-Schönwälder
Universitat Politècnica de Catalunya, Spain

14:18

C2uL-01.2 Rapid Spectrum Sweeping Scanner Exploiting Mixer Harmonics for Cognitive Radio Applications 1848
Amr Abdelhamid¹, Murat Torlak², Won Namgoong¹
¹*State University of New York at Albany, United States*; ²*The University of Texas at Dallas, United States*

14:36

C2uL-01.3 A Quadrature Hybrid Transimpedance-Amplifier-Based Mixer-First Receiver 1853
Erez Zolkov, Emanuel Cohen
Technion - Israel Institute of Technology, Israel

14:54

C2uL-01.4 A Widely-Tunable RF Receiver Employing Synthetic Diversity for Interference Mitigation 1858
Sanaz Sadeghi, Sweta Soni, Alyosha Molnar
Cornell University, United States

15:12

C2uL-01.5 Low-Power Low-Data-Rate Wireless PPM Receiver Based on 13-Bits Barker Coded SAW Correlator with Scalable Data-Rate and Sensitivity 1863

Saed Abughannam, J. Christoph Scheytt
Heinz Nixdorf Institute, Paderborn University, Germany

C2uL-02 Unconventional Computing Techniques for Emerging Technology Applications II (Virtual USA)

Time: Wednesday, June 1 (14:00-15:30)
Place: Room 2
Chair(s): Nikos Temenos, *National Technical University of Athens, Greece*
Paul Sotiriadis, *University of California, San Diego*

14:00

C2uL-02.1 SDEX: Monte Carlo Simulation of Stochastic Differential Equations on Memristor Crossbars 1867

Louis Primeau¹, Amirali Amirsoleimani², Roman Genov¹
¹*University of Toronto, Canada;* ²*York University, Canada*

14:18

C2uL-02.2 Efficient Kernels for Real-Time Position Decoding from In Vivo Calcium Images 1872

Zhe Chen, Jim Zhou, Garrett J. Blair, Hugh T. Blair, Jason Cong
University of California, Los Angeles, United States

14:36

C2uL-02.3 Modeling a Stochastic Computing Non-Scaling Adder and its Application in Image Sharpening

Nikos Temenos, Paul P. Sotiriadis
National Technical University of Athens, Greece

14:54

C2uL-02.4 A Review of Simulation Algorithms of Classical Ising Machines for Combinatorial Optimization 1877

Tingting Zhang, Qichao Tao, Bailiang Liu, Jie Han
University of Alberta, Canada

15:12

C2uL-02.5 A CMOS Inductor-Less PMIC with MPPT and Burst Control for a 600 μ W Magnetoelectric Transducer 1882

Josep Maria Sánchez-Chiva¹, Dimitri Galayko^{1,2}, Amine Rhouni¹
¹*Sorbonne Université, France;* ²*Université Paris-Saclay - CNRS, France*

C2uL-03 Implantable and Intraoperative Biomedical Circuits and Systems (Virtual USA)

Time: Wednesday, June 1 (14:00-15:30)
Place: Room 3
Chair(s): Aydin Karsilayan, *Texas A&M University, USA*

14:00

C2uL-03.1 Pulse and Breathing Motion Artifacts Correction of Intraoperative Thermal Imaging in Neurosurgery 1887

Yahya Moshaei-Nezhad¹, Martin Oelschlägel¹, Juliane Müller¹, Matthias Kirsch^{1,2}, Ronald Tetzlaff¹
¹*Technische Universität Dresden, Germany;* ²*Asklepios Kliniken Schildautal, Germany*

14:18	C2uL-03.2	An Experimental Reliability Study of Pseudo-Resistors in Biomedical Applications	1892
		Stefan Reich, Dominik Fritschi, Markus Sporer, Maurits Ortmanns <i>Universität Ulm, Germany</i>	
14:36	C2uL-03.3	Wireless Power Transfer for Smart Knee Implants	1896
		Manav Jain ¹ , Milutin Stanačević ¹ , Ryan Willing ² , Sherry Towfighian ³ , Emre Salman ¹ ¹ State University of New York at Stony Brook, United States; ² Western University, Canada; ³ Binghamton University, United States	
14:54	C2uL-03.4	A 200GΩ-Z_{IN}, <0.2%-THD CT-ΔΣ-Based ADC-Direct Artifact-Tolerant Neural Recording Circuit	1901
		Tania Moeinfard, Hossein Kassiri <i>York University, Canada</i>	
	C2uL-04	Regulators and References (Virtual USA)	
	<i>Time:</i>	Wednesday, June 1 (14:00-15:30)	
	<i>Place:</i>	Room 4	
	<i>Chair(s):</i>	Tawfiq Musah, <i>Ohio State University</i> Shahriar Mirabbasi, <i>University of British Columbia</i>	
14:00	C2uL-04.1	A 200mA-Load 0.62fs-FOM Active-Capacitor-Assisted Dual-Loop Output Capacitorless Low-Dropout Regulator in Standard 65nm CMOS	1906
		Weijie Han, Ziyang Luo, Chen Chen, Jin Liu, Hoi Lee <i>The University of Texas at Dallas, United States</i>	
14:18	C2uL-04.2	A 0.73-to-1.71 V Capacitor-Less Low-Noise Low-Dropout Regulator in 28-nm CMOS	1910
		Lantao Wang, Running Guo, Johannes Bastl, Jonas Meier, Michael Hanhart, Tim Lauber, Alexander Meyer, Ralf Wunderlich, Stefan Heinen <i>RWTH Aachen University, Germany</i>	
14:36	C2uL-04.3	A Novel Sub-1V Bandgap Reference with 17.1 ppm/°C Temperature Coefficient in 28nm CMOS	1914
		R. Nagulapalli, K. Hayatleh, N. Yassine, S. Barker <i>Oxford Brookes University, United Kingdom</i>	
14:54	C2uL-04.4	A 36pW CMOS Voltage Reference with Independent TC and Output Level Calibration for Miniature Low-Power Systems	1918
		Yuyang Li, Inhee Lee <i>University of Pittsburgh, United States</i>	
15:12	C2uL-04.5	A 156pW Gate-Leakage Based Voltage/Current Reference for Low-Power IoT Systems	1923
		Abhishek Pullela ¹ , Ashfakh Ali ¹ , Arpan Jain ¹ , Inhee Lee ² , Zia Abbas ¹ ¹ International Institute of Information Technology Hyderabad, India; ² University of Pittsburgh, United States	

C2uL-05 Video Coding Beyond the Standardization of Versatile Video Coding (Virtual USA)

Time: Wednesday, June 1 (14:00-15:30)

Place: Room 5

Chair(s): Peng Yin, *Dolby Labs*

14:00

C2uL-05.1 Advanced Block Partitioning Methods Beyond VVC 1928

Kai Zhang, Li Zhang, Zhipin Deng, Na Zhang, Yang Wang
Bytedance Inc., United States

14:18

C2uL-05.2 Multi-Level Latent Fusion in Learning-Based Image Coding 1933

Jay N. Shingala¹, Arunkumar Mohananchettiar¹, Pankaj Sharma¹, Peng Yin², Arjun Arora²,
Sean McCarthy², Taoran Lu², Fangjun Pu²
¹*Ittiam Systems, India;* ²*Dolby Laboratories Inc., United States*

14:36

C2uL-05.3 Optimized Bit Allocation for Learning-Based Video Compression 1938

Zhaobin Zhang, Yue Li, Kai Zhang, Li Zhang, Yuwen He
Bytedance Inc., United States

14:54

C2uL-05.4 pyNeurode: A Real-Time Neural Signal Processing Framework 1943

Wing-Kin Tam, Matthew F. Nolan
University of Edinburgh, United Kingdom

C2uL-06 Video Encoder Control and Neural Network Implementation (Virtual USA)

Time: Wednesday, June 1 (14:00-15:30)

Place: Room 6

Chair(s): Daniel Palomino, *Federal University of Pelotas (UFPEL), Brazil*

14:00

C2uL-06.1 Fast Transform Decision Scheme for VVC Intra-Frame Prediction Using Decision Trees 1948

Mário Saldanha¹, Gustavo Sanchez², César Marcon³, Luciano Agostini¹
¹*Universidade Federal de Pelotas, Brazil;* ²*Instituto Federal Farroupilha, Brazil;*
³*Pontifical Catholic University of Rio Grande do Sul, Brazil*

14:18

C2uL-06.2 CNN-Based Partitioning Structure Prediction for VVC Intra Speedup: Bottom-Up-Based and Top-Down-Based 1953

Yue Li, Li Zhang, Jizheng Xu
Bytedance Inc., United States

14:36

C2uL-06.3 Fast Affine Motion Estimation for VVC Using Machine-Learning-Based Early Search Termination 1958

Adson Duarte, Paulo Gonçalves, Luciano Agostini, Bruno Zatt, Guilherme Corrêa,
Marcelo Porto, Daniel Palomino
Universidade Federal de Pelotas, Brazil

- 14:54
C2uL-06.4 **Increasing the Accuracy of a Neural Network Using Frequency Selective Mesh-to-Grid Resampling** 1963
 Andreas Spruck, Viktoria Heimann, André Kaup
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany
- 15:12
C2uL-06.5 **Customizable FPGA-Based Accelerator for Binarized Graph Neural Networks** 1968
 Ziwei Wang, Zhiqiang Que, Wayne Luk, Hongxiang Fan
Imperial College London, United Kingdom
- C3uL-01** **RF and Microwave Circuits (Virtual USA)**
Time: Wednesday, June 1 (16:00-17:30)
Place: Room 1
Chair(s): Arindam Sanyal, *Arizona State University*
 Shahriar Mirabbasi, *University of British Columbia*
- 16:00
C3uL-01.1 **A 32-ppm/°C 0.9-nW/kHz Relaxation Oscillator with Event-Driven Architecture and Charge Reuse Technique** 1973
 Xinhang Xu, Siyuan Ye, Jihang Gao, Yihan Zhang, Linxiao Shen, Le Ye
Peking University, China
- 16:18
C3uL-01.2 **Design of a CMOS Parametric Frequency Divider with 2.4-GHz Output Frequency for RF Systems-on-a-Chip** 1978
 Mengting Yan, Hussein M.E. Hussein, Cristian Cassella, Matteo Rinaldi, Marvin Onabajo
Northeastern University, United States
- 16:36
C3uL-01.3 **A Multilevel N-Path Filter Topology for Low-Power Sinusoidal Clocking with Non-Overlapping Phases** 1983
 Loai G. Salem, M. Mahmudul Hasan Sajeeb
University of California, Santa Barbara, United States
- 16:54
C3uL-01.4 **Automatic Design of High-Gain 26.5-to-29.5-GHz Transformer-Less Low-Noise Amplifier 1.86-to-8.87-mW Variants in 65-nm CMOS** 1988
 Luís Mendes^{1,2}, João Vaz^{1,3}, Fábio Passos¹, Nuno Lourenço^{1,4}, Ricardo Martins¹
¹Instituto de Telecomunicações, Portugal; ²Instituto Politécnico de Leiria, Portugal; ³Instituto Superior Técnico, Universidade de Lisboa, Portugal
- 17:12
C3uL-01.5 **16 Gbps, 19.6mW Ultralow-Power-Consumption Continuous-Phase Frequency-Shift-Keying Transmitter in 65 nm CMOS Technology** 1993
 Yanlu Wang, Muh-Dey Wei, Renato Negra
RWTH Aachen University, Germany

C3uL-02 Emergent Devices, Circuits and Applications (Virtual USA)

Time: Wednesday, June 1 (16:00-17:30)
Place: Room 2
Chair(s): Themistoklis Prodromakis, *Southampton University*

16:00
C3uL-02.1 Logic Gate for Sequenced Data with Nonlinear Nanomechanical Resonator Driven by Weak Signals 1998
Yukihiro Tadokoro¹, Hiroya Tanaka²
¹*Toyota Central R&D Labs., Inc., Toyota Research Institute of North America, United States;*
²*Toyota Central R&D Labs., Inc., Japan*

16:18
C3uL-02.2 Superconductive Logic Using 2Φ-Josephson Junctions with Half Flux Quantum Pulses
Issa Salameh¹, Eby G. Friedman², Shahar Kvatinsky¹
¹*Technion - Israel Institute of Technology, Israel;* ²*University of Rochester, United States*

16:36
C3uL-02.3 A Wide Dynamic Range Read-Out System for Resistive Switching Technology 2003
Lijie Xie, Jiawei Shen, Andrea Mifsud, Chaohan Wang, Abdulaziz Alshaya, Christos Papavassiliou
Imperial College London, United Kingdom

16:54
C3uL-02.4 Resolving Unusual Gate Current and Dielectric Breakdown of Solution Processed Carbon Nanotube Thin Film Transistor 2008
Sean F. Romanuik, Bishakh Rout, Pierre-Luc Girard-Lauriault, Sharmistha Bhadra
McGill University, Canada

C3uL-03 Efficient Circuits and Systems for Visual Signal Coding, Processing, and Communications (Virtual Asia)

Time: Wednesday, June 1 (16:00-17:30)
Place: Room 3
Chair(s): Yibo Fan, *Fudan University, China*

16:00
C3uL-03.1 An Area-Efficient Unified Transform Architecture for VVC 2012
Zhijian Hao¹, Qi Zheng¹, Yibo Fan¹, Guoqing Xiang², Peng Zhang², Heming Sun^{3,4}
¹*Fudan University, China;* ²*Peking University, China;* ³*Waseda University, Japan;* ⁴*JST PRESTO, Japan*

16:18
C3uL-03.2 A 3.1 Gbin/s Advanced Entropy Coding Hardware Design for AVS3 2017
Yujie Cai¹, Wei Li¹, Xiaoyang Zeng¹, Yibo Fan¹, Peng Zhang², Guoqing Xiang², Haibing Yin³
¹*Fudan University, China;* ²*Peking University, China;* ³*Hangzhou Dianzi University, China*

16:36
C3uL-03.3 UCViT: Hardware-Friendly Vision Transformer via Unified Compression 2022
HongRui Song, Ya Wang, Meiqi Wang, Zhongfeng Wang
Nanjing University, China

16:54
C3uL-03.4 Intra Encoding Complexity Control with a Time-Cost Model for Versatile Video Coding 2027
Yan Huang¹, Jizheng Xu², Li Zhang², Yan Zhao¹, Li Song¹
¹*Shanghai Jiao Tong University, China;* ²*Bytedance Inc., United States*

- 17:12
C3uL-03.5 Deep Feature Compression with Collaborative Coding of Image Texture 2032
 Lei Xiong¹, Hwei Liu¹, Shuyuan Zhu¹, Xiaozhen Zheng², Ruiqin Xiong³, Bing Zeng¹
¹University of Electronic Science and Technology of China, China; ²SZ DJI Technology Co., Ltd., China;
³Peking University, China
- C3uL-04 Amplifiers and Read-Out Circuits (Virtual USA)**
Time: Wednesday, June 1 (16:00-17:30)
Place: Room 4
Chair(s): Tawfiq Musah, *Ohio State University*
 Igor Filanovsky, *University of Alberta*
- 16:00
C3uL-04.1 Characterization of Sub-Nyquist TIA with Equalization in Optical Receivers 2037
 Mohamed Ahmed, Tawfiq Musah
The Ohio State University, United States
- 16:18
C3uL-04.2 Frequency Compensation Scheme for a Full GaN OpAmp Driving 1-nF Load 2042
 Salvatore Pennisi¹, Francesco Pulvirenti², Katia Samperi¹
¹Università degli Studi di Catania, Italy; ²STMicroelectronics, Italy
- 16:36
C3uL-04.3 A PVT Compensated Resistance to Frequency Converter for Sensor Array Read-Out
 Ming Yan¹, Dalton Martini Colombo², Michael S. Freund¹, Kamal El-Sankary¹
¹Dalhousie University, Canada; ²Federal University of Minas Gerais, Brazil
- 16:54
C3uL-04.4 A 14-Bit 1-GS/s SiGe Bootstrap Sampler for High Resolution ADC with 250-MHz Input 2047
 Jiazhang Song, Li-Yang Chen, Mau-Chung Frank Chang, Sudhakar Pamarti, Chih-Kong Ken Yang
University of California, Los Angeles, United States
- 17:12
C3uL-04.5 Integrating Ultra-Thin SiGe BiCMOS Power Amplifier Chip in Combination with Flexible Antenna in the Polymer Foil 2052
 Sefa Özbek, Shuo Wang, Serafin B. Fischer, Markus Grözing, Joachim N. Burghartz,
 Jan Hesselbarth, Manfred Berroth
Universität Stuttgart, Germany
- C3uL-05 TCAS Papers: Circuits and Systems II (Virtual USA)**
Time: Wednesday, June 1 (16:00-17:30)
Place: Room 5
Chair(s): Aydin Karsilayan, *Texas A&M University, USA*
- 16:00
C3uL-05.1 An All-Standard-Cell-Based Synthesizable SAR ADC with Nonlinearity-Compensated RDAC
 Zule Xu, Naoki Ojima, Shuwei Li, Tetsuya Iizuka
The University of Tokyo, Japan
- 16:18
C3uL-05.2 FPGA-Based Relaxation D/A Converters with Parasitics-Induced Error Suppression and Digital Self-Calibration
 Roberto Rubino, Paolo S. Crovetto, Francesco Musolino
Politecnico di Torino, Italy

16:36

C3uL-05.3 How to Build a Memristive Integrate-and-Fire Model for Spiking Neuronal Signal Generation

Sung-Mo Kang¹, Donguk Choi¹, Jason K. Eshraghian³, Peng Zhou¹, Jieun Kim⁵, Bai-Sun Kong⁵, Xiaojian Zhu², Ahmet S. Demirkol⁴, Alon Ascoli⁴, Ronald Tetzlaff⁴, Wei D. Lu³, Leon Chua⁶
¹University of California, Santa Cruz, United States; ²Institute of Materials Technology, Chinese Academy of Sciences, China; ³University of Michigan, Ann Arbor, United States; ⁴Technische Universität Dresden, Germany; ⁵SungKyunKwan University, Korea; ⁶University of California, Berkeley, United States

16:54

C3uL-05.4 NoPUF: A Novel PUF Design Framework Towards Modeling Attack Resistant PUFs

Antian Wang¹, Weihang Tan¹, Yuejiang Wen², Yingjie Lao¹
¹Clemson University, United States; ²North Carolina State University, United States

17:12

C3uL-05.5 PhaseCamouflage: Leveraging Adiabatic Operation to Thwart Reverse Engineering

Ivan Miketic, Emre Salman
State University of New York at Stony Brook, United States

C3uL-06 Error Correction Codes and Compute-in-Memory (Virtual USA)

Time: Wednesday, June 1 (16:00-17:30)
Place: Room 6
Chair(s): Hoyoung Yoo, Chungnam National University, South Korea

16:00

C3uL-06.1 High-Throughput Split-Tree Architecture for Nonbinary SCL Polar Decoder 2057

Yaoyu Tao, Cedric Choi
Qualcomm Wireless R&D, United States

16:18

C3uL-06.2 Efficient Check Node Processing for Min-Max NB-LDPC Decoding over Lower-Order Finite Fields 2062

Xinmiao Zhang
The Ohio State University, United States

16:36

C3uL-06.3 Efficient Nested Key Equation Solver for Short Generalized Integrated Interleaved BCH Codes 2067

Zhenshan Xie, Xinmiao Zhang
The Ohio State University, United States

Virtual Region 10 Friendly Time (UTC-8)

A1aL-01 Smart Sensors and Sensory Systems II (Virtual Asia)

Time: Monday, May 30 (9:00-10:30)
Place: Room 1
Chair(s): Xiaojin Zhao, Shenzhen University
Cheng-Ta Chiang, National Chia Yi University

9:00

A1aL-01.1 System-Level Modeling and Design of a Temperature Compensated CMOS MEMS Thermal Flow Sensor 2072

Zhijuan Li¹, Zetao Fang¹, Bo Wang², Moaaz Ahmed², Xiaofang Pan¹, Su-Ting Han¹, Xiaojin Zhao¹, Wei Xu¹
¹Shenzhen University, China; ²Hamad Bin Khalifa University, Qatar

- 9:18
A1aL-01.2 Remote PPG Estimation from RGB-NIR Facial Image Sequence for Heart Rate Estimation 2077
 Dao Q. Le, Jui-Chiu Chiang, Wen-Nung Lie
National Chung Cheng University, Taiwan
- 9:36
A1aL-01.3 A Real-Time Respiration Monitoring System Using WiFi-Based Radar Model 2082
 Wangdong Xie¹, Liangyu Gan¹, Chunqi Shi¹, Justin Wu², Yuehting Lee², Jinghong Chen³, Runxi Zhang¹
¹East China Normal University, China; ²Amlagic Shanghai Co. Ltd., China; ³University of Houston, United States
- 9:54
A1aL-01.4 Distributed Body Sensor Network System Based on Stretchable Conductive Wires and Wearable Sensors for Motion Detection 2087
 Sujie Chen, Xin Xi, Ruili Liu, Xiaojun Guo
Shanghai Jiao Tong University, China
- 10:12
A1aL-01.5 Handheld Fluorometer for Detection of Blue/Green Fluorescence 2092
 Kang Choi, Kasun Pathirage, Salman Azam, Pamela Abshire, Roy Anderson, Elisabeth Smela
University of Maryland College Park, United States
- A1aL-02 Data Path and Arithmetic Circuits and Systems I (Virtual Asia)**
Time: Monday, May 30 (9:00-10:30)
Place: Room 2
Chair(s): Duncan Elliott, *The University of Alberta*
 Robert Chen-Hao Chang, *National Chung Hsing University*
- 9:00
A1aL-02.1 Redundancy Pruning for Binary Hyperdimensional Computing Architectures 2097
 Ryan Albert G. Antonio, Anastacia B. Alvarez
University of the Philippines, Philippines
- 9:18
A1aL-02.2 A Low Power DNN-Based Speech Recognition Processor with Precision Recoverable Approximate Computing 2102
 Bo Liu, Xuetao Wang, Renyuan Zhang, Anfeng Xue, Ziyu Wang, Haige Wu, Hao Cai
Southeast University, China
- 9:36
A1aL-02.3 High-Speed Hardware Architecture for Post-Quantum Diffie–Hellman Key Exchange Based on Residue Number System 2107
 Rei Ueno^{1,2}, Naofumi Homma¹
¹Tohoku University, Japan; ²JST PRESTO, Japan
- 9:54
A1aL-02.4 High Performance VLSI Architecture for the Modified SORT-N Algorithm 2112
 Pavan Kumar Ganjimala, Subrahmanyam Mula
Indian Institute of Technology Palakkad, India
- 10:12
A1aL-02.5 Reconfigurable Multifunction Computing Unit Using an Universal Piecewise Linear Method ... 2117
 Fei Lyu¹, Jian Chen¹, Shuo Huang¹, Wenxiu Wang¹, Yuanyong Luo², Yu Wang³
¹Jinling Institute of Technology, China; ²Linx Lab, Huawei Corporation, China;
³Nanjing Xiaozhuang University, China

A1aL-03 Experimental Teaching Systems II (Virtual Asia)

Time: Monday, May 30 (9:00-10:30)

Place: Room 3

Chair(s): Mohsin M. Jamali, *The University of Texas Permian Basin*

9:00

A1aL-03.1 Cross-Grade Curriculum Group Based Teaching Experiment System for Innovative Design of IoT Intelligent Dynamic Measurement and Control 2122

Yu Zhang, Hongqing Ma, Peihong Li, Xihua Li, Xiangdong Jin, Qimin Zhou,
Xiaoxing Shi, Xinyu Jin, Huizhong Li
Zhejiang University, China

9:18

A1aL-03.2 Project-Based Learning: Bridging the Gap between Algorithm and Architecture in Neural Network Course 2127

Heming Sun^{1,2}, Lu Yu³
¹*Waseda University, Japan;* ²*JST PRESTO, Japan;* ³*Zhejiang University, China*

9:36

A1aL-03.3 Design of Network Security Experiment Teaching System Based on Honeypot Technology 2132

Chen Zhu¹, Qiang Li¹, Bin Sun¹, Xinyu Jin¹, Yusun Zhou², Muhan Xie¹
¹*Zhejiang University, China;* ²*Zhejiang University City College, China*

9:54

A1aL-03.4 Addressing Retention and Improving Performance in Gateway Engineering Courses 2137

Mohsin M. Jamali, Sepehr Arbabi, Hossein Hosseini, Harishchandra Aryal
The University of Texas Permian Basin, United States

10:12

A1aL-03.5 Systematic Development of CMOS Fixed-Transconductance Bias Circuits

Shanthi Pavan
Indian Institute of Technology Madras, India

A1aL-04 Spiking Neural Networks and Systems (Virtual Asia)

Time: Monday, May 30 (9:00-10:30)

Place: Room 4

Chair(s): Jörg Velten, *Bergische University Wuppertal*
Timir Datta, *Feinstein Institutes*

9:00

A1aL-04.1 Unsupervised Learning Based on Temporal Coding Using STDP in Spiking Neural Networks 2142

Congyi Sun¹, Qinyu Chen², Kai Chen¹, Guoqiang He¹, Yuxiang Fu¹, Li Li¹
¹*Nanjing University, China;* ²*University of Shanghai for Science and Technology, China*

9:18

A1aL-04.2 A Compact Online-Learning Spiking Neuromorphic Biosignal Processor 2147

Chaoming Fang^{1,2}, Ziyang Shen^{2,3}, Fengshi Tian^{2,4}, Jie Yang², Mohamad Sawan²
¹*Zhejiang University, China;* ²*Westlake University, China;* ³*Fudan University, China;* ⁴*Hong Kong University of Science and Technology, China*

9:36

A1aL-04.3 A Spiking Neural Network with Resistively Coupled Synapses Using Time-to-First-Spike Coding Towards Efficient Charge-Domain Computing 2152

Yusuke Sakemi¹, Kai Morino², Takashi Morie³, Takeo Hosomi⁴, Kazuyuki Aihara⁵
¹*Chiba Institute of Technology, Japan;* ²*Kyushu University, Japan;* ³*Kyushu Institute of Technology, Japan;*
⁴*NEC Corporation, Japan;* ⁵*The University of Tokyo, Japan*

9:54

- A1aL-04.4 An FPGA-Based Co-Processor for Spiking Neural Networks with On-Chip STDP-Based Learning 2157**
Thao N.N. Nguyen, Bharadwaj Veeravalli, Xuanyao Fong
National University of Singapore, Singapore

10:12

- A1aL-04.5 Improving Spiking Neural Network Accuracy Using Time-Based Neurons 2162**
Hanseok Kim, Woo-Seok Choi
Seoul National University, Korea

A1aL-05 Wireless and Wireline Communications II (Virtual Asia)

Time: Monday, May 30 (9:00-10:30)

Place: Room 5

Chair(s): Xiangyu Meng, *Sun Yat-Sen University*
Junghwan Han, *Chungnam National University*

9:00

- A1aL-05.1 Tensor-Based Hybrid Precoding Processor for 8×8×8 mmWave 3D-MIMO Systems 2167**
Tsung-Lin Wu¹, Chung-An Shen², Yuan-Hao Huang¹
¹*National Tsing Hua University, Taiwan;* ²*National Taiwan University of Science and Technology, Taiwan*

9:18

- A1aL-05.2 Communication-Efficient Federated Learning with Cooperative Filter Selection 2172**
Zhao Yang¹, Qingshuang Sun²
¹*Northwestern Polytechnical University, China;* ²*Vrije Universiteit Brussel, Belgium*

9:36

- A1aL-05.3 A 266-3750 MHz Wide-Range Adaptive Phase-Rotator-Based All Digital DLL for LPDDR5 Controllers 2177**
Jeewan Lee¹, Yoonjae Choi², Chulwoo Kim²
¹*SK Hynix, Korea;* ²*Korea University, Korea*

9:54

- A1aL-05.4 An M-PSK Modulated Polar Transmitter Based on a Ring Oscillator with Low Power and Low Design Complexity for IoT Applications 2182**
Fariborz Lohrabi Pour, Dong Sam Ha
Virginia Polytechnic Institute and State University, United States

10:12

- A1aL-05.5 High Sensitivity Near-Zero Power Wakeup Receiver for Backscattering RF Tags 2187**
Xiao Sha, Puyang Zheng, Milutin Stanaćević
State University of New York at Stony Brook, United States

A1aL-06 Renewable Energy System (Virtual Asia)

Time: Monday, May 30 (9:00-10:30)

Place: Room 6

Chair(s): Dong Liu, *The City University of Hong Kong*

9:00

- A1aL-06.1 Multi-Attractor and Transient Stability of Islanded Microgrid 2192**
Jingxi Yang, Chi K. Tse, Dong Liu
City University of Hong Kong, China

- 9:18
A1aL-06.2 Impedance Model and Stability Analysis of Offshore Wind Farm via AC Submarine Cable 2197
 Jiaqi Yang¹, Zhen Li¹, Bin Liu³, Chengze Li², He Li², Xiangdong Liu¹
¹Beijing Institute of Technology, China; ²Shenyang Polytechnic College, China; ³Tsinghua University, China
- 9:36
A1aL-06.3 I-V Curve Tracer Based Intermittent Maximum Power Point Tracking for Photovoltaic System 2202
 Jonghyun Park, Yun Chan Im, Yong Sin Kim
 Korea University, Korea
- 9:54
A1aL-06.4 HERIC Based PV Inverter Using Partial Sinewave Tracking Dual Mode Control 2206
 Kazunori Ito, Hiroataka Koizumi
 Tokyo University of Science, Japan
- 10:12
A1aL-06.5 A Novel Approach to the Maximum Peak Power Tracking under Partial Shading Conditions 2210
 Imran Pervez, Charalampos Antoniadis, Yehia Massoud
 King Abdullah University of Science and Technology, Saudi Arabia
- A1aL-07 RF Circuits and Systems (Virtual Asia)**
 Time: Monday, May 30 (9:00-10:30)
 Place: Room 7
 Chair(s): Jusung Kim, Hanbat National University
- 9:00
A1aL-07.1 A Two-Way Current-Combining W-Band Power Amplifier Achieving 17.4-dBm Output Power with 19.4% PAE in 65-nm Bulk CMOS 2215
 Zhiyang Zhang, Xi Wang, Junyan Ren, Shunli Ma
 Fudan University, China
- A2aL-01 TCAS Papers: Circuits and Systems I (Virtual Asia)**
 Time: Monday, May 30 (10:45-12:15)
 Place: Room 1
 Chair(s): Jose Silva-Martinez, Texas A&M University
- 10:45
A2aL-01.1 A Foreground Calibration for M-Channel Time-Interleaved Analog-to-Digital Converters Based on Genetic Algorithm
 Yang Azevedo Tavares, Minjae Lee
 Gwangju Institute of Science and Technology, Korea
- 11:03
A2aL-01.2 A Reconfigurable Differential-to-Single-Ended Autonomous Current Adaptation Buffer Amplifier Suitable for Biomedical Applications
 Zu-Jia Lo¹, Yuan-Chuan Wang¹, Yun-Jieper Huang¹, Ren-Yong Hung¹, Yi-Heng Wu¹,
 Tzu-Yun Wang¹, Yang-Jing Huang¹, Hui-Chun Huang¹, Yu-Cheng Lu¹, Sheng-Yu Peng¹,
 Chia-Yuan Chang², Wen-Sung Lai², Yu-Juei Hsu³
¹National Taiwan University of Science and Technology, Taiwan; ²National Taiwan University, Taiwan;
³National Defense Medical Center, Taiwan
- 11:21
A2aL-01.3 TMS-Crossbars with Tactile Sensing
 R. Chitra, A.R. Aswani, A.P. James
 Digital University Kerala, India

A2aL-02 TCAS Papers: Advanced Design Techniques (Virtual Asia)

Time: Monday, May 30 (10:45-12:15)
Place: Room 2
Chair(s): Zhiyong Zhang, *Texas A&M University*

10:45

A2aL-02.1 Dynamic Range Enhancement via Linearized Output in Nanoelectromechanical Systems by Combining High-Order Harmonics

Keita Funayama¹, Hiroya Tanaka¹, Keiichi Shimaoka¹, Yukihiro Tadokoro¹, Jun Hirotsu², Yutaka Ohno²
¹*Toyota Central R&D Labs., Inc., Japan*; ²*Nagoya University, Japan*

11:03

A2aL-02.2 Shift Register with Coupled Bidirectional Bifurcation Amplifiers

Hiroya Tanaka, Yukihiro Tadokoro
Toyota Central R&D Labs., Inc., Japan

11:21

A2aL-02.3 High Performance Deterministic Stochastic Computing Using Residue Number System

Kamyar Givaki¹, Reza Hojabr², M. H. Gholamrezaei³, Ahmad Khonsari¹, Saeid Gorgin³,
Dara Rahmati⁴, M. Hassan Najafi⁵
¹*University of Tehran, Iran*; ²*Simon Fraser University, Canada*; ³*Chosun University, Korea*;
⁴*Shahid Beheshti University, Iran*; ⁵*University of Louisiana at Lafayette, United States*

A2aL-03 Sensors, Memories and Edge AI Accelerators for Biomedical and Healthcare (Virtual Asia)

Time: Monday, May 30 (10:45-12:15)
Place: Room 3
Chair(s): Zhiyong Zhang, *Texas A&M University*

10:45

A2aL-03.1 Energy-Efficient Intelligent Pulmonary Auscultation for Post COVID-19 Era Wearable Monitoring Enabled by Two-Stage Hybrid Neural Network 2220

Bingqiang Liu¹, Ziyuan Wen¹, Hongling Zhu¹, Jinsheng Lai¹, Jiajun Wu¹, Heng Ping¹, Wenqing Liu²,
Guoyi Yu¹, Jianmin Zhang², Zuozhu Liu³, Hesong Zeng¹, Chao Wang¹
¹*Huazhong University of Science and Technology, China*; ²*Jiangnan University, China*;
³*Zhejiang University, China*

11:03

A2aL-03.2 Silk Piezoelectric Tactile Sensors: The Way Forward to Developing Intelligent Implantable Sensors 2225

Satish Bonam¹, Jose Joseph², Aditya Bhagavathi¹, Shiv Govind Singh¹, Siva Rama Krishna Vanjari¹
¹*Indian Institute of Technology Hyderabad, India*; ²*Digital University Kerala, India*

A2aL-04 Recent Progress in Theory and Applications of Memristive Technologies Toward a New Era in Electronic V (Virtual Asia)

Time: Monday, May 30 (10:45-12:15)
Place: Room 4
Chair(s): Esteban Tlelo Cuautle, *INAOE, Mexico*

10:45

A2aL-04.1 Entrenching Decision Trees in a Robust Molecular Circuit Element 2229

T Venkatesan¹, Sreebrata Goswami², R. Stanley Williams³, Sreetosh Goswami⁴
¹*University of Oklahoma, United States*; ²*Indian Association for the Cultivation of Science, India*;
³*Texas A&M University, United States*; ⁴*Indian Institute of Science Bangalore, India*

- 11:03
A2aL-04.2 Molecular Building Blocks for Non-Linear Circuits 2233
 T. Venkatesan¹, R. Stanley Williams², Sreebrata Goswami³, Sreetosh Goswami⁴
¹University of Oklahoma, United States; ²Texas A&M University, United States; ³Indian Association for the
 Cultivation of Science, India; ⁴Indian Institute of Science Bangalore, India
- 11:21
A2aL-04.3 Compact Thermo-Diffusion Based Physical Memristor Model 2237
 Iosif-Angelos Fyrigos¹, Theodoros Panagiotis Chatzinikolaou¹, Vasileios Ntinas^{1,3}, Stavros Kitsios²,
 Panagiotis Bousoulas², Michail-Antisthenis Tsompanas¹, Dimitris Tsoukalas², Andrew Adamatzky⁴,
 Antonio Rubio³, Georgios Ch. Sirakoulis¹
¹Democritus University of Thrace, Greece; ²National Technical University of Athens, Greece;
³Universitat Politècnica de Catalunya, Spain; ⁴University of the West of England, United Kingdom
- A2aL-05 Cryptography and Hardware Security I (Virtual Asia)**
Time: Monday, May 30 (10:45-12:15)
Place: Room 5
Chair(s): Dur-e-Shahwar Kundi, *Queen's University Belfast*
 Chuan Zhang, *Southeast University*
- 10:45
A2aL-05.1 Efficient VLSI Architecture of Bluestein's FFT for Fully Homomorphic Encryption 2242
 Shi-Yong Wu, Kuan-Yu Chen, Ming-Der Shieh
National Cheng Kung University, Taiwan
- 11:03
A2aL-05.2 Non-Profiling Based Correlation Optimization Deep Learning Analysis 2246
 Juncheng Chen, Jun-Sheng Ng, Nay Aung Kyaw, Ne Kyaw Zwa Lwin, Kwen-Siong Chong,
 Zhiping Lin, Joseph Sylvester Chang, Bah-Hwee Gwee
Nanyang Technological University, Singapore
- 11:21
A2aL-05.3 A Lightweight and Efficient Schoolbook Polynomial Multiplier for Saber 2251
 Yuantuo Zhang¹, Yijun Cui¹, Ziyin Ni¹, Dur-E-Shahwar Kundi², Dongsheng Liu³, Weiqiang Liu¹
¹Nanjing University of Aeronautics and Astronautics, China; ²Queen's University Belfast, United Kingdom;
³Huazhong University of Science and Technology, China
- 11:39
**A2aL-05.4 An Asynchronous-Logic Masked Advanced Encryption Standard (AES) Accelerator
 and its Side-Channel Attack Evaluations** 2256
 Jun-Sheng Ng, Juncheng Chen, Nay Aung Kyaw, Ne Kyaw Zwa Lwin, Kwen-Siong Chong,
 Joseph Chang, Bah-Hwee Gwee
Nanyang Technological University, Singapore
- A2aL-06 Nonlinear Systems and Complex Networks II (Virtual Asia)**
Time: Monday, May 30 (10:45-12:15)
Place: Room 6
Chair(s): Wei Xing Zheng, *Western Sydney University*
- 10:45
A2aL-06.1 Multi-Robot Formation Control Using Collective Behavior Model and Reinforcement Learning 2261
 Jung-Chun Liu, Tsung-Te Liu
National Taiwan University, Taiwan

- 11:03
A2aL-06.2 A Novel Hardware-Efficient Network of Ergodic Cellular Automaton Neuron Models and its On-FPGA Learning 2266
 Haruto Suzuki, Hiroyuki Torikai
Hosei University, Japan
- 11:21
A2aL-06.3 The Effect of Node Centrality on the Evolution of Cooperation in Social Networks 2271
 Yajun Mao¹, Zhihai Rong^{2,3}
¹Beijing Technology and Business University, China; ²University of Electronic Science and Technology of China, China; ³Nanfang College, China
- A2aL-07 Error Correction Codes and Compute-in-Memory (Virtual Asia)**
Time: Monday, May 30 (10:45-12:15)
Place: Room 7
Chair(s): Hoyoung Yoo, Chungnam National University, South Korea
- 10:45
A2aL-07.1 ShareFloat CIM: A Compute-in-Memory Architecture with Floating-Point Multiply-and-Accumulate Operations 2276
 An Guo, Yongliang Zhou, Bo Wang, Tianzhu Xiong, Chen Xue, Yufei Wang, Xin Si, Jun Yang
Southeast University, China
- A3aL-01 Circuits and Systems for Space and High-Level Autonomous Vehicles (Virtual Asia)**
Time: Monday, May 30 (14:00-15:30)
Place: Room 1
Chair(s): Wei Shu, Zero-Error Systems Private Limited, Singapore
- 14:00
A3aL-01.1 Characterization of Single Event Upsets of Nanoscale FDSOI Circuits Based on the Simulation and Irradiation Results 2281
 Luchang Ding, Chang Cai, Gengsheng Chen, Zehao Wu, Jing Zhang, Chang Wu, Jun Yu
Fudan University, China
- 14:18
A3aL-01.2 Implementation of Radiation Hardened Flip-Flops Based on Novel Fishbone Layouts 2286
 Chang Cai¹, Zehao Wu¹, Jing Zhang¹, Luchang Ding¹, Lei Shen¹, Jun Yu¹, Yaqing Chi²
¹Fudan University, China; ²National University of Defense Technology, China
- 14:36
A3aL-01.3 Advanced Safety Test Solution for Automotive SoC Based on In-System-Test Architecture 2290
 Sangsoon Im, Giha Nam, Sungcheol Park, Mijung Noh
Samsung Electronics, Korea
- 14:54
A3aL-01.4 Safety Assurance System for Electric Vehicles Based on Infrared LiDAR 2294
 Yiqing Mao, Xu Cheng, Yun Chen
Fudan University, China

A3aL-02 Machine Learning for Neural Applications (Virtual Asia)

Time: Monday, May 30 (14:00-15:30)
Place: Room 2
Chair(s): Milutin Stanaćević, *Stony Brook University*
Samson Yu, *Deakin University*

14:00

A3aL-02.1 Short Floating-Point CNN Accelerator for Brain-Computer Interface to Decode Visual Information 2299
Shin-Ichi O'uchi, Ryusuke Hayashi
National Institute of Advanced Industrial Science and Technology, Japan

14:18

A3aL-02.2 SaleNet: A Low-Power End-to-End CNN Accelerator for Sustained Attention Level Evaluation Using EEG 2304
Chao Zhang¹, Zijian Tang¹, Taoming Guo¹, Jiaxin Lei¹, Jiaxin Xiao¹, Anhe Wang², Shuo Bai², Milin Zhang¹
¹*Tsinghua University, China;* ²*Chinese Academy of Sciences, China*

14:36

A3aL-02.3 Multiphysiological Shallow Neural Network-Based Mental Stress Detection System for Wearable Environment 2309
Muhammad Sheeraz, Abdul Rehman Aslam, Muhammad Awais Bin Altaf
Lahore University of Management Sciences, Pakistan

14:54

A3aL-02.4 A Miniaturized Flexible Functional Near-Infrared Spectroscopy System for Obstructive Sleep Apnea Detection 2314
Xude Huang, Shuwei Zhang, Chen Chen, Wei Chen
Fudan University, China

15:12

A3aL-02.5 A 73 μ W Single Channel Photoplethysmography-Based Blood Pressure Estimation Processor 2318
Abdul Rehman, Muhammad Awais Bin Altaf, Wala Saadeh
Lahore University of Management Sciences, Pakistan

A3aL-03 Image Processing and Fast Transform (Virtual Asia)

Time: Monday, May 30 (14:00-15:30)
Place: Room 3
Chair(s): Daniel Lun, *Hong Kong Polytechnic University*
Soontorn Oraintara, *Mahidol University*

14:00

A3aL-03.1 Multispectral and Multimodal Image Registration Based on a Dynamic Fusion Index 2323
Junxue Zheng, Cheolkon Jung
Xidian University, China

14:18

A3aL-03.2 Multi-Scale Adaptive Dual Attention for Image Defocus Blur Detection 2328
Yue Li, Xuechun Han, Wei Wang
Nankai University, China

14:36

A3aL-03.3 SUNet: Swin Transformer UNet for Image Denoising 2333
Chi-Mao Fan¹, Tsung-Jung Liu¹, Kuan-Hsien Liu²
¹*National Chung Hsing University, Taiwan;* ²*National Taichung University of Science and Technology, Taiwan*

- 14:54
A3aL-03.4 An End-to-End Computer Vision System Architecture 2338
 Ling Zhang, Wei Zhou, Xiangyu Zhang, Xin Lou
ShanghaiTech University, China
- 15:12
A3aL-03.5 Energy-Efficient Fast Fourier Transform for Real-Valued Applications
 Charalampos Eleftheriadis, Georgios Karakonstantis
Queen's University Belfast, United Kingdom
- A3aL-04 Neuromorphic and Event-Based Systems/Applications (Virtual Asia)**
Time: Monday, May 30 (14:00-15:30)
Place: Room 4
Chair(s): Deepu John, *University College Dublin*
 Dongsheng Yu, *University of Mining and Technology*
- 14:00
A3aL-04.1 An MPSoC-Based On-Line Edge Infrastructure for Embedded Neuromorphic Robotic Controllers ... 2343
 E. Piñero-Fuentes, S. Canas-Moreno, A.P. Ríos-Navarro, D. Cascado-Caballero,
 Á. Jiménez-Fernández, A. Linares-Barranco
University of Seville, Spain
- 14:18
A3aL-04.2 Comparison of the Resilience of Convolutional and Cellular Neural Networks against Adversarial Attacks 2348
 András Horváth
Pázmány Péter Catholic University, Hungary
- 14:36
A3aL-04.3 Hotspot Prediction of Network-on-Chip for Neuromorphic Processor with Liquid State Machine 2353
 Ziyang Kang, Xun Xiao, Shiming Li, Lei Wang, Yao Wang
National University of Defense Technology, China
- 14:54
A3aL-04.4 Improve 3D Feature Extraction and Fusion for Stage Diagnosis of Alzheimer's Disease 2358
 Mingjin Liu, Wenxin Yu, Jialiang Tang, Ning Jiang, Kang Xu, Chang Liu
Southwest University of Science and Technology, China
- 15:12
A3aL-04.5 Exploring the Impact of Adding Adversarial Perturbation Onto Different Image Regions 2363
 Ruijie Yang, Yuanfang Guo, Ruikui Wang, Xiaohan Zhao, Yunhong Wang
Beihang University, China
- A3aL-05 Intelligent Analysis and Decision-Making of Large-Scale Nonlinear Complex Systems I (Virtual Asia)**
Time: Monday, May 30 (14:00-15:30)
Place: Room 5
Chair(s): Hassan Najafi, *University of Louisiana*
- 14:00
A3aL-05.1 Pearson Correlation Coefficient-Based Performance Enhancement of Broad Learning System for Stock Price Prediction
 Guanzhi Li¹, Aining Zhang¹, Qizhi Zhang¹, Di Wu², Choujun Zhan¹
¹South China Normal University, China; ²Norwegian University of Science and Technology, Norway

14:18
A3aL-05.2 Event-Based Resilient Consensus of Second-Order Multi-Agent Systems under DoS Attacks 2368
Mei Sun, Deguang Lyu, Qiang Jia
Jiangsu University, China

14:36
A3aL-05.3 Delay Propagation for a High-Speed Railway Network with the Consideration of Primary Delay Derivation 2373
Wenbo Lian¹, Xingtang Wu^{1,2}, Min Zhou¹, Qingpei Duan³, Hairong Dong¹
¹*Beijing Jiaotong University, China*; ²*Beihang University, China*;
³*China Railway Beijing Bureau Group Co., Ltd, China*

14:54
A3aL-05.4 Ethereum Account Classification Based on Graph Convolutional Network
Tao Huang¹, Dan Lin¹, Haibing Xia², Jiajing Wu¹
¹*Sun Yat-sen University, China*; ²*Merchants Union Consumer Finance Company Limited, China*

15:12
A3aL-05.5 Analyzing Robustness of Complex Networks against Incomplete Information
Weijun Ma¹, Junyuan Fang², Jiajing Wu¹
¹*Sun Yat-sen University, China*; ²*City University of Hong Kong, China*

A3aL-06 Energy-Efficient Power Solutions for Future IoT Devices II (Virtual Asia)
Time: Monday, May 30 (14:00-15:30)
Place: Room 6
Chair(s): Sijun Du, *Delft University of Technology*

14:00
A3aL-06.1 A Multiple Charge Extractions and Multiple Precharge Interface Circuit for Piezoelectric Energy Harvesting 2378
Yi Yang¹, Zhiyuan Chen¹, Jingjing Liu¹, Ziyu Guo¹, Junmin Jiang², Xiaoyang Zeng¹
¹*Fudan University, China*; ²*Southern University of Science and Technology, China*

14:18
A3aL-06.2 A Nano-Power Wake-Up Circuit for Energy-Driven IoT Applications 2383
Li Teng¹, Junrui Liang¹, Sijun Du²
¹*ShanghaiTech University, China*; ²*Delft University of Technology, The Netherlands*

14:36
A3aL-06.3 Quality-Aware Merge Candidate Construction for Video Coding 2388
Lei Zhao¹, Kai Zhang², Li Zhang²
¹*Bytedance Network Technology, China*; ²*Bytedance Inc., United States*

14:54
A3aL-06.4 An Always-on tinyML Acoustic Classifier for Ecological Applications 2393
H.R. Sabbella¹, A.R. Nair¹, V. Gumme¹, S.S. Yadav¹, S. Chakrabartty², C.S. Thakur¹
¹*Indian Institute of Science Bangalore, India*; ²*Washington University in St. Louis, United States*

A4aL-01 Sensory Circuits and Systems II (Virtual Asia)

Time: Monday, May 30 (15:45-17:15)

Place: Room 1

Chair(s): Milin Zhang, *Tsinghua University*

15:45

A4aL-01.1 Single-Axis Capacitive Accelerometer Chip with AC Offset Suppression Loop 2397

Heng-Yu Chiu, Shih-Meng Tseng, Yi-Chen Chen, Chia-Ling Wei

National Cheng Kung University, Taiwan

16:03

A4aL-01.2 A Compact Low-Noise Digital Pixel with 15-Bit Two-Step PFM-Based ADC for IRFPAs 2401

Shanzhe Yu, Yacong Zhang, Ye Zhou, Runkun Zhu, Wengao Lu, Zhongjian Chen

Peking University, China

16:21

A4aL-01.3 A Nanowatt Comparator with Feedforward Slew Rate Enhancement and PVT-Insensitive Bias for Always-on MEMS Switch Wake-Up Sensor 2405

Jinhen Lee^{1,2}, Jianming Zhao², Yuan Gao²

¹*Nanyang Technological University, Singapore;* ²*Agency for Science, Technology and Research, Singapore*

16:39

A4aL-01.4 Electronic Technique and System for Non-Contact Reading of Temperature Sensors Based on Piezoelectric MEMS Resonators 2409

Marco Bau¹, Marco Zini¹, Alessandro Nastro¹, Marco Ferrari¹, Vittorio Ferrari¹, Joshua E.-Y. Lee^{2,3}

¹*Università degli Studi di Brescia, Italy;* ²*City University of Hong Kong, China;*

³*Agency for Science, Technology and Research, Singapore*

16:57

A4aL-01.5 tinyRadar: mmWave Radar Based Human Activity Classification for Edge Computing 2414

Satyapreet Singh Yadav¹, Radha Agarwal¹, Kola Bharath¹, Sandeep Rao², Chetan Singh Thakur¹

¹*Indian Institute of Science Bangalore, India;* ²*Texas Instruments, India*

A4aL-02 Circuits and Systems for Hardware Security (Virtual Asia)

Time: Monday, May 30 (15:45-17:15)

Place: Room 2

Chair(s): Yue Zheng, *Nanyang Technological University*

Itamar Levi, *Bar-Ilan University*

15:45

A4aL-02.1 Mirror^N PUF: Harvesting Multiple Independent Bits from Each PUF Cell in 65nm 2418

Yizhak Shifman, Alexander Fish, Joseph Shor

Bar-Ilan University, Israel

16:03

A4aL-02.2 Semi-Supervised Trojan Nets Classification Using Anomaly Detection Based on SCOAP Features 2423

Pei-Yu Lo¹, Chi-Wei Chen¹, Wei-Ting Hsu¹, Chih-Wei Chen², Chin-Wei Tien¹, Sy-Yen Kuo¹

¹*National Taiwan University, Taiwan;* ²*Institute for Information Industry, Taiwan*

16:21

A4aL-02.3 Horizontal Correlation Analysis Without Precise Location on Schoolbook Polynomial Multiplication of Lattice-Based Cryptosystem 2428

Chuanhao Lu¹, Yijun Cui¹, Yang Li², Dur-E-Shahwar Kundi³, Chenghua Wang¹, Weiqiang Liu¹

¹*Nanjing University of Aeronautics and Astronautics, China;* ²*University of Electro-Communications, China;*

³*Queen's University Belfast, United Kingdom*

- 16:39
A4aL-02.4 A 1800 μm^2 , 953Gbps/W AES Accelerator for IoT Applications in 40nm CMOS 2433
 Jingjing Lan, Vishnu P. Nambiar, Ming Ming Wong, Fei Li, Yuan Gao,
 Kevin Tshun Chuan Chai, Anh Tuan Do
Agency for Science, Technology and Research, Singapore
- 16:57
A4aL-02.5 A High Area-Efficiency RRAM-Based Strong PUF with Multi-Entropy Source and Configurable Double-Read Process 2438
 Xianwu Hu, Yu Wang, Jiayun Feng, Zizhao Ma, Xiaoyang Zeng, Yufeng Xie
Fudan University, China
- A4aL-03 Intelligent Micro-Sensor Techniques for Continuous Health Monitoring I (Virtual Asia)**
- Time:* Monday, May 30 (15:45-17:15)
Place: Room 3
Chair(s): Yuanjin Zheng, *Nanyang Technological University*
 Hanjun Jiang, *Tsinghua University*
- 15:45
A4aL-03.1 Wearable Bowel Sound Monitoring with Quality Enhancement Using U-Net 2443
 Kang Zhao¹, Shulin Feng¹, Hanjun Jiang¹, Zihua Wang¹, Ping Chen², Binjie Zhu², Xianglong Duan³
¹*Tsinghua University, China*; ²*Yiemed Medical Technology Co., Ltd., China*;
³*Shaanxi Provincial People's Hospital, China*
- 16:03
A4aL-03.2 A 2MHz CMOS Active Rectifier with PWM Mode Adaptive On/Off Delay Compensation for Wireless Power Transfer Systems 2448
 Kaishan Zheng, Xin Liu, Qian Su, Xiaosong Wang, Yu Liu
Institute of Microelectronics, Chinese Academy of Sciences, China
- 16:21
A4aL-03.3 Towards Task-Aware Signal Compression for Efficient Continuous Health Monitoring 2453
 Di Wu, Jie Yang, Mohamad Sawan
Westlake University, China
- 16:39
A4aL-03.4 Learning-Based Algorithm for Real Imaging System Enhancement: Acoustic Resolution to Optical Resolution Photoacoustic Microscopy 2458
 Zhengyuan Zhang, Haoran Jin, Zesheng Zheng, Yuanjin Zheng
Nanyang Technological University, Singapore
- 16:57
A4aL-03.5 A Flexible-Window Filtering Technique for Interference Suppression in SpO2 Monitoring 2463
 Xin Hu¹, Yuxuan Luo¹, Yong Chen², Bo Zhao¹
¹*Zhejiang University, China*; ²*University of Macau, Macau*

A4aL-04 Pattern Recognition, Deep Learning and Learning Systems III (Virtual Asia)

Time: Monday, May 30 (15:45-17:15)
Place: Room 4
Chair(s): Wenrui Dai, *Shanghai Jiao Tong University, China*
Mohsin M. Jamali, *The University of Texas Permian Basin*

15:45
A4aL-04.1 Spectre Attack Detection with Neutral Network on RISC-V Processor 2467
Anh-Tien Le¹, Trong-Thuc Hoang¹, Ba-Anh Dao¹, Akira Tsukamoto², Kuniyasu Suzuki², Cong-Kha Pham¹
¹*University of Electro-Communications, Japan;* ²*National Institute of Advanced Industrial Science and Technology, Japan;* ²*University of Electro-Communication, Vietnam*

16:03
A4aL-04.2 An Energy-Efficient YOLO Accelerator Optimizing Filter Switching Activity 2472
Kyeongjong Lim, Gyuri Kim, Taehyung Park, Xuan Truong Nguyen, Hyuk-Jae Lee
Seoul National University, Korea

16:21
A4aL-04.3 Appearance-Motion United Auto-Encoder Framework for Video Anomaly Detection
Yang Liu¹, Jing Liu¹, Jieyu Lin², Mengyang Zhao¹, Liang Song¹
¹*Fudan University, China;* ²*University of Toronto, Canada*

16:39
A4aL-04.4 A Novel Deep Learning Model for Link Prediction of Knowledge Graph 2477
Shuai Ding, Qinghan Lai, Zihan Zhou, Jinghao Gong, Jin'An Cui, Song Liu
Qilu University of Technology, China

16:57
A4aL-04.5 RARN: A Real-Time Skeleton-Based Action Recognition Network for Auxiliary Rehabilitation Therapy 2482
Mengqi Shen, Hong Lu
Fudan University, China

A4aL-05 Wireless and Wireline Communications III (Virtual Asia)

Time: Monday, May 30 (15:45-17:15)
Place: Room 5
Chair(s): Jienan Chen, *University of Electronic Science and Technology of China*
Yong Chen, *University of Macau*

15:45
A4aL-05.1 A High-Linearity 14GHz 7b Phase Interpolator for Ultra-High-Speed Wireline Applications 2487
Ninghuang Li, Weixin Gai, Bingyi Ye, Haowei Niu, Lei Lu
Peking University, China

16:03
A4aL-05.2 A Two-Stage Digital Predistortion Method for Quadrature Digital Power Amplifiers 2491
Fu Gao, Yun Yin, Yicheng Li, Jie Lin, Hongtao Xu
Fudan University, China

16:21
A4aL-05.3 Compressive Sensing Based Hardware Design for Channel Estimation of Wideband Millimeter Wave Hybrid MIMO System 2496
Chung-Lun Tu¹, Tse-Yuan Lin¹, Kang-Lun Chiu¹, Shyh-Jye Jou¹, Pei-Yun Tsai²
¹*National Yang Ming Chiao Tung University, Taiwan;* ²*National Central University, Taiwan*

- 16:39
A4aL-05.4 A 23.5-28.5 GHz High-Gain CMOS Transceiver Based on LO Phase-Shifting Architecture with Broadband LO/IF for 5G Communications 2501
 Qingfeng Zhang¹, Chenxi Zhao¹, Yiming Yu¹, Yunqiu Wu¹, Huihua Liu¹, Wenquan Che², Quan Xue², Kai Kang¹
¹University of Electronic Science and Technology of China, China; ²South China University of Technology, China
- 16:57
A4aL-05.5 A Low-Latency Carrier Phase Recovery Hardware for Coherent Optical Communication 2506
 Liyu Lin, Kaihui Wang, Yun Chen, Jianjun Yu, Xiaoyang Zeng
 Fudan University, China
- A4aL-06 Power IC Design II (Virtual Asia)**
Time: Monday, May 30 (15:45-17:15)
Place: Room 6
Chair(s): Yan Lu, University of Macau
- 15:45
A4aL-06.1 A Wide-Load-Range Tri-Mode Buck Converter with Seamless Mode Transition 2511
 Yanxia Yao, Menglian Zhao, Xiaobo Wu
 Zhejiang University, China
- 16:03
A4aL-06.2 A Digital-Control Buck Converter with Dual Pulse-Skipping Modes for Internet of Things 2516
 Tsung-Wen Sun, Kuan-Yu Liao, Tsung-Heng Tsai
 National Chung Cheng University, Taiwan
- 16:21
A4aL-06.3 Partitioning Scheme and Performance Analysis of Distributed Digital Low-Dropout Regulators in SoC 2520
 Xuliang Wang, Wing-Hung Ki
 Hong Kong University of Science and Technology, China
- 16:39
A4aL-06.4 A Self-Regulating Negative Charge Pump Using Multi-Phase Clock for Wideband ADCs 2525
 Haoran Wang, Junjie Jing, Fule Li
 Tsinghua University, China
- B1aL-01 Reconfigurable Architectures, SoC and 3D ICs (Virtual Asia)**
Time: Tuesday, May 31 (9:00-10:30)
Place: Room 1
Chair(s): Chung-An Shen, Taiwan University of Science
 Hao Zhang, Ocean University of China
- 9:00
B1aL-01.1 An FPGA-Based HW/SW Co-Verification Environment for Programmable Network Devices 2529
 Mengyue Su, Jean-Pierre David, Yvon Savaria, Bill Pontikakis, Thomas Luinaud
 Polytechnique Montréal, Canada
- 9:18
B1aL-01.2 Entropy-Based Thermal Sensor Allocation for Temperature-Aware Multi-Core Platforms 2534
 Kun-Chih Chen, Chia-Hsin Chen
 National Sun Yat-sen University, Taiwan

9:36

B1aL-01.3 A Soft RISC-V Processor IP with High-Performance and Low-Resource Consumption for FPGA 2538
Tian Zheng^{1,2}, Gang Cai^{1,2,3}, Zhihong Huang^{1,3}
¹Aerospace Information Research Institute, Chinese Academy of Sciences, China; ²University of the Chinese Academy of Sciences, China; ³Gusu Laboratory of Materials, China

9:54

B1aL-01.4 Design Techniques of High Speed PHY Using Highly Compact FOVEROS through Silicon Via 2542
Sanjib Basu^{1,2}, Dror Lazar¹, Rupesh Pothineni¹
¹Intel Technology India Pvt. Ltd., India; ²Intel Israel Design Center, Israel

10:12

B1aL-01.5 Impact of Sheet Width and Silicon Height in 3D Stacked Nanosheet GAA Transistor Technology ... 2547
Anil Kumar Gundu¹, Volkan Kursun²
¹Hong Kong University of Science and Technology, China;
²Norwegian University of Science and Technology, Norway

B1aL-02 Memory and Compute-in-Memory Circuits and Architectures II (Virtual Asia)

Time: Tuesday, May 31 (9:00-10:30)

Place: Room 2

Chair(s): Tony Tae-Hyoung Kim, *Nanyang Technological University*
Youngjoo Lee, *POSTECH*

9:00

B1aL-02.1 A Computing-in-Memory SRAM Macro Based on Fully-Capacitive-Coupling with Hierarchical Capacity Attenuator for 4-b MAC Operation 2551
Kanglin Xiao^{1,2}, Xiaoxin Cui¹, Xin Qiao¹, Nanbing Pan¹, Xin'An Wang², Yuan Wang¹
¹Peking University, China; ²Peking University Shenzhen Graduate School, China

9:18

B1aL-02.2 A Reconfigurable 8T SRAM Macro for Bit-Parallel Searching and Computing In-Memory 2556
Yuzong Chen, Junjie Mu, Hyunjoon Kim, Lu Lu, Tony Tae-Hyoung Kim
Nanyang Technological University, Singapore

9:36

B1aL-02.3 A 28nm 64Kb SRAM Based Inference-Training Tri-Mode Computing-in-Memory Macro 2561
Nanbing Pan, Xiaoxin Cui, Xin Qiao, Kanglin Xiao, Qingyu Guo, Yuan Wang
Peking University, China

9:54

B1aL-02.4 A Highly Parallel Fine-Grained Sort-Merge Join on Near Memory Computing 2566
Po-Yen Lin, Yen-Shi Kuo, Bo-Cheng Lai
National Yang Ming Chiao Tung University, Taiwan

10:12

B1aL-02.5 An Area-Efficient and Robust Memristive LUT Based on the Enhanced Scouting Logic Cells 2571
Xiaole Cui^{1,2}, Fan Liu^{1,2}, Sunrui Zhang¹, Xiaoxin Cui¹
¹Peking University, China; ²Peng Cheng Lab, China

B1aL-03 Biomedical Analog to Digital Converters (Virtual Asia)

Time: Tuesday, May 31 (9:00-10:30)
Place: Room 3
Chair(s): Bo Zhao, *Zhejiang University*
Nicole McFarlane, *University of Tennessee Knoxville*

9:00

B1aL-03.1 A VCO-Based 2nd-Order Continuous Time Sigma-Delta Modulator for Current-Sensing Systems 2576
Yi-Ting Hsieh¹, Shih-Shuo Chang¹, Hao-Yun Lee¹, Ju-Yi Chen², Shuenn-Yuh Lee¹
¹*National Cheng Kung University, Taiwan;* ²*National Cheng Kung University Hospital, Taiwan*

9:18

B1aL-03.2 High-Pass Sigma-Delta Modulator with Operational Amplifier Sharing and Noise-Coupling Technique for Biomedical Signal Acquisition 2580
Hao-Yun Lee¹, Chia-Ho Kung¹, Po-Han Su¹, Ju-Yi Chen², Shuenn-Yuh Lee¹
¹*National Cheng Kung University, Taiwan;* ²*National Cheng Kung University Hospital, Taiwan*

9:36

B1aL-03.3 A 100dB-TCMRR 8-Channel Bio-Potential Front-End with Multi-Channel Common-Mode Replication 2584
Borui Tan, Sanfeng Zhang, Chen Gao, Xiong Zhou, Qiang Li
University of Electronic Science and Technology of China, China

B1aL-04 Sparsity, Adaptive Filtering and Data Fusion (Virtual Asia)

Time: Tuesday, May 31 (9:00-10:30)
Place: Room 4
Chair(s): Wei Xing Zheng, *Western Sydney University*
Wei Liu, *University of Sheffield*

9:00

B1aL-04.1 Robust Recovery of Sparse Signal from Compressed Measurements for Wireless Sensor Networks 2589
Ketan Atul Bapat, Mrityunjy Chakraborty
Indian Institute of Technology Kharagpur, India

9:18

B1aL-04.2 Robust Diffusion Average Strategy over Distributed Networks with Impulsive Link Noise 2594
Zhao Zhang¹, Sheng Zhang¹, Wei Xing Zheng²
¹*Southwest Jiaotong University, China;* ²*Western Sydney University, Australia*

9:36

B1aL-04.3 Adaptive Combination of Two Multi-Sample Multiband-Structured Subband Adaptive Filters 2599
Yishu Peng¹, Sheng Zhang¹, Wei Xing Zheng²
¹*Southwest Jiaotong University, China;* ²*Western Sydney University, Australia*

9:54

B1aL-04.4 Antenna Selection Design of Crossed-Dipole Arrays for Multi-Beam Multiplexing Based on a Hybrid Beamforming Structure 2604
Junwei Zhang, Wei Liu
University of Sheffield, United Kingdom

10:12

B1aL-04.5 Multi-Level Attention Fusion for Multimodal Driving Maneuver Recognition 2609
Jing Liu, Yang Liu, Chengwen Tian, Mengyang Zhao, Xinhua Zeng, Liang Song
Fudan University, China

B1aL-05 Late Breaking News III (Virtual Asia)

Time: Tuesday, May 31 (9:00-10:30)
Place: Room 5
Chair(s): Hoi Lee, *University of Texas at Dallas*

9:00

B1aL-05.1 A RISC-V-Based Research Platform for Rapid Design Cycle 2614
Esteban Garzón^{1,2}, Roman Golman¹, Odem Harel¹, Tzachi Noy¹, Yehuda Kra¹, Asaf Pollock¹, Slava Yuzhaninov¹,
Yonatan Shoshan¹, Yehuda Rudin¹, Yoav Weitzman¹, Marco Lanuzza², Adam Teman¹
¹Bar-Ilan University, Israel; ²University of Calabria, Italy

9:18

B1aL-05.2 A Bio-Mimetic Leaf Wetness Sensor 2616
Brian H. Nguyen, Gregory S. Gilbert, Marco Rolandi
University of California, Santa Cruz, United States

9:36

B1aL-05.3 Improving Pin Accessibility of Standard Cells through Fin Depopulation 2621
Doyeon Won, Taewhan Kim
Seoul National University, Korea

9:54

B1aL-05.4 Optimizing Timing in Placement through I/O Signal Flipping on Multi-Bit Flip-Flops 2623
Soomin Kim, Taewhan Kim
Seoul National University, Korea

B1aL-06 Power Electronics Circuit I (Virtual Asia)

Time: Tuesday, May 31 (9:00-10:30)
Place: Room 6
Chair(s): Xiaolu Li, *The City University of Hong Kong*

9:00

B1aL-06.1 A Wireless Power Transfer System with Regulated Receiver Based on LCC-S Compensation and Global Control 2625
Haoyu Cai, Yilin Zhao, Xian Tang
Tsinghua University, China

9:18

B1aL-06.2 A Current-Injection-Based Flying Capacitor Balancing Circuit for Three-Level DC-DC Converter 2630
Zhitong Chen, Shiyong Liu, Yong Chen, Xiaoya Fan, Yanzhao Ma
Northwestern Polytechnical University, China

9:36

B1aL-06.3 Achievement of CV and CC Output Modes on Class-E/F Inverter with One Auxiliary Switch 2635
Wenqi Zhu, Yutaro Komiyama, Kien Nguyen, Hiroo Sekiya
Chiba University, Japan

B2aL-01 SAR ADCs (Virtual Asia)

Time: Tuesday, May 31 (10:45-12:15)
Place: Room 1
Chair(s): Jusung Kim, *Hanbat National University*
 Thierry Taris, *University of Bordeaux*

10:45

B2aL-01.1 A Low-Input Capacitance 12-Bit SAR ADC for Use in Self-Powered IoT Nodes 2640

Nima Shahpari¹, Mehdi Habibi¹, Piero Malcovati², Jose M. de la Rosa³
¹*University of Isfahan, Iran;* ²*Università degli Studi di Pavia, Italy;* ³*Instituto de Microelectrónica de Sevilla IMSE-CNM CSIC and Universidad de Sevilla, Spain*

11:03

B2aL-01.2 Editable Asynchronous Control Logic for SAR ADCs 2645

Tian Lan, Fei Xia, Gang Mao, Shengqi Yu, Rishad Shafik, Alex Yakovlev
Newcastle University, United Kingdom

11:21

B2aL-01.3 A 3Bit/Cycle 1GS/s 8-Bit SAR ADC Employing Asynchronous Ping-Pong Quantization Scheme 2650

Yuekang Guo, Xiaoming Liu, Jing Jin, Jianjun Zhou
Shanghai Jiao Tong University, China

11:39

B2aL-01.4 A 2.5-GS/s Time-Interleaved SAR-Assisted Ringamp-Based Pipelined ADC with Digital Background Calibration 2655

Jingchao Lan¹, Danfeng Zhai¹, Yongzhen Chen², Zhekan Ni³, Xingchen Shen¹, Fan Ye¹, Junyan Ren¹
¹*Fudan University, China;* ²*Tongji University, China;* ³*Hangzhou Dianzi University, China*

11:57

B2aL-01.5 An Auxiliary-Loop-Enhanced Fast-Transient FVF LDO as Reference Buffer of a SAR ADC 2660

Yi Zeng, Chi-Hang Chan, Yan Zhu, Rui P. Martins
University of Macau, China

B2aL-02 Digital Circuits, Systems and Architectures for Machine Learning II (Virtual Asia)

Time: Tuesday, May 31 (10:45-12:15)
Place: Room 2
Chair(s): Yeong-Kang Lai, *National Chung Hsing University*
 Yuan Du, *Nanjing University*

10:45

B2aL-02.1 A Real Time Super Resolution Accelerator with Tilted Layer Fusion 2665

An-Jung Huang, Kai-Chieh Hsu, Tian-Sheuan Chang
National Yang Ming Chiao Tung University, Taiwan

11:03

B2aL-02.2 An Efficient Hardware Accelerator for Sparse Transformer Neural Networks 2670

Chao Fang¹, Shouliang Guo¹, Wei Wu¹, Jun Lin¹, Zhongfeng Wang¹, Ming Kai Hsu², Lingzhi Liu²
¹*Nanjing University, China;* ²*Kuaishou Technology, United States*

11:21

B2aL-02.3 PCFBCD: An Innovative Approach to Accelerating Collaborative Filtering 2675

Bin Zhang, Haitao Du, Song Chen, Yi Kang
University of Science and Technology of China, China

- 11:39
B2aL-02.4 **0.08mm² 128nW MFCC Engine for Ultra-Low Power, Always-on Smart Sensing Applications** 2680
 Yi Sheng Chong¹, Wang Ling Goh¹, Yew Soon Ong¹, Vishnu P. Nambiar², Anh Tuan Do²
¹Nanyang Technological University, Singapore; ²Agency for Science, Technology and Research, Singapore
- 11:57
B2aL-02.5 **A Reconfigurable Approach for Deconvolutional Network Acceleration with Fast Algorithm** 2685
 Peixiang Yang, Wendong Mao, Zhongfeng Wang, Jun Lin
 Nanjing University, China
- B2aL-03 Biomedical Circuits and Systems (Virtual Asia)**
Time: Tuesday, May 31 (10:45-12:15)
Place: Room 3
Chair(s): Joseph Chang, Nanyang Technological University
 Nicole McFarlane, University of Tennessee Knoxville
- 10:45
B2aL-03.1 **An Event-Driven Compressive Neuromorphic System for Cardiac Arrhythmia Detection** 2690
 Jinbo Chen^{1,2}, Fengshi Tian^{2,3}, Jie Yang², Mohamad Sawan²
¹Zhejiang University, China; ²Westlake University, China; ³Hong Kong University of Science and Technology, China
- 11:03
B2aL-03.2 **NIMBLE: A Neuromorphic Learning Scheme and Memristor Based Computing-In-Memory Engine for EMG Based Hand Gesture Recognition** 2695
 Fengshi Tian, Jingwen Jiang, Jinhao Liang, Zhiyuan Zhang, Jiahe Shi, Chaoming Fang, Hui Wu, Xiaoyong Xue, Xiaoyang Zeng
 Fudan University, China
- 11:21
B2aL-03.3 **An Alignment-Based Hardware Accelerator for Rapid Prediction of RNA Secondary Structures** 2700
 Shih-Shiuan Weng¹, Yang-Ming Yeh¹, Yu-Cheng Li², Yi-Chang Lu¹
¹National Taiwan University, Taiwan; ²Academia Sinica, Taiwan
- 11:39
B2aL-03.4 **Design of a Multi-Mode Animal Behavior Analysis System with Dual-View Video and Wireless Bio-Potential Acquisition** 2705
 Jiaxin Lei¹, Shimeng Wang¹, Weining Li¹, Deng Luo¹, Xiaoyan Ma², Dandan Hui², Zhe Zhao¹, Xiong Zhong², Milin Zhang¹
¹Tsinghua University, China; ²Beijing Ningju Technology, China
- 11:57
B2aL-03.5 **A 16-Channel Neural Recorder with 2.8 nJ/Bit, 971.4 kbps Sub-2.4 GHz Polar Transmitter** 2710
 Wei Song¹, Heng Huang¹, Yusong Wu¹, Xiliang Liu², Chao Sun², Zijian Tang¹, Xiaoyan Ma², Tianhe Jiang², Xiong Zhong², Milin Zhang¹
¹Tsinghua University, China; ²Beijing Ningju Technology Co., Ltd., China

B2aL-04 Pattern Recognition, Deep Learning and Learning Systems I (Virtual Asia)

Time: Tuesday, May 31 (10:45-12:15)
Place: Room 4
Chair(s): Yongxiang Xia, Hangzhou Dianzi University

10:45

B2aL-04.1 RGBD-Based Hardware Friendly Head Pose Estimation System via Convolutional Attention Module 2715
Yen-Yu Cheng, Ching-Te Chiu, Yi-Fan Chen
National Tsing Hua University, Taiwan

11:03

B2aL-04.2 S-SIM: A Simulator for Systolic Array-Based DNN Accelerators with Tile Access Awareness 2720
Yuhang Li, Mei Wen, Renyu Yang, Junzhong Shen, Yasong Cao, Jianan Wang
National University of Defense Technology, China

11:21

B2aL-04.3 A Heterogeneous FPGA-Based Accelerator Design for Efficient and Low-Cost Point Clouds Deep Learning Inference 2725
Jinling Xu¹, Yonggui Wang², Wenbiao Zhou¹
¹Beijing Institute of Technology, China; ²Zhejiang Qianjiang Robot Co., China

11:39

B2aL-04.4 CSL-YOLO: A Cross-Stage Lightweight Object Detector with Low FLOPs 2730
Yu-Ming Zhang¹, Chun-Chieh Lee¹, Jun-Wei Hsieh², Kuo-Chin Fan¹
¹National Central University, Taiwan; ²National Yang Ming Chiao Tung University, Taiwan

11:57

B2aL-04.5 Music to Dance: Motion Generation Based on Multi-Feature Fusion Strategy 2735
Yufei Gao¹, Wenxin Yu¹, Xuwen Zhang¹, Xin Deng¹, Zhiqiang Zhang²
¹Southwest University of Science and Technology, China; ²Hosei University, Japan

B2aL-05 Oscillators and Synthesizers (Virtual Asia)

Time: Tuesday, May 31 (10:45-12:15)
Place: Room 5
Chair(s): Luis Oliveira, Universidade Nova de Lisboa
Sohmyung Ha, New York University Abu Dhabi

10:45

B2aL-05.1 A Class-C Injection-Locked Tripler with 48 dB Sub-Harmonic Suppression and 15 fs Additive RMS Jitter in 0.13 μ m BiCMOS Process 2740
Sonam Sadhukhan^{1,2}, Pranav Kumar², Arpan Thakkar², Apoorva Bhatia², Saurabh Saxena¹
¹Indian Institute of Technology Madras, India; ²Texas Instruments Pvt. Ltd., India

11:03

B2aL-05.2 A 24 GHz FMCW/Doppler Dual-Mode Frequency Synthesizer with 68.8 kHz RMS FM Error and 1.25 GHz Chirp Bandwidth
Jinge Li¹, Chunqi Shi¹, Zhaoqi Chen¹, Runxi Zhang¹, Hao Deng², Jinghong Chen²
¹East China Normal University, China; ²University of Houston, United States

11:21

B2aL-05.3 A Quantization Noise Reduction Method for Delta-Sigma Fractional-N PLLs Using Cascaded Injection-Locked Oscillators
Liqun Feng, Woogeun Rhee, Zhihua Wang
Tsinghua University, China

11:39
B2aL-05.4 A Fast Locking Ring Oscillator Based Fractional-N DPLL with an Assistance from a LUT-Based FSM 2745
Zeeshan Ali, Pallavi Paliwal, Rupesh Lad, Dhanraj Bhukya, Shalabh Gupta
Indian Institute of Technology Bombay, India

11:57
B2aL-05.5 A Type-3 FMCW Radar Synthesizer with Wide Frequency Modulation Bandwidth 2750
Cheng-Tang Chen, Yu-Hong Yang, Tai-Cheng Lee
National Taiwan University, Taiwan

B2aL-06 Energy Harvesting II (Virtual Asia)

Time: Tuesday, May 31 (10:45-12:15)
Place: Room 6
Chair(s): Junrui Liang, *Shanghaitech University*

10:45
B2aL-06.1 A Dickson Hybrid Boost Converter with On-Chip Cold-Start for Thermoelectric Energy Harvesting 2754
Chenkang Xue, Lijie Shao, Linhu Zhao, Xu Yang, Hang Zhou, Yuqiu Lin,
Yong Ding, Wuhua Li, Wanyuan Qu
Zhejiang University, China

11:03
B2aL-06.2 Performance Enhancement with a Capacitor-Scaling Design for SSHC Piezoelectric Energy Harvesting Interfaces 2758
Yiwei Zou, Sijun Du
Delft University of Technology, The Netherlands

11:21
B2aL-06.3 A Battery-Free Pavement Roughness Estimation System Based on Kinetic Energy Harvesting 2763
Hailiang Yang, Li Teng, Junrui Liang
ShanghaiTech University, China

11:39
B2aL-06.4 A Cross Regulation Reduced Multi-Output and Multi-VCR Piezoelectric Energy Harvesting System Using Shared Capacitors 2768
Jing Wang¹, Zhiyuan Chen¹, Junrui Liang², Xu Cheng¹, Jun Han¹, Xiaoyang Zeng¹
¹Fudan University, China; ²ShanghaiTech University, China

11:57
B2aL-06.5 Sub-50-mV Charge Pump and its Driver for Extremely Low-Voltage Thermal Energy Harvesting 2773
Hikaru Sebe, Daisuke Kanemoto, Tetsuya Hirose
Osaka University, Japan

B3aL-01 Nyquist Converters (Virtual Asia)

Time: Tuesday, May 31 (14:00-15:30)
Place: Room 1
Chair(s): Qiang Li, *University of Electronic Science and Technology of China*
Nuno Paulino, *Universidade Nova de Lisboa*

14:00
B3aL-01.1 Ultra Compact and Linear 4-Bit Digital-to-Analog Converter in 22nm FDSOI Technology 2778
Hossein Eslahi¹, Tara J. Hamilton², Sourabh Khandelwal¹
¹Macquarie University, Australia; ²University of Technology Sydney, Australia

14:18	B3aL-01.2	A 12-Bit Segmented Current-Steering DAC with High-Speed Deserializer	2782
		Rongxing Qin, Fei You, Mingming Ma, Qian He, Songbai He <i>University of Electronic Science and Technology of China, China</i>	
14:36	B3aL-01.3	Zero-Crossing-Prediction-Based Single-Slope ADC with a Constant Charge Bias Amplifier for Low Power Image Sensors	2787
		Keunyeol Park, Hohyeon Lee, Soo Youn Kim <i>Dongguk University, Korea</i>	
14:54	B3aL-01.4	Analysis of Flash ADC Loading on the Performance of a Continuous-Time Pipelined ADC	2792
		Chaitanya Kumar, Saravana Manivannan, Shanthi Pavan <i>Indian Institute of Technology Madras, India</i>	
15:12	B3aL-01.5	Generalized Resistive DAC Analysis through Unitized T-Network Element	2797
		Bharath T., Rohit Narula, Preetam Tadeparthy <i>Texas Instruments India Pvt Ltd, India</i>	
	B3aL-02	Digital Circuits, Systems and Architectures for Machine Learning III (Virtual Asia)	
	<i>Time:</i>	Tuesday, May 31 (14:00-15:30)	
	<i>Place:</i>	Room 2	
	<i>Chair(s):</i>	Hongbin Sun, <i>Xian Jiaotong University</i> Robert Chen-Hao Chang, <i>National Chung Hsing University</i>	
14:00	B3aL-02.1	An Efficient Hardware Architecture for DNN Training by Exploiting Triple Sparsity	2802
		Jian Huang, Jinming Lu, Zhongfeng Wang <i>Nanjing University, China</i>	
14:18	B3aL-02.2	NNASIM: An Efficient Event-Driven Simulator for DNN Accelerators with Accurate Timing and Area Models	2806
		Xiaoling Yi ¹ , Jiangnan Yu ¹ , Zheng Wu ¹ , Xiankui Xiong ^{2,3} , Dong Xu ^{2,3} , Chixiao Chen ¹ , Jun Tao ¹ , Fan Yang ¹ ¹ <i>Fudan University, China</i> ; ² <i>ZTE Corporation, China</i> ; ³ <i>State Key Laboratory of Mobile Network and Mobile Multimedia Technology, China</i>	
14:36	B3aL-02.3	A High-Speed Codec Architecture for Lagrange Coded Computing	2811
		Bohang Xiong, Jing Tian, Zhongfeng Wang <i>Nanjing University, China</i>	
14:54	B3aL-02.4	A 11.6μW Computing-on-Memory-Boundary Keyword Spotting Processor with Joint MFCC-CNN Ternary Quantization	2816
		Xinru Jia ¹ , Haozhe Zhu ¹ , Yunzhengmao Wang ¹ , Jinshan Zhang ¹ , Feng Lin ¹ , Xiankui Xiong ³ , Dong Xu ³ , Chixiao Chen ^{1,2,3} , Qi Liu ¹ ¹ <i>Fudan University, China</i> ; ² <i>Jihua Laboratory, China</i> ; ³ <i>ZTE Corporation, China</i>	
15:12	B3aL-02.5	BSRA: Block-Based Super Resolution Accelerator with Hardware Efficient Pixel Attention	2821
		Dun-Hao Yang, Tian-Sheuan Chang <i>National Yang Ming Chiao Tung University, Taiwan</i>	

B3aL-03 Intelligent Micro-Sensor Techniques for Continuous Health Monitoring II (Virtual Asia)

Time: Tuesday, May 31 (14:00-15:30)
Place: Room 3
Chair(s): Hanjun Jiang, *Tsinghua University*
Yuanjin Zheng, *Nanyang Technological University*

14:00

B3aL-03.1 An Ultra Compact Neural Front-End with CT-NEO Based Spike Detection for Implantable Applications 2826
Tongtong Guo, Huaiyu Liu, Yan Liu
Shanghai Jiao Tong University, China

14:18

B3aL-03.2 A High Resolution Chemical Sensing Front-End with Integrated Sigma Delta Quantisation 2831
Xiuli Zhang, Jinge Ma, Yuanqi Hu
Beihang University, China

14:36

B3aL-03.3 Photoacoustic Dual-Mode Microsensor Based on PMUT Technology 2836
Yiyun Wang¹, Junxiang Cai^{1,2,3}, Tao Wu^{1,2,3}, Fei Gao¹
¹*ShanghaiTech University, China*; ²*Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, China*; ³*University of Chinese Academy of Sciences, Beijing, China*

14:54

B3aL-03.4 Pulse Transition Characterization from Electrocardiography and Photoplethysmography for Non-Invasive Blood Pressure Estimation 2841
Hazem Mohammed^{1,2}, Hao Wu³, Guoxing Wang¹
¹*Shanghai Jiao Tong University, China*; ²*Shanghai Jiao Tong University and Assiut University, China*; ³*Shenzhen University, China*

15:12

B3aL-03.5 Organic Thin-Film Transistor Technology for Flexible Analog Front-End Towards Wearable Sensors N/A
Li'ang Deng, Wei Tang, Sujie Chen
Shanghai Jiao Tong University, China

B3aL-04 Pattern Recognition, Deep Learning and Learning Systems II (Virtual Asia)

Time: Tuesday, May 31 (14:00-15:30)
Place: Room 4
Chair(s): Xiaolu Li, *The City University of Hong Kong*
Jörg Velten, *Bergische University Wuppertal*

14:00

B3aL-04.1 A Question Embedding-Based Method to Enrich Features for Knowledge Base Question Answering 2851
Xin Wang^{1,2}, Meng Lin², Qianqian Lu²
¹*University of Chinese Academy of Sciences, China*; ²*Chinese Academy of Sciences, China*

14:18

B3aL-04.2 A Point Matching Strategy of 3D Loss Function for Single RGB Images Deep Mesh Reconstruction 2856
Xin Deng, Ning Jiang, Shiyu Chen, Jiarui Cheng, Yufei Gao, Wenxin Yu
Southwest University of Science and Technology, China

14:36	B3aL-04.3	SFCN: Spoon Fully Convolutional Networks for Pulse Localization	2861
		Bohong Yang ¹ , Kai Meng ¹ , Hong Lu ¹ , Xing Zhu ² , Jingjing Luo ^{1,2} <i>¹Fudan University, China; ²Jihua Laboratory, China</i>	
14:54	B3aL-04.4	Hybrid Uncalibrated Near-Light Photometric Stereo in Realistic Environment	2866
		Wu Ran ¹ , Xingsong Liu ¹ , Wang Feng ¹ , Hong Lu ¹ , Bohong Yang ¹ , Xing Zhu ² , Jingjing Luo ^{1,2} <i>¹Fudan University, China; ²Jihua Laboratory, China</i>	
15:12	B3aL-04.5	Mixed-Precision Quantization of U-Net for Medical Image Segmentation	2871
		Liming Guo, Wen Fei, Wenrui Dai, Chenglin Li, Junni Zou, Hongkai Xiong <i>Shanghai Jiao Tong University, China</i>	
	B3aL-05	Synthesizable and Programmable Analog Circuits (Virtual Asia)	
	<i>Time:</i>	Tuesday, May 31 (14:00-15:30)	
	<i>Place:</i>	Room 5	
	<i>Chair(s):</i>	Sohmyung Ha, <i>New York University Abu Dhabi</i> Raafat Lababidi, <i>ENSTA Bretagne</i>	
14:00	B3aL-05.1	A Fully Synthesizable Dynamic Latched Comparator with Reduced Kickback Noise	2876
		Min Li, Jue Wang, Xu Cheng, Xiaoyang Zeng <i>Fudan University, China</i>	
14:18	B3aL-05.2	A Ring-Oscillator Sub-Sampling PLL with Hybrid Loop Using Generator-Based Design Flow	2881
		Zhongkai Wang ¹ , Minsoo Choi ² , John Wright ¹ , Kyoungtae Lee ³ , Zhaokai Liu ¹ , Bozhi Yin ¹ , Jaeduk Han ⁴ , Sijun Du ⁵ , Elad Alon ¹ <i>¹University of California, Berkeley, United States; ²Samsung Semiconductor, United States; ³University of California at San Francisco, United States; ⁴Hanyang University, Korea; ⁵Delft University of Technology, The Netherlands</i>	
14:36	B3aL-05.3	A Batch Bayesian Optimization Approach for Analog Circuit Synthesis Based on Multi-Points Selection Criterion	2886
		Xu Fu ¹ , Changhao Yan ¹ , Zhaori Bi ¹ , Fan Yang ¹ , Dian Zhou ² , Xuan Zeng ¹ <i>¹Fudan University, China; ²The University of Texas at Dallas, United States</i>	
14:54	B3aL-05.4	Variation-Aware Analog Circuit Sizing in Carbon Nanotube	2891
		Zahra Heshmatpour, Lihong Zhang, Howard M. Heys <i>Memorial University of Newfoundland, Canada</i>	
15:12	B3aL-05.5	Fogging-Effect-Aware Mixed-Signal IC Placement with Reinforcement Learning	2895
		Mohammad Hajjafari, Mehrnaz Ahmadi, Zhenxin Zhao, Lihong Zhang <i>Memorial University of Newfoundland, Canada</i>	

B3aL-06 Power IC Design III (Virtual Asia)

Time: Tuesday, May 31 (14:00-15:30)

Place: Room 6

Chair(s): Junmin Jiang, *Southern University of Science and Technology*

14:00

B3aL-06.1 A Hybrid Boost Converter with Regulated Flying Capacitor Voltage and Reduced Inductor Current for LED Lighting 2900

Chuang Wang^{1,2}, Zixiao Lin¹, Yan Lu¹, Xiuping Li², Rui P. Martins^{1,3}

¹*University of Macau, China;* ²*Beijing University of Posts and Telecommunications, China;* ³*Instituto Superior Técnico, Universidade de Lisboa, China*

14:18

B3aL-06.2 A Novel Constant Current Control Strategy with Seamless Switching between CC and CV 2905

Yue Shi^{1,2}, Xue Ai¹, Junyuan Rong¹, Zekun Zhou¹, Bo Zhang¹

¹*University of Electronic Science and Technology of China, China;* ²*Chengdu University of Information Technology, China*

14:36

B3aL-06.3 A High-Voltage Inverting Converter Based on COT Controlled Buck Regulator with On-Chip Ripple Compensation Technique 2909

Yanzhao Ma¹, Zhitong Chen¹, Xiaoxu Chen¹, Xue Xia², Long Zhang², Xiaoya Fan¹

¹*Northwestern Polytechnical University, China;* ²*Xi'an Aerosemi Technology, China*

14:54

B3aL-06.4 A 6.78MHz Regulating Rectifier with Constant On-Time Control for High Resolution and Ultra-Fast Transient Response 2914

Kai Cui, Yufei Sun, Xiaoya Fan, Yanzhao Ma

Northwestern Polytechnical University, China

15:12

B3aL-06.5 Triple Binary SAR Control in Distributive Digital Low Dropout Regulators for 3.6ns Fast Transient Response and 0.4mV Low Output Voltage Ripple 2919

Bo-Kuan Wu¹, Tzu-Ying Wu¹, Sheng Cheng Lee¹, Ke-Horng Chen¹, Ying-Hsi Lin², Shian-Ru Lin², Tsung-Yen Tsai²

¹*National Chiao Tung University, Taiwan;* ²*Realtek Semiconductor Corp, Taiwan*

B4aL-01 Amplifiers (Virtual Asia)

Time: Tuesday, May 31 (15:45-17:15)

Place: Room 1

Chair(s): Mohamad Sawan, *Westlake University*

Roberto Gomez-Garcia, *Universidad de Alcala*

15:45

B4aL-01.1 A 40-nm CMOS Wide Input Range and Variable Gain Time-Difference Amplifier Based on Current Source Architecture 2923

Li Lin, Lean Karlo S. Tolentino, Chua-Chin Wang

National Sun Yat-sen University, Taiwan

16:03

B4aL-01.2 An Accurate Modelling of CMOS Folded Cascode Op-Amp with Negative Transconductance 2928

Krishnanunni B., Devraj M. Rajagopal, Rohan Sinha

Texas Instruments Inc., India

16:21	B4aL-01.3	A Synthesis Friendly Dynamic Amplifier with Fuzzy-Logic Piecewise-Linear Calibration	2933
		Jiawei Wang, Jue Wang, Xu Cheng, Jun Han, Xiaoyang Zeng <i>Fudan University, China</i>	
16:39	B4aL-01.4	Using the Miller Theorem to Analyze Two-Stage Miller-Compensated Opamps	2938
		R.S. Ashwin Kumar <i>Indian Institute of Technology Kanpur, India</i>	
16:57	B4aL-01.5	Bandwidth-Enhanced Feed-Forward Amplifier with Shared Class-AB Gain and Compensation Paths	2943
		Mayank Anupam, Harshit Rathore, Imon Mondal <i>Indian Institute of Technology Kanpur, India</i>	
	B4aL-02	Memory and Compute-in-Memory Circuits and Architectures III (Virtual Asia)	
<i>Time:</i>		Tuesday, May 31 (15:45-17:15)	
<i>Place:</i>		Room 2	
<i>Chair(s):</i>		Yuan Du, <i>Nanjing University</i> Tony Tae-Hyoung Kim, <i>Nanyang Technological University</i>	
15:45	B4aL-02.1	An Automated Approach to Compare Bit Serial and Bit Parallel In-Memory Computing for DNNs	2948
		Alok Parmar ¹ , Kailash Prasad ² , Nanditha Rao ¹ , Joycee Mekie ² ¹ <i>International Institute of Information Technology Bangalore, India;</i> ² <i>Indian Institute of Technology Gandhinagar, India</i>	
16:03	B4aL-02.2	Edge Computation-in-Memory for In-Situ Class-Incremental Learning with Knowledge Distillation	2953
		Shinsei Yoshikiyo, Naoko Misawa, Chihiro Matsui, Ken Takeuchi <i>The University of Tokyo, Japan</i>	
16:21	B4aL-02.3	Recovering Accuracy of RRAM-Based CIM for Binarized Neural Network via Chip-in-the-Loop Training	2958
		Yi Sheng Chong ¹ , Wang Ling Goh ¹ , Yew Soon Ong ¹ , Vishnu P. Nambiar ² , Anh Tuan Do ² ¹ <i>Nanyang Technological University, Singapore;</i> ² <i>Agency for Science, Technology and Research, Singapore</i>	
16:39	B4aL-02.4	Compute-in-Memory Using 6T SRAM for a Wide Variety of Workloads	2963
		Pramod Kumar Bharti ¹ , Saurabh Jain ² , Kamlesh R. Pillai ² , Sagar Varma Sayyaparaju ² , Gurpreet S. Kalsi ² , Joycee Mekie ¹ , Sreenivas Subramoney ² ¹ <i>Indian Institute of Technology Gandhinagar, India;</i> ² <i>Intel Labs, India</i>	
16:57	B4aL-02.5	PSCNN: A 885.86 TOPS/W Programmable SRAM-Based Computing-in-Memory Processor for Keyword Spotting	2968
		Shu-Hung Kuo, Tian-Sheuan Chang <i>National Yang Ming Chiao Tung University, Taiwan</i>	

B4aL-03 Multimedia Systems and Applications II (Virtual Asia)

Time: Tuesday, May 31 (15:45-17:15)

Place: Room 3

Chair(s): Hong-Han Shuai, *National Yang Ming Chiao Tung University*

15:45

B4aL-03.1 **INIT: inpainting Network for Incomplete Text** 2973

Fanfu Xue, Jia Zhang, Jiande Sun, Jinghui Yin, Liming Zou, Jing Li

Shandong Normal University, China

16:03

B4aL-03.2 **An 81.92Gpixels/s Fast Reconstruction of Images from Compressively Sensed Measurements** 2978

Jiayao Xu, Pham Do Kim Chi, Chen Fu, Jinjia Zhou

Hosei University, Japan

16:21

B4aL-03.3 **The Hierarchical Ensemble Model for Network Intrusion Detection in the Real-World Dataset** 2983

Lei Chen, Shao-En Weng, Chu-Jun Peng, Yin-Chi Li, Hong-Han Shuai, Wen-Huang Cheng

National Yang Ming Chiao Tung University, Taiwan

16:39

B4aL-03.4 **Collaborative Scalable Visual Compression for Human-Centered Videos** 2988

Haofeng Huang¹, Wenhan Yang¹, Wei Xiang², Jiaying Liu¹, Ling-Yu Duan¹

¹*Peking University, China*; ²*Bigo Technology, Singapore*

16:57

B4aL-03.5 **Multi-Concept Mining for Video Captioning Based on Multiple Tasks** 2993

Qinyu Zhang¹, Pengjie Tang², Hanli Wang^{1,3}, Jinjing Gu¹

¹*Tongji University, China*; ²*Jinggangshan University, China*; ³*Frontiers Science Center for Intelligent Autonomous Systems, China*

B4aL-04 Neural Systems Based on Emerging Device and Circuit Technologies II (Virtual Asia)

Time: Tuesday, May 31 (15:45-17:15)

Place: Room 4

Chair(s): Mohsin M. Jamali, *The University of Texas Permian Basin*

15:45

B4aL-04.1 **Automated Quantization Range Mapping for DAC/ADC Non-Linearity in Computing-in-Memory** 2998

Chi-Tse Huang, Yu-Chuan Chuang, Ming-Guang Lin, An-Yeu Wu

National Taiwan University, Taiwan

16:03

B4aL-04.2 **SpikingSIM: A Bio-Inspired Spiking Simulator** 3003

Junwei Zhao¹, Shiliang Zhang¹, Lei Ma^{1,2}, Zhaofei Yu¹, Tiejun Huang^{1,2}

¹*Peking University, China*; ²*Beijing Academy of Artificial Intelligence, China*

16:21

B4aL-04.3 **Multi-View RGB-D Based 3D Point Cloud Face Model Reconstruction System** 3008

Jie-Yu Luo, Ching-Te Chiu, An-Ting Hsieh

National Tsing Hua University, Taiwan

- 16:39
B4aL-04.4 Efficient Neural Networks with Spatial Wise Sparsity Using Unified Importance Map 3013
 Chen Tang¹, Wenyu Sun², Wenxun Wang¹, Zhuqing Yuan¹, Yongpan Liu¹
¹Tsinghua University, China; ²Tsinghua Shenzhen International Graduate School, China
- 16:57
B4aL-04.5 Bayesian Deep Active Learning for Analog Circuit Performance Classification 3018
 Lining Zhang, Salahuddin Raju, Ashish James, Rahul Dutta, Gregoire Fournier, Damien Lancry,
 Kevin Chair Tshun Chuan, Vijay Ramaseshan Chandrasekhar, Chuan Sheng Foo
 Agency for Science, Technology and Research, Singapore
- B4aL-05 Image/Video Coding and Standardization (Virtual Asia)**
 Time: Tuesday, May 31 (15:45-17:15)
 Place: Room 5
 Chair(s): Heming Sun, Waseda University, Japan
- 15:45
B4aL-05.1 LCU-Level Rate-Distortion Optimization for Versatile Video Coding 3023
 Gencheng Xu¹, Shiyu Jin¹, Kaicheng Tang¹, Zijing Zhang¹, Yimin Zhou²
¹University of Electronic Science and Technology of China, China;
²Chengdu University of Information Technology, China
- 16:03
B4aL-05.2 Fast Intra Mode Decision for VVC Based on Histogram of Oriented Gradient 3028
 Aorui Gou¹, Heming Sun^{2,3}, Jiro Katto¹, Tingting Li¹, Xiaoyang Zeng¹, Yibo Fan¹
¹Fudan University, China; ²Waseda University, Japan; ³JST PRESTO, Japan
- 16:21
B4aL-05.3 An Online SVM Based VVC Intra Fast Partition Algorithm with Pre-Scene-Cut Detection 3033
 Chao Shu, Chao Yang, Ping An
 Shanghai University, China
- 16:39
B4aL-05.4 An Optimization Algorithm for Color Table Coding of Palette for VVC Based on DPCM and CCLP 3038
 Minghong Mo¹, Fan Liang^{1,2}, Jun Wang^{1,3}
¹Sun Yat-sen University, China; ²Peng Cheng Laboratory, China; ³Southern Marine Science and Engineering Guangdong Laboratory, China
- 16:57
B4aL-05.5 Hierarchical Coding for Talking-Head Video 3043
 Yu Liu¹, Shibo Li¹, Shuyuan Zhu¹, Siu-Kei Au Yeung², Xing Wen³, Bing Zeng¹
¹University of Electronic Science and Technology of China, China;
²Hong Kong Metropolitan University, China; ³Kuaishou, China
- B4aL-06 Single-Physical Entity Ultra-Subminiature Power Management for Next-Generation Internet-of-Things (Virtual Asia)**
 Time: Tuesday, May 31 (15:45-17:15)
 Place: Room 6
 Chair(s): Victor Adrian, Nanyang Technological University (NTU), Singapore
- 15:45
B4aL-06.1 A 0.6V 150mA 4-Stage Output-Capacitorless LDO Regulator Using Feedforward with Embedded Miller-RC Compensation 3048
 Jinhen Lee, Pak Kwong Chan
 Nanyang Technological University, Singapore

16:03
B4aL-06.2 **An Integrated DC-DC Converter with Novel Asymmetrical Segmented Power-Stages for Sustained High Power-Efficiencies** 3053
Jinhen Lee, Victor Adrian, Joseph Chang, Yin Sun, Sun-Yang Tay
Nanyang Technological University, Singapore

16:21
B4aL-06.3 **A Dual-Mode Seamless Transition Low-Dropout Regulator with Improved Load Transient Response for RF Energy-Harvesting Application** 3058
Tzu-Yu Tzeng¹, Sheng Cheng Lee¹, Ke-Horng Chen¹, Ying-Hsi Lin², Shian-Ru Lin², Tsung-Yen Tsai²
¹National Yang Ming Chiao Tung University, Taiwan; ²Realtek Semiconductor Corp, Taiwan

16:39
B4aL-06.4 **A Versatile and Accurate Vector-Based Method for Modeling and Analyzing Planar Air-Core Inductors** 3063
Sun-Yang Tay, Victor Adrian, Joseph Chang, Jinhen Lee, Bah-Hwee Gwee
Nanyang Technological University, Singapore

16:57
B4aL-06.5 **Two-Stage Energy Efficiency Optimization of Switched-Capacitor Converters for IoT Systems** 3068
Yuanchen Qu¹, Lu Wang¹, Qingfu Xu², Pingqiang Zhou¹
¹ShanghaiTech University, China; ²Guangxi Normal University, China

C1aL-01 Microwave and RF Circuits (Virtual Asia)

Time: Wednesday, June 1 (9:00-10:30)
Place: Room 1
Chair(s): Jusung Kim, *Hanbat National University*
Thierry Taris, *University of Bordeaux*

9:00
C1aL-01.1 **Wide-Band Inductorless and Capacitorless LNTA Based on Cascode Inverters** 3073
Cong Tao, Liangbo Lei, Zhiliang Hong, Yumei Huang
Fudan University, China

9:18
C1aL-01.2 **An X-Band Phase Detector Based on Quadrature Modulation in 28-nm CMOS** 3077
Chengqiang Zhao, Wuyu Fan, Jingjing Lv, Li Du, Yuan Du
Nanjing University, China

9:36
C1aL-01.3 **A Dual-Band Vector-Sum Phase Shifter for 28-GHz and 60-GHz Phased Arrays in 65-nm CMOS** 3082
Haibo Yang, Yiming Yu, Chenxi Zhao, Huihua Liu, Yunqiu Wu, Kai Kang
University of Electronic Science and Technology of China, China

9:54
C1aL-01.4 **A Threshold Voltage Tracking Circuit Providing up to 20dB Improvement in IIP2 of Single-Ended Passive Mixers** 3087
Kasyap V. Karun¹, Gajendranath Chowdary²
¹Qualcomm Technologies, India; ²Indian Institute of Technology Hyderabad, India

10:12
C1aL-01.5 **Design of 2.87 GHz Frequency Synthesizer with Programmable Sweep for Diamond Color Defect Based CMOS Quantum Sensing Applications** 3092
Adithya Sunil Edakkadan¹, Kasturi Saha², Maryam Shojaei Baghini², Abhishek Srivastava¹
¹International Institute of Information Technology Hyderabad, India; ²Indian Institute of Technology Bombay, India

C1aL-02 Digital Circuits, Systems and Architectures for Machine Learning IV (Virtual Asia)

Time: Wednesday, June 1 (9:00-10:30)
Place: Room 2
Chair(s): Hao Zhang, *Ocean University of China*
Chip Hong Chang, *Nanyang Technological University*

9:00

C1aL-02.1 An Automated Compiler for RISC-V Based DNN Accelerator 3097

Zheng Wu¹, Wuzhen Xie¹, Xiaoling Yi¹, Haitao Yang¹, Ruiyao Pu¹, Xiankui Xiong^{2,3},
Haidong Yao^{2,3}, Chixiao Chen¹, Jun Tao¹, Fan Yang¹
¹Fudan University, China; ²ZTE Corporation, China; ³State Key Laboratory of Mobile Network and
Mobile Multimedia Technology, China

9:18

C1aL-02.2 Algorithm-Hardware Co-Optimization for Cost-Efficient ML-Based ISP Accelerator 3102

Dongyoung Rim, Hyeokjun Kwon, Youngjoo Lee
Pohang University of Science and Technology, Korea

9:36

C1aL-02.3 Dynamically Swappable Digit-Serial Multi-Precision Deep Neural Network Accelerator with Early Termination 3107

Shen-Fu Hsiao, Hung-Ching Li, Yu-Che Yen, Po-Chang Li
National Sun Yat-sen University, Taiwan

9:54

C1aL-02.4 An Ultra Energy Efficient Streaming-Based FPGA Accelerator for Lightweight Neural Network 3111

Shaoyi Chen^{1,2,4}, Zhiqi Zhou^{1,4}, Yajun Ha^{1,3}
¹ShanghaiTech University, China; ²Shanghai Institute of Technical Physics, Chinese Academy of Sciences,
China; ³Shanghai Engineering Research Center of Energy Efficient and Custom AI IC, China;
⁴University of Chinese Academy of Sciences, China

10:12

C1aL-02.5 Variable-Precision Approximate Floating-Point Multiplier for Efficient Deep Learning Computation

Hao Zhang¹, Seok-Bum Ko²
¹Ocean University of China, China; ²University of Saskatchewan, Canada

C1aL-03 Multimedia Systems and Applications III (Virtual Asia)

Time: Wednesday, June 1 (9:00-10:30)
Place: Room 3
Chair(s): Dong Liu, *University of Science and Technology of China*

9:00

C1aL-03.1 Approximate In-Memory Computing Using Memristive ImPLY Logic and its Application to Image Processing 3115

Seyed Erfan Fatemieh¹, Mohammad Reza Reshadinezhad¹, Nima TaheriNejad²
¹University of Isfahan, Iran; ²Technische Universität Wien, Austria

9:18

C1aL-03.2 Meta-Interpolation: Time-Arbitrary Frame Interpolation via Dual Meta-Learning 3120

Shixing Yu¹, Yiyang Ma¹, Wenhan Yang¹, Wei Xiang², Jiaying Liu¹
¹Peking University, China; ²Bigo Technology, Singapore

9:36

C1aL-03.3 Spatio-Temporal Super-Resolution Network: Enhance Visual Representations for Video Captioning 3125

Quanhui Cao¹, Pengjie Tang², Hanli Wang^{1,2,3}

¹Tongji University, China; ²Jinggangshan University, China; ³Frontiers Science Center for Intelligent Autonomous Systems, China

9:54

C1aL-03.4 Triplet Confidence for Robust Out-of-Vocabulary Keyword Spotting 3130

Chengliang Wang, Yujie Hao, Xing Wu, Chao Liao

Chongqing University, China

10:12

C1aL-03.5 Spatially Scalable Video-Based Point Cloud Compression 3135

Shanshan Li, Li Li, Dong Liu, Houqiang Li

University of Science and Technology of China, China

C1aL-04 Pattern Recognition, Deep Learning and Learning Systems IV (Virtual Asia)

Time: Wednesday, June 1 (9:00-10:30)

Place: Room 4

Chair(s): Jiajing Wu, Sun Yat-sen University

9:00

C1aL-04.1 Efficient Search for Efficient Architecture 3140

Liewen Liao, Yaoming Wang, Hao Li, Wenrui Dai, Chenglin Li, Junni Zou, Hongkai Xiong

Shanghai Jiao Tong University, China

9:18

C1aL-04.2 Real-Time Image Inpainting Using PatchMatch Based Two-Generator Adversarial Networks with Optimized Edge Loss Function 3145

Luchang Ding, Jing Zhang, Chang Wu, Chang Cai, Gengsheng Chen

Fudan University, China

9:36

C1aL-04.3 Attention-Based Auto-Encoder Framework for Abnormal Driving Detection 3150

Jing Liu¹, Yang Liu¹, Donglai Wei¹, Wei Ni², Xinhua Zeng¹, Liang Song¹

¹Fudan University, China; ²Shanghai East-bund Research Institute on NSAI, China

9:54

C1aL-04.4 Fourier Domain Adaptation for Nighttime Pedestrian Detection Using Faster R-CNN 3155

Peggy Joy Lu, Jen-Hui Chuang

National Yang Ming Chiao Tung University, Taiwan

10:12

C1aL-04.5 Pay Attention via Binarization: Enhancing Explainability of Neural Networks via Binarization of Activation 3160

Yuma Tashiro¹, Hiromitsu Awano²

¹Osaka University, Japan; ²Kyoto University, Japan

C1aL-05 Image/Video Quality Assessment and Enhancement (Virtual Asia)

Time: Wednesday, June 1 (9:00-10:30)
Place: Room 5
Chair(s): Guangtao Zhai, *Shanghai Jiao Tong University, China*
Wenrui Dai, *Shanghai Jiao Tong University, China*

9:00

C1aL-05.1 A Full-Reference Image Quality Assessment Method with Saliency and Error Feature Fusion .. 3165
Da Ai¹, Yunhong Liu¹, Yurong Yang¹, Mingyue Lu¹, Ying Liu¹, Nam Ling²
¹*Xi'an University of Posts and Telecommunications, China*; ²*Santa Clara University, United States*

9:18

C1aL-05.2 A No-Reference Deep Learning Quality Assessment Method for Super-Resolution Images Based on Frequency Maps 3170
Zicheng Zhang, Wei Sun, Xiongkuo Min, Wenhan Zhu, Tao Wang, Wei Lu, Guangtao Zhai
Shanghai Jiao Tong University, China

9:36

C1aL-05.3 Recurrent Deformable Fusion for Compressed Video Artifact Reduction 3175
Liuhan Peng¹, Askar Hamdulla¹, Mao Ye², Shuai Li³, Hongwei Guo⁴
¹*Xinjiang University of China, China*; ²*University of Electronic Science and Technology of China, China*;
³*Shandong University, China*; ⁴*Honghe University, China*

9:54

C1aL-05.4 Luminance-Guided Chrominance Image Enhancement for HEVC Intra Coding 3180
Hewei Liu¹, Renwei Yang¹, Shuyuan Zhu¹, Xing Wen², Bing Zeng¹
¹*University of Electronic Science and Technology of China, China*; ²*Kuaishou, China*

10:12

C1aL-05.5 Improving Optical Flow Inference for Video Colorization 3185
Rulin Huang, Shaohui Li, Wenrui Dai, Chenglin Li, Junni Zou, Hongkai Xiong
Shanghai Jiao Tong University, China

C1aL-06 Neural Network-Based Video Coding II (Virtual Asia)

Time: Wednesday, June 1 (9:00-10:30)
Place: Room 6
Chair(s): Li Zhang, *Bytedance Inc., San Diego*

9:00

C1aL-06.1 Wavelet-Based Learned Scalable Video Coding 3190
Cunhui Dong¹, Haichuan Ma¹, Dong Liu¹, John W. Woods²
¹*University of Science and Technology of China, China*; ²*Rensselaer Polytechnic Institute, United States*

9:18

C1aL-06.2 A QP-Adaptive Mechanism for CNN-Based Filter in Video Coding 3195
Chao Liu¹, Heming Sun^{2,3}, Jiro Katto^{1,3}, Xiaoyang Zeng¹, Yibo Fan¹
¹*Fudan University, China*; ²*JST PRESTO, Japan*; ³*Waseda University, Japan*

9:36

C1aL-06.3 Deep Video Compression for P-Frame in Sub-Sampled Color Spaces 3200
Rongqun Lin, Pingping Zhang, Meng Wang, Shiqi Wang, Sam Kwong
City University of Hong Kong, China

9:54	C1aL-06.4	Joint Luma and Chroma Multi-Scale CNN In-Loop Filter for Versatile Video Coding	3205
		Yanchen Zhao, Kai Lin, Shanshe Wang, Siwei Ma <i>Peking University, China</i>	
10:12	C1aL-06.5	Deep Learning-Assisted Video Compression Framework	3210
		Hengyu Man, Chang Yu, Feng Xing, Yang Cheng, Bo Zheng, Xiaopeng Fan <i>Harbin Institute of Technology, China</i>	
	C2aL-01	Circuits and Techniques for Converters (Virtual Asia)	
	<i>Time:</i>	Wednesday, June 1 (10:45-12:15)	
	<i>Place:</i>	Room 1	
	<i>Chair(s):</i>	Qiang Li, <i>University of Electronic Science and Technology of China</i> Nuno Paulino, <i>Universidade Nova de Lisboa</i>	
10:45	C2aL-01.1	A Second-Order VCO-Based $\Delta\Sigma$ ADC with Fully Digital Feedback Summation	3215
		Chaoyang Xing ¹ , Yi Zhong ¹ , Jin Shao ² , Pengpeng Chen ³ , Lu Jie ¹ , Nan Sun ¹ ¹ Tsinghua University, China; ² Beijing Smartchip Microelectronics Technology Co., Ltd, China; ³ Hangzhou Vango Technologies, Inc., China	
11:03	C2aL-01.2	Systematic Design for Multistage Feed-Forward Op-Amp for High-Speed Continuous-Time $\Sigma\Delta$ ADCs	3219
		Marco Saif ^{1,2} , Alhassan Sayed ^{2,3} , Michel Vasilevski ⁴ , Mohamed Dessouky ¹ , Hassan Aboushady ² ¹ Ain Shams University, Egypt; ² Sorbonne University, France; ³ Minia University, Egypt; ⁴ Seamless Waves, France	
11:21	C2aL-01.3	A Charge-Redistribution Multi-Bit Stochastic-Resonance ADC Enhancing SNDR for Weak Input Signal	3224
		Ryoya Shibata ¹ , Zule Xu ¹ , Yasushi Hotta ² , Hitoshi Tabata ¹ , Tetsuya Iizuka ¹ ¹ The University of Tokyo, Japan; ² University of Hyogo, Japan	
11:39	C2aL-01.4	A Mismatch Compensation Scheme for Cyclic-Pipelined ADC via Dynamic Element Matching Technique	3229
		Yihao Yang, Yanjin Lyu, Yuanqi Hu <i>Beihang University, China</i>	
11:57	C2aL-01.5	Mixed-Signal Integrated Circuit for Direct Raised-Cosine Filter Waveform Synthesis of Digital Signals Up to 24 GS/s in 22 nm FD-SOI CMOS Technology	3234
		Daniel Widmann, Raphael Nägele, Markus Grözing, Manfred Berroth <i>Universität Stuttgart, Germany</i>	
	C2aL-02	Electronic Design Automation and Physical Design (Virtual Asia)	
	<i>Time:</i>	Wednesday, June 1 (10:45-12:15)	
	<i>Place:</i>	Room 2	
	<i>Chair(s):</i>	Youngjoo Lee, <i>POSTECH</i> Yeong-Kang Lai, <i>National Chung Hsing University</i>	
10:45	C2aL-02.1	Scalable Synthetic Circuit Generation Using Geometry Embedding for CAD Tool Assessment	3239
		Bing-Yu Li, Rung-Bin Lin <i>Yuan Ze University, Taiwan</i>	

11:03
C2aL-02.2 SAT-Based Scheduling Algorithm for High-Level Synthesis Considering Resource Sharing 3244
Hao Jiang, Fan Yang, Changhao Yan, Xuan Zeng
Fudan University, China

11:21
C2aL-02.3 Machine Learning Framework Using Complex Network Features to Predict Wire-Length 3249
Tingyuan Nie, Zuyuan Zhu, Qi Kong, Lijian Zhou, Zhenhao Wang
Qingdao University of Technology, China

11:39
C2aL-02.4 Topology-Based Exact Synthesis for Majority Inverter Graph 3255
Xianliang Ge, Shinji Kimura
Waseda University, Japan

11:57
C2aL-02.5 Three-Dimensional Flexible-Module Placement for Stacked Three-Dimensional Integration 3260
Tomohiro Noguchi, Omran Hindawi, Mineo Kaneko
Japan Advanced Institute of Science and Technology, Japan

C2aL-03 Multimedia Systems and Applications V (Virtual Asia)

Time: Wednesday, June 1 (10:45-12:15)

Place: Room 3

Chair(s): Hyun Kim, *Seoul National University of Science and Technology, South Korea*

10:45
C2aL-03.1 A Skeleton-Based Dynamic Hand Gesture Recognition for Home Appliance Control System 3265
Tsong-Han Tsai, Yi-Jhen Luo, Wei-Chung Wan
National Central University, Taiwan

11:03
C2aL-03.2 TAGAN: Texture and Attention Guided Generative Adversarial Network for Image Super Resolution 3269
Haitao Wang, Jiande Sun, Wenxiu Diao, Jing Li, Kai Zhang
Shandong Normal University, China

C2aL-04 Memristive and CNT Circuits and Systems III (Virtual Asia)

Time: Wednesday, June 1 (10:45-12:15)

Place: Room 4

Chair(s): Adnan Harb, *Lebanese International University*
Koji Inone, *Kyushu University*

10:45
C2aL-04.1 HPSW-CIM: A Novel ReRAM-Based Computing-in-Memory Architecture with Constant-Term Circuit for Full Parallel Hybrid-Precision-Signed-Weight MAC Operation 3274
Zihao Xuan, Yue Zhang, Yuan Li, Chang Liu, Yi Kang
University of Science and Technology of China, China

11:03
C2aL-04.2 C-RRAM: A Fully Input Parallel Charge-Domain RRAM-Based Computing-in-Memory Design with High Tolerance for RRAM Variations 3279
Yifan He, Yuxuan Huang, Jinshan Yue, Wenyu Sun, Lu Zhang, Yongpan Liu
Tsinghua University, China

11:21	C2aL-04.3	Memristive CNN for Wafer Defect Detection	3284
		Chitra R. ¹ , Aswani A.R. ² , A.P. James ² <i>¹IITMK, Digital University Kerala, Kerala University of Digital Sciences, Innovation and Technology, India; ²Digital University Kerala, India</i>	
11:39	C2aL-04.4	Domain Specific ReRAM Computation-in-Memory Design Considering Bit Precision and Memory Errors for Simulated Annealing	3289
		Naoko Misawa, Kenta Taoka, Chihiro Matsui, Ken Takeuchi <i>The University of Tokyo, Japan</i>	
11:57	C2aL-04.5	Aging Aware Retraining for Memristor-Based Neuromorphic Computing	3294
		Wenwen Ye ¹ , Grace Li Zhang ² , Bing Li ² , Ulf Schlichtmann ² , Cheng Zhuo ¹ , Xunzhao Yin ¹ <i>¹Zhejiang University, China; ²Technical University of Munich, Germany</i>	
	C2aL-05	Deep Learning for Visual Signal Representation and Processing (Virtual Asia)	
	<i>Time:</i>	Wednesday, June 1 (10:45-12:15)	
	<i>Place:</i>	Room 5	
	<i>Chair(s):</i>	Hsu-Feng Hsiao, <i>National Yang Ming Chiao Tung University, Taiwan</i>	
10:45	C2aL-05.1	Collaborative Normality Learning Framework for Weakly Supervised Video Anomaly Detection	
		Yang Liu ¹ , Jing Liu ¹ , Mengyang Zhao ¹ , Shuang Li ² , Liang Song ¹ <i>¹Fudan University, China; ²Tianjin University, China</i>	
11:03	C2aL-05.2	TAFNet: A Three-Stream Adaptive Fusion Network for RGB-T Crowd Counting	3299
		Haihan Tang, Yi Wang, Lap-Pui Chau <i>Nanyang Technological University, Singapore</i>	
11:21	C2aL-05.3	Combining CNN and MLP for Plant Pathology Recognition in Natural Scenes	3304
		Hong Wang, Denghao Pang, Jian Ma <i>Anhui University, China</i>	
11:39	C2aL-05.4	A Scale-Reductive Pooling with Majority-Take-All for Salient Object Detection	3309
		Chin-Han Shen, Yang-Jie Chen, Hsu-Feng Hsiao <i>National Yang Ming Chiao Tung University, Taiwan</i>	
11:57	C2aL-05.5	GENHOP: An Image Generation Method Based on Successive Subspace Learning	3314
		Xuejing Lei, Wei Wang, C.-C. Jay Kuo <i>University of Southern California, United States</i>	

C2aL-06 Mixed-Signal Circuits for Machine Learning, Hardware Security and Edge Intelligence I (Virtual Asia)

Time: Wednesday, June 1 (10:45-12:15)
Place: Room 6
Chair(s): Vishal Saxena, *University of Delaware*

10:45

C2aL-06.1 Analog-Memory-Based 14nm Hardware Accelerator for Dense Deep Neural Networks including Transformers 3319
Atsuya Okazaki¹, Pritish Narayanan², Stefano Ambrogio², Kohji Hosokawa¹, Hsinyu Tsai², Akiyo Nomura¹, Takeo Yasuda¹, Charles Mackin², Alexander Friz², Masatoshi Ishii¹, Yasuteru Kohda¹, Katie Spoon², An Chen², Andrea Fasoli², Malte J. Rasch³, Geoffrey W. Burr²
¹*IBM Research - Tokyo, Japan*; ²*IBM Research - Almaden, United States*; ³*IBM T. J. Watson Research Center, United States*

11:03

C2aL-06.2 High-Precision Nano-Amp Current Sensor and Obfuscation Based Analog Trojan Detection Circuit 3324
Mostafa Abedi, Tiancheng Yang, Yunsi Fei, Aatmesh Shrivastava
Northeastern University, United States

11:21

C2aL-06.3 Ali266: An Optimized VVC Software Encoder Implementation Towards Real-Time Applications 3329
Jianhua Chen, Yan Ye, Liangwei Yu, Xinchao Dong, Shuqing Fang, Shengyang Xu, Zhiwei Huang, Ru-Ling Liao, Jie Liu, Rongbing Yang
Alibaba Group, China

11:39

C2aL-06.4 An Efficient FPGA-Based Accelerator for Deep Forest 3334
Mingyu Zhu, Jiapeng Luo, Wendong Mao, Zhongfeng Wang
Nanjing University, China

C3aL-01 Millimeter Wave Circuits (Virtual Asia)

Time: Wednesday, June 1 (14:00-15:30)
Place: Room 1
Chair(s): Raafat Lababidi, *ENSTA Bretagne*
Zhiyong Zhang, *Texas A&M University*

14:00

C3aL-01.1 A 120-160 GHz 28 mW LNA in 70-nm GaAs mHEMT Technology 3339
Che Hao Li¹, Chien-Nan Kuo²
¹*Industrial Technology Research Institute, Taiwan*; ²*National Yang Ming Chiao Tung University, Taiwan*

14:18

C3aL-01.2 Design of a dB-Linear 21.5-to-36 GHz 6-Bit RF-VGA with Accurate Gain Control in 0.13- μ m SiGe BiCMOS Technology 3343
Yu Wang¹, Fanyi Meng¹, Kaixue Ma¹, Min Lu²
¹*Tianjin University, China*; ²*ZTE Corporation, China*

14:36

C3aL-01.3 A 71-86 GHz Cascaded Harmonic Enhanced Tripler with -69 dBc Fundamental and -66 dBc Second Harmonic Suppression 3347
Zhaoqi Chen¹, Chunqi Shi¹, Yuri Lu¹, Runxi Zhang¹, Hao Deng², Jinghong Chen²
¹*East China Normal University, China*; ²*University of Houston, United States*

14:54

C3aL-01.4 A Highly Linearized Ka-Band Heterodyne Receiver Using a Folded Class-AB Inductive Peaking Mixer and Magnetic-Self-Cancellation-Transformer-Based IF Amplifiers 3351

Qixiu Wu¹, Wei Deng¹, Haikun Jia¹, Rui Wu², Fuyuan Zhao¹, Baoyong Chi¹
¹Tsinghua University, China; ²Aerospace Information Research Institute, Chinese Academy of Science, China

15:12

C3aL-01.5 A 23.4-27.6 GHz “Zig-Zag” VCO with Continuous Frequency Switching for FMCW Radars 3355

Yuri Lu¹, Chunqi Shi¹, Jingge Li¹, Runxi Zhang¹, Hao Deng², Jinghong Chen²
¹East China Normal University, China; ²University of Houston, United States

C3aL-02 Low-Power Logic, Circuits and Architectures II (Virtual Asia)

Time: Wednesday, June 1 (14:00-15:30)

Place: Room 2

Chair(s): Weiwei Shan, Souteast University

Chung-An Shen, Taiwan University of Science

14:00

C3aL-02.1 HEAM: High-Efficiency Approximate Multiplier Optimization for Deep Neural Networks 3359

Su Zheng, Zhen Li, Yao Lu, Jingbo Gao, Jide Zhang, Lingli Wang
Fudan University, China

14:18

C3aL-02.2 Novel Stochastic Computing Using Amplitude and Frequency Pulse Encoding 3364

Yuhao Chen, Hongge Li
Beihang University, China

14:36

C3aL-02.3 An Area-Efficient and High Throughput Hardware Implementation of Exponent Function 3369

Muhammad Awais Hussain, Shung-Wei Lin, Tsung-Han Tsai
National Central University, Taiwan

14:54

C3aL-02.4 Novel FDSOI-Based Dynamic XNOR Logic for Ultra-Dense Highly-Efficient Computing 3373

Shubham Kumar¹, Swetaki Chatterjee¹, Chetan Kumar Dabhi³, Hussam Amrouch², Yogesh Singh Chauhan¹
¹Indian Institute of Technology Kanpur, India; ²Universität Stuttgart, Germany;
³University of California, Berkeley, United States

15:12

C3aL-02.5 A 19-bit Range and 4.5-ps Resolution Fully-Synthesizable Time-to-Digital Converter with Quad-Edge Offset Cancellation 3378

Heon Hwa Cheong^{1,2}, Suhwan Kim¹
¹Seoul National University, Korea; ²Samsung Electronics, Korea

C3aL-03 High Energy-Efficient Hardware Acceleration (Virtual Asia)

Time: Wednesday, June 1 (14:00-15:30)

Place: Room 3

Chair(s): Vishal Saxena, University of Delaware

14:00

C3aL-03.1 SNNIM: A 10T-SRAM Based Spiking-Neural-Network-in-Memory Architecture with Capacitance Computation 3383

Bo Wang, Chen Xue, Han Liu, Xiang Li, Anran Yin, Zhongyuan Feng, Yuyao Kong, Tianzhu Xiong, Haiming Hsu, Yongliang Zhou, An Guo, Yufei Wang, Jun Yang, Xin Si
Southeast University, China

- 14:18
C3aL-03.2 **A Lightweight Spiking GAN Model for Memristor-Centric Silicon Circuit with On-Chip Reinforcement Adversarial Learning** 3388
 Min Tian, Jing Lu, Haoran Gao, Haibing Wang, Jianyi Yu, Cong Shi
Chongqing University, China
- 14:36
C3aL-03.3 **A 3-8bit Reconfigurable Hybrid ADC Architecture with Successive-Approximation and Single-Slope Stages for Computing in Memory** 3393
 Wuyu Fan, Yuandong Li, Li Du, Likai Li, Yuan Du
Nanjing University, China
- 14:54
C3aL-03.4 **Deep Neural Network Interlayer Feature Map Compression Based on Least-Squares Fitting** 3398
 Chenjia Xie, Zhuang Shao, Hang Xu, Xiaoliang Chen, Li Du, Yuan Du, Zhongfeng Wang
Nanjing University, China
- C3aL-04 Emerging Devices, Circuits and Systems (Virtual Asia)**
Time: Wednesday, June 1 (14:00-15:30)
Place: Room 4
Chair(s): Alex James, *Clootrack Pvt Ltd.*
 Xunzhao Yin, *Zhejiang University*
- 14:00
C3aL-04.1 **Versatile FeFET Voltage-Sensing Analog CiM for Fast & Small-Area Hyperdimensional Computing** 3403
 Chihiro Matsui, Eitaro Kobayashi, Kasidit Toprasertpong, Shinichi Takagi, Ken Takeuchi
The University of Tokyo, Japan
- 14:18
C3aL-04.2 **An 8T/Cell FeFET-Based Nonvolatile SRAM with Improved Density and Sub-fJ Backup and Restore Energy** 3408
 Jianfeng Wang¹, Nuo Xiu¹, Juejian Wu¹, Yiming Chen¹, Yanan Sun², Huazhong Yang¹, Vijaykrishnan Narayanan³, Sumitha George⁴, Xueqing Li¹
¹*Tsinghua University, China*; ²*Shanghai Jiao Tong University, China*; ³*Pennsylvania State University, United States*; ⁴*North Dakota State University, United States*
- 14:36
C3aL-04.3 **Cryo-CMOS Model-Enabled 8-Bit Current Steering DAC Design for Quantum Computing** 3413
 Yongqi Hu^{1,2,3}, Zewei Wang^{1,2,3}, Renhe Chen^{1,2,3}, Zhidong Tang^{1,2,3}, Ao Guo⁴, Chengwei Cao⁴, Weican Wu⁴, Shoumian Chen⁴, Yuhang Zhao⁴, Liujiang Yu⁵, Ganbing Shang⁵, Hao Xu⁶, Shaojian Hu⁴, Xufeng Kou¹
¹*ShanghaiTech University, China*; ²*Shanghai Institute of Microsystem and Information Technology, China*; ³*University of Chinese Academy of Sciences*; ⁴*Shanghai IC Research and Development Center, China*; ⁵*Huali Microelectronics Corporation, China*; ⁶*Fudan University, China*
- 14:54
C3aL-04.4 **Atomic-Sized Pd Tunneling Junction Memory with 25ns Switching Capacity and Enhanced Endurance** 3418
 Zhongzheng Tian, Dacheng Yu, Zhongyang Ren, Jiaojiao Tian, Liming Ren, Yunyi Fu
Peking University, China
- 15:12
C3aL-04.5 **Significance of Organic Ferroelectric in Harnessing Transient Negative Capacitance Effect at Low Voltage over Oxide Ferroelectric** 3423
 Khoirom Johnson Singh, Lomash Chandra Acharya, Anand Bulusu, Sudeb Dasgupta
Indian Institute of Technology Roorkee, India

C3aL-05 Algorithm Optimization and Hardware Solutions for Low-Complexity Biomedical Signal Processing (Virtual Asia)

Time: Wednesday, June 1 (14:00-15:30)
Place: Room 5
Chair(s): Bruno Zatt, *Federal University of Pelotas, Brazil*

14:00
C3aL-05.1 On the Design of Rationalised Bi-Orthogonal Wavelet Using Reversible Logic 3428
Sithara Raveendran, Pranose J. Edavoor, Nithin Kumar Y.B., Vasantha M.H.
National Institute of Technology Goa, India

14:18
C3aL-05.2 Interleaved Hybrid Domain Learning for Super-Resolution MRI 3433
Vazim Ibrahim^{1,2}, Sumit Datta^{1,2}, Alex P. James^{1,2}, Joseph Suresh Paul^{1,2}
¹*Kerala University of Digital Sciences, Innovation and Technology, India;*
²*Indian Institute of Information Technology and Management-Kerala, India*

14:36
C3aL-05.3 Speed Imagery EEG Classification with Spatial-Temporal Feature Attention Deep Neural Networks 3438
Xiaoqian Hao, Biao Sun
Tianjin University, China

14:54
C3aL-05.4 A CMOS Axon-Sharing Neuron Array with Background Calibration 3443
Xiangao Qi¹, Jian Zhao¹, Guoxing Wang¹, Kea-Tiong Tang², Yongfu Li¹
¹*Shanghai Jiao Tong University, China;* ²*National Tsing Hua University, Taiwan*

15:12
C3aL-05.5 Toward Ultra-Large Scale Neural Spike Sorting with Distributed Sorting Channels and Unsupervised Training 3448
Junhong Sun, Tianhao Li, Tongtong Guo, Yongfu Li, Changyun Fu, Yan Liu
Shanghai Jiao Tong University, China

C3aL-06 Recent Progress in Theory and Applications of Memristive Technologies Toward a New Era in Electronic II (Virtual Asia)

Time: Wednesday, June 1 (14:00-15:30)
Place: Room 6
Chair(s): Alon Ascoli, *TU Dresden, Germany*

14:00
C3aL-06.1 Analog Image Denoising with an Adaptive Memristive Crossbar Network 3453
O. Krestinskaya¹, K. Salama¹, A.P. James²
¹*King Abdullah University of Science and Technology, Saudi Arabia;* ²*Digital University Kerala, India*

14:18
C3aL-06.2 Experimentally-Validated Crossbar Model for Defect-Aware Training of Neural Networks
Ruibin Mao¹, Bo Wen¹, Mingrui Jiang¹, Jiezhi Chen², Can Li¹
¹*University of Hong Kong, China;* ²*Shandong University, China*

14:36
C3aL-06.3 Unstructured Weight Pruning in Variability-Aware Memristive Crossbar Neural Networks 3458
Aswani A.R.¹, Chitra R.², A.P. James¹
¹*Digital University Kerala, India;* ²*IITMK, India*

- 14:54
C3aL-06.4 Wave Cellular Automata for Computing Applications 3463
 Theodoros Panagiotis Chatzinikolaou¹, Iosif-Angelos Fyrigos¹, Vasileios Ntinis^{1,3}, Stavros Kitsios²,
 Panagiotis Bousoulas², Michail-Antisthenis Tsompanas¹, Dimitris Tsoukalas²,
 Andrew Adamatzky⁴, Georgios Ch. Sirakoulis¹
¹Democritus University of Thrace, Greece; ²National Technical University of Athens, Greece;
³Universitat Politecnica de Catalunya, Spain; ⁴University of the West of England, United Kingdom
- 15:12
C3aL-06.5 An Event-Driven Spiking Neural Network Accelerator with On-Chip Sparse Weight 3468
 Yisong Kuang, Xiaoxin Cui, Chenglong Zou, Yi Zhong, Zhenhui Dai,
 Zilin Wang, Kefei Liu, Dunshan Yu, Yuan Wang
 Peking University, China
- C4aL-01 Analog Circuits with Adjustability (Virtual Asia)**
 Time: Wednesday, June 1 (15:45-17:15)
 Place: Room 1
 Chair(s): Jusung Kim, Hanbat National University
 Roberto Gomez-Garcia, Universidad de Alcala
- 15:45
C4aL-01.1 A True Time Delay Element Using Cascaded Variable Bandwidth All Pass Filters 3473
 Mayur S. Marinaik, Ganga K. Maheshwarappa, Naveen Kadayinti
 Indian Institute of Technology Dharwad, India
- 16:03
C4aL-01.2 OTA Based Fractional-Order Oscillator with Controlled Phase Difference 3478
 Garima Varshney, Neeta Pandey, Rajeshwari Pandey
 Delhi Technological University, India
- 16:21
C4aL-01.3 A PVT-Invariant Front-End Ring Amplifier Using Self-Stabilization Technique for SAR ADC 3483
 Chi-Wei Chen, Chien-Yu Su, Hsin-Shu Chen
 National Taiwan University, Taiwan
- 16:39
C4aL-01.4 A Novel Low-Leakage ESD Power Clamp Circuit with Adjustable Transient Response Time 3488
 Zilong Shen¹, Yize Wang², Xing Zhang¹, Yuan Wang¹
¹Peking University, China; ²Beijing Microelectronics Technology Institute, China
- 16:57
C4aL-01.5 An Integrated 200MHz 4A Pulsed Laser Driver with DLL-Based Time Interpolator for Indirect Time-of-Flight Applications 3493
 Shenglong Zhuo¹, Yuwei Wang², Tao Xia¹, Yifan Wu², Lichun Xie², Wei Zheng², Zhihong Lin¹,
 Miao Sun¹, Lei Zhao¹, Yajie Qin¹, Rui Bai², Patrick Yin Chiang¹
¹Fudan University, China; ²PhotonIC Technologies, China

C4aL-02 Digital Circuits and Systems (Virtual Asia)

Time: Wednesday, June 1 (15:45-17:15)

Place: Room 2

Chair(s): Taigon Song, *Kyungbook National University, South Korea*

15:45

C4aL-02.1 Quantified Satisfiability-Based Simultaneous Selection of Multiple Local Approximate Changes under Maximum Error Bound 3498

Chenfei Lou¹, Weihua Xiao¹, Weikang Qian^{1,2}

¹*University of Michigan-Shanghai Jiao Tong University Joint Institute, Shanghai Jiao Tong University, China;* ²*Shanghai Jiao Tong University, China*

16:03

C4aL-02.2 Adversarial Sample Generation for Lithography Hotspot Detection 3503

Shuyuan Sun, Yiyang Jiang, Fan Yang, Xuan Zeng

Fudan University, China

16:21

C4aL-02.3 Systems on a Chip with 8bits and 32bits Processors in 0.18 μ m Technology for IoT Applications

Marco Sarmiento, Khai-Duy Nguyen, Ckristian Duran, Ronaldo Serrano, Trong-Thuc Hoang, Koichiro Ishibashi, Cong-Kha Pham

University of Electro-Communications, Japan

16:39

C4aL-02.4 Low Error-Rate Approximate Multiplier Design for DNNs with Hardware-Driven Co-Optimization 3507

Yao Lu, Jide Zhang, Su Zheng, Zhen Li, Lingli Wang

Fudan University, China

16:57

C4aL-02.5 TDPRO: Ultra-Low Power ECG Processor with High-Precision Time-Domain Computing Engine 3512

Liang Chang, Siqi Yang, Huinan Wang, Jianbiao Xiao, Xin Zhao, Shuisheng Lin, Jun Zhou

University of Electronic Science and Technology of China, China

C4aL-03 Intelligent Analysis and Decision-Making of Large-Scale Nonlinear Complex Systems II (Virtual Asia)

Time: Wednesday, June 1 (15:45-17:15)

Place: Room 3

Chair(s): Hassan Najafi, *University of Louisiana*

15:45

C4aL-03.1 Temporal Analysis of Transaction Ego Networks with Different Labels on Ethereum 3517

Baoying Huang¹, Jieli Liu¹, Jiajing Wu¹, Quanzhong Li¹, Hao Lin²

¹*Sun Yat-sen University, China;* ²*Merchants Union Consumer Finance Company Limited, China*

16:03

C4aL-03.2 Predicting Onset Time of Cascading Failure in Power Systems Using a Neural Network-Based Classifier 3522

Junyuan Fang, Dong Liu, Chi K. Tse

City University of Hong Kong, China

- 16:21
C4aL-03.3 Analysis of Q-Learning Like Algorithms through Evolutionary Game Dynamics
 Yiming Shi, Zhihai Rong
University of Electronic Science and Technology of China, China
- 16:39
C4aL-03.4 Phishing Detection on Ethereum via Attributed Ego-Graph Embedding
 Yijun Xia, Jieli Liu, Tao Huang, Jiajing Wu
Sun Yat-sen University, China
- 16:57
C4aL-03.5 Evolution of Locality on Ethereum Transaction Network 3527
 Dingyuan Lu¹, Jieli Liu¹, Shanhe Zhao², Jiajing Wu¹
¹*Sun Yat-sen University, China;* ²*Merchants Union Consumer Finance Co.,Ltd., China*
- C4aL-04 New Emerging Principles and Applications (Virtual Asia)**
Time: Wednesday, June 1 (15:45-17:15)
Place: Room 4
Chair(s): Sudeb Dasgupta, *Indian Institute of Research of Roorkee*
 Xueqing Li, *Tsinghua University*
- 15:45
C4aL-04.1 STATE: A Test Structure for Rapid Prediction of Resistive RAM Electrical Parameter Variability 3532
 Hassan Aziza¹, Jérémy Postel-Pellerin¹, Hussein Bazzi^{1,2}, Mathieu Moreau¹, Adnan Harb²
¹*IM2NP, Aix-Marseille Université, France;* ²*Lebanese International University, Lebanon*
- 16:03
C4aL-04.2 A High-Voltage Characterisation Platform for Emerging Resistive Switching Technologies 3537
 Jiawei Shen, Andrea Mifsud, Lijie Xie, Abdulaziz Alshaya, Christos Papavassiliou
Imperial College London, United Kingdom
- 16:21
C4aL-04.3 Temperature Sensing System with Flexible Electronics Using Oxide TFTs 3542
 Suyash Shrivastava, Pydi Ganga Bahubalindrani
Indian Institute of Science Education and Research, Bhopal, India
- 16:39
C4aL-04.4 Design of Variable Bit-Width Arithmetic Unit Using Single Flux Quantum Device 3547
 Iori Ishikawa¹, Ikki Nagaoka², Ryota Kashima², Koki Ishida¹, Kosuke Fukumitsu¹, Keitaro Oka¹,
 Masamitsu Tanaka², Satoshi Kawakami¹, Teruo Tanimoto¹, Takatsugu Ono¹, Akira Fujimaki², Koji Inoue¹
¹*Kyushu University, Japan;* ²*Nagoya University, Japan*
- 16:57
C4aL-04.5 Bionic Robust Memristor-Based Artificial Nociception System for Robotics 3552
 Guangyu Feng, Bokyung Kim, Hai Li
Duke University, United States

C4aL-05 References and Regulators (Virtual Asia)

Time: Wednesday, June 1 (15:45-17:15)

Place: Room 5

Chair(s): Joseph Chang, *Nanyang Technological University*
Mohamad Sawan, *Westlake University*

15:45

C4aL-05.1 A Nanopower 95.6% Efficiency Voltage Regulator with Adaptive Supply-Switching for Energy Harvesting Applications 3557

Yiwei Zou, Xinling Yue, Sijun Du
Delft University of Technology, The Netherlands

16:03

C4aL-05.2 Optimization of CMOS Voltage Reference with Prediction Based on Multi-Group Hierarchical Collaborative Evolution and GBDT 3562

Yanhan Zeng, Peidong Lin, Mingrui Lv, Shangzuo Xie, Mingjiang Hou, Jingci Yang, Weijian Chen
Guangzhou University, China

16:21

C4aL-05.3 An Input-Output Regulated Adaptive Ramp for Fast Load Transition of PWM Buck Converter 3566

Bingbing He¹, Haoran Li², Mingyi Chen¹, Yongfu Li¹, Yan Liu¹, Yang Zhao¹
¹*Shanghai Jiao Tong University, China;* ²*Alibaba DAMO Academy, China*

16:39

C4aL-05.4 LDO Regulator Optimized on Power Efficiency and Load Transient Response with Voltage Damper and Body Loop Feedback 3571

Heebae Kim, Seung Soo Kwak, Yong Sin Kim
Korea University, Korea

16:57

C4aL-05.5 A Single-Inductor Triple-Output Buck-Boost Converter with Output Ripple Control for Wearable Devices 3575

Zhi-Yun Hsu¹, Chi-Wei Liu¹, Jun-Wan Wu¹, Wei-Jen Chang², Tsung-Ling Li², Po-Hung Chen¹
¹*National Yang Ming Chiao Tung University, Taiwan;* ²*Gear Radio Electronics Corp., Taiwan*