

2021 IEEE 3rd International Conference on Artificial Intelligence Circuits and Systems (AICAS 2021)

**Washington, DC, USA
6 – 9 June 2021**



**IEEE Catalog Number: CFP21R18-POD
ISBN: 978-1-6654-3025-8**

**Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

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

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

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

IEEE Catalog Number:	CFP21R18-POD
ISBN (Print-On-Demand):	978-1-6654-3025-8
ISBN (Online):	978-1-6654-1913-0

Additional Copies of This Publication Are Available From:

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

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

AN EFFICIENT AND FAST SOFTMAX HARDWARE ARCHITECTURE (EFSHA) FOR DEEP NEURAL NETWORKS.....	1
<i>Muhammad Awais Hussain, Tsung-Han Tsai</i>	
NEUROSIM VALIDATION WITH 40NM RRAM COMPUTE-IN-MEMORY MACRO.....	5
<i>Anni Lu, Xiaochen Peng, Wantong Li, Hongwu Jiang, Shimeng Yu</i>	
MLFLASH-CIM: EMBEDDED MULTI-LEVEL NOR-FLASH CELL BASED COMPUTING IN MEMORY ARCHITECTURE FOR EDGE AI DEVICES.....	9
<i>Sitao Zeng, Yuxin Zhang, Zhiguo Zhu, Zhaolong Qin, Chunmeng Dou, Xin Si, Qiang Li</i>	
ENERGY-EFFICIENT INTELLIGENT EPTS DEVICE USING NOVEL DCNN-BASED DYNAMIC SENSOR ACTIVATION.....	13
<i>Hyunsung Kim, Jaehee Kim, Young-Seok Kim, Mijung Kim, Youngjoo Lee</i>	
EFFICIENT DIGITAL IMPLEMENTATION OF N-MODE TENSOR-MATRIX MULTIPLICATION.....	14
<i>Christian Gianoglio, Edoardo Ragusa, Rodolfo Zunino, Paolo Gastaldo</i>	
AN ULTRA-LOW-POWER REAL-TIME HAND-GESTURE RECOGNITION SYSTEM FOR EDGE APPLICATIONS.....	18
<i>Yuncheng Lu, Zehao Li, Tony Tae-Hyoung Kim</i>	
REAL-TIME LANGUAGE RECOGNITION USING HYPERDIMENSIONAL COMPUTING ON PHASE-CHANGE MEMORY ARRAY.....	19
<i>Geethan Karunaratne, Abbas Rahimi, Manuel Le Gallo, Giovanni Cherubini, Abu Sebastian</i>	
A REAL-TIME FACE RECOGNITION SYSTEM BY EFFICIENT HARDWARE-SOFTWARE CO-DESIGN ON FPGA SOCS.....	20
<i>Hao Wang, Shan Cao, Shugong Xu</i>	
DESIGN OPTIMIZATION FOR ADMM-BASED SVM TRAINING PROCESSOR FOR EDGE COMPUTING.....	22
<i>Shuo-An Huang, Yi-Yen Hsieh, Chia-Hsiang Yang</i>	
QUANTIZATION STRATEGY FOR PARETO-OPTIMALLY LOW-COST AND ACCURATE CNN.....	27
<i>Kengo Nakata, Daisuke Miyashita, Asuka Maki, Fumihiko Tachibana, Shinichi Sasaki, Jun Deguchi, Ryuichi Fujimoto</i>	
A QUALITY-ORIENTED RECONFIGURABLE CONVOLUTION ENGINE USING CROSS-SHAPED SPARSE KERNELS FOR HIGHLY-PARALLEL CNN ACCELERATION.....	31
<i>Chi-Wen Weng, Chao-Tsung Huang</i>	
ADAPTABLE APPROXIMATION BASED ON BIT DECOMPOSITION FOR DEEP NEURAL NETWORK ACCELERATORS.....	35
<i>Taha Soliman, Cecilia De La Parra, Andre Guntoro, Norbert Wehn</i>	
SINGLE RRAM CELL-BASED IN-MEMORY ACCELERATOR ARCHITECTURE FOR BINARY NEURAL NETWORKS.....	39
<i>Hyunmyung Oh, Hyungjun Kim, Nameun Kang, Yulhwa Kim, Jihoon Park, Jae-Joon Kim</i>	

AN AI AUV ENABLING VISION-BASED DIVER-FOLLOWING AND OBSTACLE AVOIDANCE WITH 3D-MODELING DATASET	43
<i>Yu-Cheng Chou, Hsin-Hung Chen, Chau-Chang Wang, Hui-Min Chou, Chua-Chin Wang</i>	
A MEMRISTOR MODEL WITH CONCISE WINDOW FUNCTION FOR SPIKING BRAIN-INSPIRED COMPUTATION	47
<i>Jiawei Xu, Deyu Wang, Feng Li, Lianhao Zhang, Dimitrios Stathis, Yu Yang, Yi Jin, Anders Lansner, Ahmed Hemani, Zhuo Zou, Li-Rong Zheng</i>	
UNBALANCED BIT-SLICING SCHEME FOR ACCURATE MEMRISTOR-BASED NEURAL NETWORK ARCHITECTURE.....	51
<i>Sumit Diware, Anteneh Gebregiorgis, Rajiv V. Joshi, Said Hamdioui, Rajendra Bishnoi</i>	
A FLEXIBLE AND FAST PYTORCH TOOLKIT FOR SIMULATING TRAINING AND INFERENCE ON ANALOG CROSSBAR ARRAYS.....	55
<i>Malte J. Rasch, Diego Moreda, Tayfun Gokmen, Manuel Le Gallo, Fabio Carta, Cindy Goldberg, Kaoutar El Maghraoui, Abu Sebastian, Vijay Narayanan</i>	
CHARACTERIZATION OF DRAIN CURRENT VARIATIONS IN FEFETS FOR PIM-BASED DNN ACCELERATORS	59
<i>Nathan Eli Miller, Zheng Wang, Saurabh Dash, Asif Islam Khan, Saibal Mukhopadhyay</i>	
FPGA-ACCELERATED AGENT-BASED SIMULATION FOR COVID-19.....	63
<i>Lei Fu, Ce Guo, Wayne Luk</i>	
HARDWARE APPROXIMATION OF EXPONENTIAL DECAY FOR SPIKING NEURAL NETWORKS.....	67
<i>Sherif Eissa, Sander Stuijk, Henk Corporaal</i>	
IAMEC, AN INTELLIGENT AUTONOMOUS MOVER FOR NAVIGATION IN INDOOR PEOPLE RICH ENVIRONMENTS	71
<i>Yin-Tsung Hwang, Kuan-Hong Chen, Chih-Peng Fan, Yong-Kang Lai, Chung-Bin Wu, Hsiao-Ping Tsai, Wei-Liang Lin, Kuang-Hao Lin</i>	
MRAM-BASED BER RESILIENT QUANTIZED EDGE-AI NETWORKS FOR HARSH INDUSTRIAL CONDITIONS.....	75
<i>Vivek Parmar, Manan Suri, Kazutaka Yamane, Taeyoung Lee, Nyuk Leong Chung, Vinayak Bharat Naik</i>	
AN 176.3 GOPS OBJECT DETECTION CNN ACCELERATOR EMULATED IN A 28NM CMOS TECHNOLOGY	79
<i>Ying-Cheng Lu, Ching-Wen Chen, Ching-Chun Pu, Yang-Tung Lin, Jyun-Kai Jhan, Shu-Ping Liang, Wei-Lun Tseng, Chi-Shi Chen, Chao-Yang Yu, Hsiu-Wen Wang, Hong-Han Shuai, Herming Chiueh</i>	
LIVE DEMO: AN 176.3 GOPS OBJECT DETECTION CNN ACCELERATOR EMULATED IN A 28NM CMOS TECHNOLOGY	83
<i>Ying-Cheng Lu, Ching-Wen Chen, Ching-Chun Pu, Yang-Tung Lin, Jyun-Kai Jhan, Shu-Ping Liang, Wei-Lun Tseng, Chi-Shi Chen, Chao-Yang Yu, Hsiu-Wen Wang, Hong-Han Shuai, Herming Chiueh</i>	
FL-HDC: HYPERDIMENSIONAL COMPUTING DESIGN FOR THE APPLICATION OF FEDERATED LEARNING	84
<i>Cheng-Yen Hsieh, Yu-Chuan Chuang, An-Yeu Andy Wu</i>	

THE 2020 LOW-POWER COMPUTER VISION CHALLENGE	89
<i>Xiao Hu, Ming-Ching Chang, Yuwei Chen, Rahul Sridhar, Zhenyu Hu, Yunhe Xue, Zhenyu Wu, Pengcheng Pi, Jiayi Shen, Jianchao Tan, Xiangru Lian, Ji Liu, Zhangyang Wang, Chia-Hsiang Liu, Yu-Shin Han, Yuan-Yao Sung, Yi Lee, Kai-Chiang Wu, Wei-Xiang Guo, Rick Lee, Shengwen Liang, Zerun Wang, Guiguang Ding, Gang Zhang, Teng Xi, Yubei Chen, Han Cai, Ligeng Zhu, Zhekai Zhang, Song Han, Seonghwan Jeong, Youngmin Kwon, Tianzhe Wang, Jeffery Pan</i>	
COMPUTE-IN-RRAM WITH LIMITED ON-CHIP RESOURCES.....	93
<i>Anni Lu, Xiaochen Peng, Shimeng Yu</i>	
AN EFFICIENT AND LOW-POWER MLP ACCELERATOR ARCHITECTURE SUPPORTING STRUCTURED PRUNING, SPARSE ACTIVATIONS AND ASYMMETRIC QUANTIZATION FOR EDGE COMPUTING.....	97
<i>Wei-Chen Lin, Ya-Chu Chang, Juinn-Dar Huang</i>	
HARDWARE-ALGORITHM CO-DESIGN ENABLING EFFICIENT EVENT-BASED OBJECT DETECTION.....	102
<i>Brian Crafton, Andrew Paredes, Evan Gebhardt, Arijit Raychowdhury</i>	
EVENT-DRIVEN CONTINUOUS-TIME FEATURE EXTRACTION FOR ULTRA LOW-POWER AUDIO KEYWORD SPOTTING.....	106
<i>Soufiane Mourrane, Benoit Larras, Andreia Cathelin, Antoine Frappé</i>	
A BIO-INSPIRED MOTION DETECTION CIRCUIT MODEL FOR THE COMPUTATION OF OPTICAL FLOW: THE SPATIAL-TEMPORAL FILTERING REICHARDT MODEL.....	110
<i>Hsin-Yu Wu, Wei-Tse Kao, Harrison Hao-Yu Ku, Cheng-Te Wang, Chih-Cheng Hsieh, Ren-Shuo Liu, Kea-Tiong Tang, Chung-Chuan Lo</i>	
INTEGER QUADRATIC INTEGRATE-AND-FIRE (IQIF): A NEURON MODEL FOR DIGITAL NEUROMORPHIC SYSTEMS	114
<i>Wen-Chieh Wu, Chen-Fu Yeh, Alexander James White, Cheng-Te Wang, Zuo-Wei Yeh, Chih-Cheng Hsieh, Ren-Shuo Liu, Kea-Tiong Tang, Chung-Chuan Lo</i>	
FEDERATED REGULARIZATION LEARNING: AN ACCURATE AND SAFE METHOD FOR FEDERATED LEARNING	118
<i>Tianqi Su, Meiqi Wang, Zhongfeng Wang</i>	
A NOVEL MULTI-SCALE DILATED 3D CNN FOR EPILEPTIC SEIZURE PREDICTION.....	122
<i>Ziyu Wang, Jie Yang, Mohamad Sawan</i>	
ONLINE DETECTION OF VIBRATION ANOMALIES USING BALANCED SPIKING NEURAL NETWORKS.....	126
<i>Nik Dennler, Germain Haessig, Matteo Cartiglia, Giacomo Indiveri</i>	
SELF-AWARE ANOMALY-DETECTION FOR EPILEPSY MONITORING ON LOW-POWER WEARABLE ELECTROCARDIOGRAPHIC DEVICES.....	130
<i>Farnaz Forooghifar, Amin Aminifar, Tomas Teijeiro, Amir Aminifar, Jesper Jeppesen, Sandor Beniczky, David Atienza</i>	
TWO-PHASE SCHEME FOR TRIMMING QTMT CU PARTITION USING MULTI-BRANCH CONVOLUTIONAL NEURAL NETWORKS.....	134
<i>Pin-Chieh Fu, Chia-Cheng Yen, Nien-Chen Yang, Jia-Shung Wang</i>	
EXPLOITING MEMRISTORS FOR NEUROMORPHIC REINFORCEMENT LEARNING	140
<i>Cong Shi, Jing Lu, Ying Wang, Ping Li, Min Tian</i>	

SOFTWARE/HARDWARE CO-DESIGN FOR MULTI-MODAL MULTI-TASK LEARNING IN AUTONOMOUS SYSTEMS.....	144
<i>Cong Hao, Deming Chen</i>	
MULTIPLE-PRECISION FLOATING-POINT DOT PRODUCT UNIT FOR EFFICIENT CONVOLUTION COMPUTATION	149
<i>Kai Li, Wei Mao, Xinang Xie, Quan Cheng, Huan Xie, Zhenjiang Dong, Hao Yu</i>	
EILE: EFFICIENT INCREMENTAL LEARNING ON THE EDGE.....	153
<i>Xi Chen, Chang Gao, Tobi Delbruck, Shih-Chii Liu</i>	
AN 8.62 μ W PROCESSOR FOR AUTISM SPECTRUM DISORDER CLASSIFICATION USING SHALLOW NEURAL NETWORK	157
<i>Abdul Rehman Aslam, Nauman Hafeez, Hadi Heidari, Muhammad Awais Bin Altaf</i>	
CONTENTION-AWARE ADAPTIVE MODEL SELECTION FOR MACHINE VISION IN EMBEDDED SYSTEMS	161
<i>Basar Kutukcu, Sabur Baidya, Anand Raghunathan, Sujit Dey</i>	
A TWO-LAYER LSTM DEEP LEARNING MODEL FOR EPILEPTIC SEIZURE PREDICTION.....	165
<i>Shiva Maleki Varnosfaderani, Rihat Rahman, Nabil J. Sarhan, Levin Kuhlmann, Eishi Asano, Aimee Luat, Mohammad Alhawari</i>	
ENSEMBLE OF PRUNED NETWORKS FOR RELIABLE CLASSIFIERS.....	169
<i>Zhen Gao, Han Zhang, Xiaohui Wei, Jiajun Xiao, Shulin Zeng, Guangjun Ge, Yu Wang, Pedro Reviriego</i>	
TILE-BASED ARCHITECTURE EXPLORATION FOR CONVOLUTIONAL ACCELERATORS IN DEEP NEURAL NETWORKS.....	173
<i>Yang-Tsai Chen, Yu-Xiang Yen, Chun-Tse Chen, Tzu-Yu Chen, Chih-Tsun Huang, Jing-Jia Liou, Juin-Ming Lu</i>	
MNSIM-TIME: PERFORMANCE MODELING FRAMEWORK FOR TRAINING-IN-MEMORY ARCHITECTURES	177
<i>Kaizhong Qiu, Zhenhua Zhu, Yi Cai, Hanbo Sun, Yu Wang, Huanzhong Yang</i>	
IMPROVING SYSTEM LATENCY OF AI ACCELERATOR WITH ON-CHIP PIPELINED ACTIVATION PREPROCESSING AND MULTI-MODE BATCH INFERENCE	181
<i>Wenxuan Chen, Zheng Wang, Ming Lei, Bo Dong, Zhuo Wang, Yongkui Yang, Chao Chen, Weiyu Guo, Chen Liang, Qian Zhang, Wenqi Fang, Zhibin Yu</i>	
DYNAMICALLY-BIASED FIXED-POINT LSTM FOR TIME SERIES PROCESSING IN AIOT EDGE DEVICE.....	185
<i>Jinhai Hu, Wang Ling Goh, Yuan Gao</i>	
PERFORMANCE OF CROSSBAR BASED LONG SHORT TERM MEMORY WITH AGING MEMRISTORS	189
<i>Ar Aswani, Rohan Kumar, Jai Narayan Tripathi, Alex James</i>	
QUANTIZED FULLY CONVOLUTION NEURAL NETWORK FOR HW IMPLEMENTATION OF HUMAN POSTURE RECOGNITION	193
<i>Alessandro Russo, Gian Domenico Licciardo, Luigi Di Benedetto, Alfredo Rubino, Rosalba Liguori, Alessandro Naddeo, Nicola Cappetti</i>	
EXPLOITING WEIGHT STATISTICS FOR COMPRESSED NEURAL NETWORK IMPLEMENTATION ON HARDWARE.....	197
<i>Prachi Kashikar, Sharad Sinha, Ajeet Kumar Verma</i>	

END-TO-END 100-TOPS/W INFERENCE WITH ANALOG IN-MEMORY COMPUTING: ARE WE THERE YET?	201
<i>Gianmarco Ottavi, Geethan Karunaratne, Francesco Conti, Irem Boybat, Luca Benini, Davide Rossi</i>	
AN ULTRA-LOW LATENCY MULTICAST ROUTER FOR LARGE-SCALE MULTI-CHIP NEUROMORPHIC PROCESSING.....	205
<i>Chen Ding, Yuxiang Huan, Hao Jia, Yulong Yan, Fanxi Yang, Zhuo Zou, Li-Rong Zheng</i>	
TEMPDIFF: TEMPORAL DIFFERENCE-BASED FEATURE MAP-LEVEL SPARSITY INDUCTION IN CNNs WITH <4% MEMORY OVERHEAD	209
<i>Udari De Alwis, Massimo Alioto</i>	
TCBNN: ERROR-CORRECTABLE TERNARY-CODED BINARIZED NEURAL NETWORK.....	213
<i>Cheng-Di Tsai, Ting-Yu Chen, Hsiao-Wen Fu, Tsung-Chu Huang</i>	
ECG-TCN: WEARABLE CARDIAC ARRHYTHMIA DETECTION WITH A TEMPORAL CONVOLUTIONAL NETWORK.....	217
<i>Thorir Mar Ingolfsson, Xiaying Wang, Michael Hersche, Alessio Burrello, Lukas Cavigelli, Luca Benini</i>	
IELAS: AN ELAS-BASED ENERGY-EFFICIENT ACCELERATOR FOR REAL-TIME STEREO MATCHING ON FPGA PLATFORM	221
<i>Tian Gao, Zishen Wan, Yuyang Zhang, Bo Yu, Yanjun Zhang, Shaoshan Liu, Arijit Raychowdhury</i>	
EFFICIENT FPGA IMPLEMENTATION OF APPROXIMATE SINGULAR VALUE DECOMPOSITION BASED ON SHALLOW NEURAL NETWORKS	225
<i>Hamoud Younes, Ali Ibrahim, Mostafa Rizk, Maurizio Valle</i>	
GRAPH-BASED SPATIO-TEMPORAL BACKPROPAGATION FOR TRAINING SPIKING NEURAL NETWORKS.....	229
<i>Yulong Yan, Haoming Chu, Xin Chen, Yi Jin, Yuxiang Huan, Lirong Zheng, Zhuo Zou</i>	
EFFICIENT FPGA IMPLEMENTATION OF A CONVOLUTIONAL NEURAL NETWORK FOR RADAR SIGNAL PROCESSING	233
<i>Jingchi Zhang, Yihao Huang, Huanrui Yang, Michael Martinez, Granger Hickman, Jeffrey Krolik, Hai Li</i>	
EFFICIENT ZERO-ACTIVATION-SKIPPING FOR ON-CHIP LOW-ENERGY CNN ACCELERATION	237
<i>Min Liu, Yifan He, Hailong Jiao</i>	
LOMA: FAST AUTO-SCHEDULING ON DNN ACCELERATORS THROUGH LOOP-ORDER-BASED MEMORY ALLOCATION	241
<i>Arne Symons, Linyan Mei, Marian Verhelst</i>	
NEURAL NETWORK ACCELERATION AND VOICE RECOGNITION WITH A FLASH-BASED IN-MEMORY COMPUTING SOC	245
<i>Liang Zhao, Shifan Gao, Shengbo Zhang, Xiang Qiu, Fan Yang, Jie Li, Zezhi Chen, Yi Zhao</i>	
MEMORY EFFICIENT INVERTIBLE NEURAL NETWORKS FOR CLASS-INCREMENTAL LEARNING.....	250
<i>Guillaume Hocquet, Olivier Bichler, Damien Querlioz</i>	

AN ENERGY-EFFICIENT QUAD-CAMERA VISUAL SYSTEM FOR AUTONOMOUS MACHINES ON FPGA PLATFORM.....	254
<i>Zishen Wan, Yuyang Zhang, Arijit Raychowdhury, Bo Yu, Yanjun Zhang, Shaoshan Liu</i>	
AUTOMATED TUNING OF END-TO-END NEURAL FLIGHT CONTROLLERS FOR AUTONOMOUS NANO-DRONES	258
<i>Vlad Niculescu, Lorenzo Lamberti, Daniele Palossi, Luca Benini</i>	
LPE: LOGARITHM POSIT PROCESSING ELEMENT FOR ENERGY-EFFICIENT EDGE-DEVICE TRAINING	262
<i>Yang Wang, Dazheng Deng, Leibo Liu, Shaojun Wei, Shouyi Yin</i>	
HPPU: AN ENERGY-EFFICIENT SPARSE DNN TRAINING PROCESSOR WITH HYBRID WEIGHT PRUNING.....	266
<i>Yang Wang, Yubin Qin, Leibo Liu, Shaojun Wei, Shouyi Yin</i>	
ANALYZING THE ENERGY-LATENCY-AREA-ACCURACY TRADE-OFF ACROSS CONTEMPORARY NEURAL NETWORKS.....	270
<i>Vikram Jain, Linyan Mei, Marian Verhelst</i>	
DESIGN TOOLS FOR RESISTIVE CROSSBAR BASED MACHINE LEARNING ACCELERATORS.....	274
<i>Indranil Chakraborty, Sourjya Roy, Shrihari Sridharan, Mustafa Ali, Aayush Ankit, Shubham Jain, Anand Raghunathan</i>	
INTEGER-ONLY APPROXIMATED MFCC FOR ULTRA-LOW POWER AUDIO NN PROCESSING ON MULTI-CORE MCUS	278
<i>Marco Fariselli, Manuele Rusci, Joel Cambonie, Eric Flamand</i>	
SMART REFRIGERATOR INVENTORY MANAGEMENT USING CONVOLUTIONAL NEURAL NETWORKS.....	282
<i>Tae-Ho Lee, Shin-Woo Kang, Taehyun Kim, Jin-Sung Kim, Hyuk-Jae Lee</i>	
UPIM: PERFORMANCE-AWARE ONLINE LEARNING CAPABLE PROCESSING-IN-MEMORY	286
<i>Sathwika Bavikadi, Purab Ranjan Sutradhar, Amlan Ganguly, Sai Manoj Pudukotai Dinakarao</i>	
TOWARDS SMART AND EFFICIENT HEALTH MONITORING USING EDGE-ENABLED SITUATIONAL-AWARENESS.....	290
<i>Sina Shahhosseini, Anil Kanduri, Milad Asgari Mehrabadi, Emad Kasaeyan Naeini, Dongjoo Seo, Sung-Soo Lim, Amir M. Rahmani, Nikil Dutt</i>	
COUGHNET: A FLEXIBLE LOW POWER CNN-LSTM PROCESSOR FOR COUGH SOUND DETECTION.....	294
<i>Hasib-Al Rashid, Arnab Neelim Mazumder, Utteja Panchakshara Kallakuri Niyogi, Tinoosh Mohsenin</i>	
ENERGY EFFICIENT COMPUTING WITH HETEROGENEOUS DNN ACCELERATORS	298
<i>Md Shazzad Hossain, Ioannis Savidis</i>	
EVALUATION OF MACHINE LEARNING-BASED DETECTION AGAINST SIDE-CHANNEL ATTACKS ON AUTONOMOUS VEHICLE.....	302
<i>Han Wang, Soheil Salehi, Hossein Sayadi, Avesta Sasan, Tinoosh Mohsenin, P D Sai Manoj, Setareh Rafatirad, Houman Homayoun</i>	

TRENDS IN ANALOG AND DIGITAL INTENSIVE COMPUTE-IN-SRAM DESIGNS	306
<i>Rishabh Sehgal, Jaydeep P. Kulkarni</i>	
FLEXIBLE-WIDTH BIT-LEVEL COMPRESSOR FOR CONVOLUTIONAL NEURAL NETWORK	310
<i>Junhan Zhu, Xiaoliang Chen, Li Du, Haoran Geng, Yichuan Bai, Yuandong Li, Yuan Du, Zhongfeng Wang</i>	
ON-CHIP PIXEL RECONSTRUCTION USING SIMPLE CNN FOR SPARSELY READ CMOS IMAGE SENSOR.....	314
<i>Wilfred Kisku, Amandeep Kaur, Deepak Mishra</i>	
ENERGY-EFFICIENT DEEP REINFORCEMENT LEARNING ACCELERATOR DESIGNS FOR MOBILE AUTONOMOUS SYSTEMS	319
<i>Juhyoung Lee, Changhyeon Kim, Donghyeon Han, Sangyeob Kim, Sangjin Kim, Hoi-Jun Yoo</i>	
DEMOGRAPHY-AWARE COVID-19 CONFINEMENT WITH GAME THEORY.....	323
<i>Sreenitha Kasarapu, Rakibul Hassan, Setareh Rafatirad, Housman Homayoun, Sai Manoj Pudukotai Dinakarrao</i>	
AN ENERGY-EFFICIENT HARDWARE ACCELERATOR FOR HIERARCHICAL DEEP REINFORCEMENT LEARNING	327
<i>Aidin Shiri, Bharat Prakash, Arnab Neelim Mazumder, Nicholas R. Waytowich, Tim Oates, Tinoosh Mohsenin</i>	

Author Index