

2023 18th International Workshop on Cellular Nanoscale Networks and their Applications (CNNA 2023)

**Xanthi, Greece
28-30 September 2023**



**IEEE Catalog Number: CFP23CNN-POD
ISBN: 979-8-3503-0893-8**

**Copyright © 2023 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:	CFP23CNN-POD
ISBN (Print-On-Demand):	979-8-3503-0893-8
ISBN (Online):	979-8-3503-0892-1
ISSN:	2165-0160

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

Enabling Real-time Network Intrusion Detection through Custom Hardware Architecture	1
<i>Dimitrios Danopoulos and Dimitrios Soudris</i>	
Interdisciplinary Applications of Non-Integer Order Circuits & Systems	3
<i>Julia Nako, Stavroula Kapoulea, Panagiotis Bertsias, Georgia Tsirimokou and Costas Psychalinos</i>	
A 93nW, Analog, Parallel-Connected Threshold Classifier for Epileptic Seizure Prediction	7
<i>Vassilis Alimisis, Argyro Kamperi, Nikolaos P. Eleftheriou and Paul P. Sotiriadis</i>	
Design of Approximate DNN Accelerators through Framework-Based and Circuit-Level Techniques	11
<i>Vasileios Leon, Sotirios Xydis, George Lentaris and Dimitrios Soudris</i>	
Intelligent Client Selection for Federated Learning using Cellular Automata	15
<i>Nikolaos Pavlidis, Vasileios Perifanis, Theodoros Panagiotis Chatzinikolaou, Georgios Ch. Sirakoulis and Pavlos S. Efraimidis</i>	
Action recognition via graph convolutional networks for the assisted living of the elderly	19
<i>Zois Tsakiris, Lazaros Tsochatzidis, Dimitrios Menychtas, Nikolaos Aggelousis and Ioannis Pratikakis</i>	
Navigation with care: the ASPiDA assistive robot	23
<i>Katerina Maria Oikonomou, Ioannis Tsampikos Papapetros, Ioannis Kansizoglou, Georgios Ch. Sirakoulis and Antonios Gasteratos</i>	
The Case for Asymmetric Systolic Array Floorplanning	27
<i>Christodoulos Peltekis, Dionysios Filippas, Giorgos Dimitrakopoulos and Chrysostomos Nicopoulos</i>	
Towards dense indoor environmental sensing with LoraWAN	31
<i>Eleftheria Katsiri, Christos Karasoulas and Christoforos Keroglou</i>	
A bio-inspired elderly action recognition system for ambient assisted living	36
<i>Katerina Maria Oikonomou, Ioannis Kansizoglou, Ioannis Tsampikos Papapetros and Antonios Gasteratos</i>	
Toward Real Time Processing of Radar Signals Detecting Elderly People Fall	42
<i>Dimitrios Arnaoutoglou, Dimitrios Dedemadis, Sotirios Katsimentes, Antigone Aikaterini Kyriakou, Athanasios Gkrekidis, Dimitrios Menychtas, Nikolaos Aggelousis, Georgios Ch. Sirakoulis and George Kyriacou</i>	
Effects of a Group Exercise on the Center of Mass of Elderly People with a High Risk of Falling	45
<i>Dimitrios Menychtas, Eugenia Kouli, Athanasios Gkrekidis, Archontissa Kanavaki, Stefania Pavlidou, Elpiniki Nasiou, Evangelia Abrasi, Georgios Kontogiannis, Helen T. Douda, Maria Michalopoulou, Ilias Smilios, Vassilios Gourgoulis, Georgios Ch. Sirakoulis and Nikolaos Aggelousis</i>	

Older adults' views on the use of in-home ambient sensors and assistive robotic agents in Greece. Data from the ASPiDA project.....	48
<i>Archontissa Kanavaki, Ioannis Kansizoglou, Maria Michalopoulou, Georgios Ch. Sirakoulis, Athanasios Gkrekidis, Evgenia Kouli, Dimitrios Menychtas, Helen T. Douda, Ilias Smilios, Vassilios Gourgoulis, Antonios Gasteratos and Nikolaos Aggelousis</i>	
Historical Document Image Binarization using a lightweight U-Net derivative architecture	52
<i>Nikolaos Detsikas and Nikolaos Mitianoudis</i>	
Preliminary study on charging patterns dedicated for low power smart mobile devices via modular RF Energy Harvester: iPowerKit	57
<i>Alexandros Boubaris, Nick Papanikolaou and Christos Christodoulou</i>	
Contactless Blood Pressure Estimation using infrared video from facial and hand regions .	62
<i>Thomas Stogiannopoulos and Nikolaos Mitianoudis</i>	
Towards a Modular Lower Body Robotic Model Using the Product of Exponentials.....	67
<i>Dimitrios Menychtas, Athanasios Gkrekidis, Georgios Michailidis, Archontissa Kanavaki, Evgenia Kouli, Theodoros Tzelepis, Panagiotis Kasimatis, Konstantinos Astrapellos, Vassilios Gourgoulis, Ilias Smilios, Maria Michalopoulou, Helen T. Douda, Georgios Ch. Sirakoulis and Nikolaos Aggelousis</i>	
Investigation of Proteinoid Microspheres for Cellular Nanonetworks Based on Frequency Response.....	70
<i>Panagiotis Mougkogiannis and Andrew Adamatzky</i>	
Stable Diffusion with Continuous-time Neural Networks	75
<i>Andras Horvath</i>	
Approximate Parallel Annealing Ising Machines (APAIMs): Controller and Arithmetic Design	79
<i>Qichao Tao, Tingting Zhang and Jie Han</i>	
An Algorithmic Approach to the Design of a Comprehensive ReRAM Memory Controller .	84
<i>Jose Cayo and Ioannis Vourkas</i>	
Explaining a Recent Observation of Bistability in the Oscillatory Response of a Pulse-Driven ReRAM	86
<i>Alon Ascoli, Nicolas Schmitt, Ioannis Messaris, Ahmet Samil Demirkol, Vasileios Ntinis, Dimitrios Prousalis, Stephan Menzel, Vikas Rana, Spiros Nikolaidis, Ronald Tetzlaff and Leon Chua</i>	
Performance Analysis of unipolar CBRAM in 1D1R configuration towards IMC under realistic conditions	92
<i>Ioannis Tompris, Evangelos Tsipas, Iosif-Angelos Fyrigos and Georgios Ch. Sirakoulis</i>	
Variability Reduction with Bilayer RRAM Device	98
<i>Tim Kempen, Ankit Bende, Alexandros Sarantopoulos, Regina Dittmann, Christopher Bengel, André Zambanini, Dennis Nielinger, Stephan Menzel and Vikas Rana</i>	
On the Design of Oscillatory Circuits Based on Stanford Memristor Model	102
<i>Mauro Di Marco, Mauro Forti, Luca Pancioni, Giacomo Innocenti and Alberto Tesi</i>	
Memristor Applications: Nanodevices Redefining Technological Landscapes.....	106
<i>Nikolaos Vasileiadis, Georgios Ch. Sirakoulis and Panagiotis Dimitrakis</i>	

Implementation of Reservoir Computers using Simulated Electrostatically Linked Systems	111
<i>Stavros G. Stavrinides, Panagiotis Tzounakis, Carol de Benito, Christos Tjortjis, Mohamad Moner Al Chawa, Ioannis Antoniou and Rodrigo Picos</i>	
Antenna based classification of posture positions using 1T1M crossbar arrays	114
<i>Elizabeth George, Aswani Radhakrishnan and Alex James</i>	
Analog Unidirectional Memristive and Memcapacitive Device for Neuromorphic Computing	117
<i>Muhammad Umair Khan, Yawar Abbas and Baker Mohammad</i>	
Enhancing the A* Algorithm for Efficient Route Planning of Agriculture	121
<i>Antonios Chatzisavvas, Malamati Louta and Minas Dasygenis</i>	
LTSPICE Memristor Neuron with MOS Transistor-Based Logarithmic-Sigmoidal Activation Function	125
<i>Valeri Mladenov, Georgi Tsenov and Stoyan Kirilov</i>	
Employing Vector Field Techniques on the Analysis of Memristor Cellular Nonlinear Networks Cell Dynamics	129
<i>Chandan Singh, Vasileios Ntinis, Dimitrios Prousalis, Yongmin Wang, Ahmet Samil Demirkol, Ioannis Messaris, Vikas Rana, Stephan Menzel, Alon Ascoli and Ronald Tetzlaff</i>	
Memristive Stochastic Binary Neurons for Solving Optimisation Problems	133
<i>Adil Malik and Christos Papavassiliou</i>	
Trading Parallelism for Resources in the FPGA Implementation of Cellular Automata-based Models	138
<i>Kevin Pizarro, Miguel Andrade and Ioannis Vourkas</i>	
A Memristive Neuromorphic Voltage-to-Frequency Mapping Oscillator for Automotive Applications	142
<i>Ioannis K. Chatzipaschalis, Theodoros Panagiotis Chatzinikolaou, Iosif-Angelos Fyrigos, Antonio Rubio and Georgios Ch. Sirakoulis</i>	