9th international workshop on

APPLications in Electronics Pervading Industry, Environment and Society

APPLEPIES 2021

21-22 September 2021, hybrid conference

First day in presence and online, Second day fully online

www.applepies.eu (Free) registration required

DAY 1 Tuesday 21 September (in presence and online)

11.00-11.15 Opening and Introduction

11.15-12.45 Session S1 (Full Oral)

Lunch break 12.45-14.00

14.00-15.45 Session S2 (Full Oral)

Break 15.45-16.00

16.00-17.30 Session SS1 (Short Oral)

DAY 2 Wednesday 22 September (online)

9.20-9.30 Introduction of Day2

9.30-10.10 The European Roadmap Towards High Performance Computing: Industrial and Scientific Perspectives (J. P. Panziera, **ATOS and** B. Mohr**, FZ Juelich**)

Break 10.10-10.20

10.20-11.50 Session S3 (Full Oral)

11.50-13.20 Session S4 (Full Oral)

Break 13.20-13.50

13.50-15.20 Session SS2 (Short Oral)

Break 15.20-15.30

15.30-16.30 High Performance Computing Continuum: The Italian Industry in the European Processor Initiative and Pilots (F. Magugliani, **E4**; D. Ghezzi, **LEONARDO**; F. Ottonelli/G. Venere, **SECO**)

16.30-16.40 Closing Conference

Session S1 (Full Oral, presence/online) 11.15-12.45 Tuesday 21 September 2021 (6 papers)

Chair Riccardo Berta

P. Nannipieri, L. Baldanzi, L. Crocetti, S. Di Matteo, F. Falaschi, L. Fanucci and S. Saponara. *CRFlex: A Flexible and Configurable Cryptographic Hardware Accelerator for AES Block Cipher Modes*

M. Cococcioni, F. Rossi, E. Ruffaldi and S. Saponara. *Experimental Results of Vectorized Posit-based DNNs on a Real ARM SVE High Performance Computing Machine*

G. Giuffrida, S. Panicacci, M. Donati and L. Fanucci. *Assisted Driving for Power Wheelchair: a Segmentation Network for Obstacle Detection on Nvidia Jetson Nano*

M. A. Mansoori and M. Casu. *Efficient Training and Hardware Co-Design of Machine Learning Models*

G. C. Cardarilli, L. Di Nunzio, R. Fazzolari, D. Giardino, M. Guadagno, M. Re and S. Spanò. *A M-PSK Timing Recovery Loop based on Q-Learning*

M. Cossu, J. L. Quimi Villon, F. Bellotti, A. Capello, A. De Gloria, L. Lazzaroni and R. Berta. *Classifying simulated driving scenarios from automated cars*

Session S2 (Full Oral, presence/online) 14.00-15.45 Tuesday 21 September 2021 (7 papers)

Chair Massimo Ruo Roch

R. S. Molina, L. G. Garcia Ordoñez, I. R. Morales, M. L. Crespo, G. Ramponi, S. Carrato, A. Cicuttin and H. Perez. *Compression of NN-based Pulse-shape Discriminators in Front-end Electronics for Particle Detection*

A. Verani, R. Di Rienzo, F. Baronti, R. Roncella and R. Saletti. *Analysis of Thermal-Induced Shunt Current Sensor Errors in a Low-Cost Battery Management System*

A. Carloni, S. Constà, M. Pasquali, F. Baronti, R. Di Rienzo, R. Roncella and R. Saletti. *Preliminary Design of a Flexible Test Station for Second-Life Battery Development*

T. Prastowo, A. Shah, L. Palopoli and R. Passerone. *Resource Optimization in MEC-based B5G Networks for Indoor Robotics Environment*

R. Moretti, T. Addabbo, A. Fort, M. Mugnaini and V. Vignoli. *Low-Level Advanced Design of True Random Number Generators Based on Truly Chaotic Digital Nonlinear Oscillators in FPGAs*

F. Sapienza, V. Lottici, F. Giannetti and S. Saponara. *Design of V2X Communications Based on 5G NR: a Physical Layer Perspective*

M. Ruo Roch and M. Martina. *A low cost and small size output amplifier for multichannel muscle stimulation*

Session S3 (Full Oral, fully online) 10.20-11.50 Wednesday 22 September 2021 (6 papers)

Chair Francesco Bellotti

G. Brunetti, G. Marocco, A. Giorgio, M. N. Armenise and C. Ciminelli. *Scalable broadband switching matrix for telecom payload based on a novel SWGs-based MZI*

M. Bassoli, V. Bianchi, A. Boni, S. Fortunati, M. Giannetto, M. Careri and I. De Munari. *A smart portable potentiostat for Point-of-Care Testing*

F. Guzzi, G. Kourousias, F. Billè, G. Di Credico, A. Gianoncelli and S. Carrato. *Signal alignment problems on multi-element X-ray Fluorescence detectors*

M. Gaiduk, R. Seepold, N. Martinez Madrid, T. Penzel, L. Weber, M. Conti, S. Orcioni and J. A. Ortega. *Evaluating Body Movement and Breathing Signals for Identification of Sleep/Wake States*

M. Grammatikakis, N. Mouzakitis, L. Kypraios and N. Papatheodorou. *DoS Detection on In-Vehicle Networks: Evaluation on an Experimental Embedded System Platform*

G. Mezzina, M. Barbareschi, S. De Simone, A. Di Benedetto, G. Narracci, C. L. Saragaglia, D. Serra and D. De Venuto. *Smart On-Board Surveillance Module for Safe Autonomous Train Operations*

Session S4 (Full Oral, fully online) 11.50-13.20 Wednesday 22 September 2021 (6 papers)

Chair Daniela De Venuto

W. O. Florian Samayoa, B. Valinoti, L. G. Garcia Ordonez, M. Cervetto, E. Marchi, M. L. Crespo, S. Carrato and A. Cicuttin. *An Open-Source Hardware/Software Architecture for Remote Control of SoC-FPGA based Systems*

G. Akkad, A. Mansour, B. Elhassan, E. Inaty and R. Ayoubi. *A Self Referencing Technique for The RC-pLMS Adaptive Beamformer and its Hardware Implementation*

A. Maya-López, F. Casino, A. Solanas and A. Martínez-Ballesté. *Microaggregation Optimisation through Random Cluster Shuffling*

I. Casalini, M. Marini and L. Fanucci. *FPGA implementation of a configurable vocal feature extraction embedded system for dysarthric speech recognition*

Q. Zheng, H. Wang, A. Elhanashi, S. Saponara and D. Zhang. *An Intelligent Non-Cooperative Spectrum Sensing Method Based on Convolutional Auto-encoder (CAE)*

L. Berzi, F. Grasso, L. Pugi, E. Boni and R. Savi. *Design and Preliminary Testing of an Electrified Directional Drilling Machine*

Session SS1 (Short Oral, presence/online) 16.00-17.30 Tuesday 21 September 2021 (10 papers)

Chair Massimo Conti

T. Apicella, E. Ragusa, A. Canepa and P. Gastaldo. *A data-driven method for reliability estimation of auxiliary power consumption prediction in Commercial Electric Vehicles*

G. Simonte, R. Di Rienzo, I. Biagioni, F. Baronti, R. Roncella and R. Saletti. *Novel setup to extend the temperature characterization range of a Sodium-Metal Halide Battery*

A. Romani, F. Bigongiari and L. Fanucci. *Exploring GPS L1 C/A Fast Acquisition with COTS FPGA*

A. Romani, F. Bigongiari and L. Fanucci. *Feasibility study of a unified fast acquisition core for modern GPS signals*

M. Conti, L. Stacchiotti and S. Orcioni. *Mismatch analysis of parallel Li-ion Batteries*

L. Fronda, R. Berta, P. Cesario, A. De Gloria and F. Bellotti. *Modeling the Line Interruption Issue in a Railway Network*

A. Ria, M. Cicalini, G. Manfredini, A. Catania, M. Piotto and P. Bruschi. *The SENSIPLUS: a single-chip fully programmable sensor interface*

M. Conti. *Simulation environment for mixed AHB-NoC architectures*

J. Agnelli, S. Saponara, D. Benedetti and N. Fantuzzi. *Exploiting sustainable composite materials for the manufacturing of high-efficient electric cars*

J. Motta, F. Bellotti, R. Berta, A. Capello, M. Cossu, A. De Gloria, L. Lazzaroni and S. Bonora. *Developing a Synthetic Dataset for Driving Scenarios*

Session SS2 (Short Oral, fully online) 13.50-15.20 Wednesday 22 September 2021 (10 papers)

Chair Ralf Seepold

S. Saponara and A. Elhanashi. *Impact of Image Resizing on Deep Learning Detectors for Training Time and Model Performance*

E. Boni, L. Pugi and A. Venturi. *Preliminary Design of a Three-Dimensional Anemometer for Sail Boats*

P. López-Aguilar and A. Solanas. *An Effective Approach to the Cross-Border Exchange of Digital Evidence Using Blockchain*

A. Osman, U. Abid, L. Gemma, M. Perotto and D. Brunelli. *TinyML Platforms Benchmarking*

A. Tierno, G. Turri, A. Cimatti and R. Passerone. *Automatic Design Space Exploration of Redundant Architectures*

A. Torrisi, F. Baggio and D. Brunelli. *Visible Light Communication for Intermittent Computing Battery-less IoT Devices*

C. Comino, T. Pacini, E. Rapuano and L. Fanucci. *Design and Implementation of an FPGA-based CNN hardware accelerator using Partial Reconfigurability: the CloudScout case study.*

M. Grammatikakis and M. Androulakis. *Comparison of a Medical-Grade and an Open ECG Biosensor using a Soft Real-Time m-Health Platform*

A. Ibrahim, H. Hajj A., M. H. Hassan and M. Valle. *Convolutional Neural Networks based Tactile Object Recognition for Tactile Sensing System*