



**8<sup>th</sup> international workshop on  
APPLications in Electronics Pervading Industry,  
Environment and Society**

***APPLEPIES 2020***

**19-20 November 2020, on-line on TEAMS, [www.applepies.eu](http://www.applepies.eu)**

**(Free) registration required**

**DAY 1 Thursday 19 November**

**9.00-9.15 Opening and Introduction** (chairs: S. Saponara, A. De Gloria)

**9.15-9.45 Scientific Keynote 1** (C. Metra, IEEE Computer Society Past President 2020, “Safety and Reliability Challenges to Enable a Smarter World”)

Break 9.45-9.50

**9.50-10.20 Scientific Keynote 2** (J. Davis, Barcelona Super Computing, “RISC-V, Enabling a Wide Open Future of HPC”)

Break 10.20-10.30

**10.30-11.45 SessionS1 AI and ML Techniques** (chair: R. Berta)

Break 11.45-11.50

**11.50-12.50 SessionS2 Environmental Monitoring and E-health** (chair: R. Seepold)

**12.50-13.20 Instrumentation & Measurement GIAKOVA Keynote** (L. Poli)

Lunch break 13.20-14.30

**14.30-15.30 SessionSS1 Mechatronics, Energies and Industry 4.0** (chair: F. Bellotti)

Break 15.30-15.40

**15.40-16.40 Session SS2 IoT, AI and ICT applications** (chair: N. Martinez Madrid)

**16.40-16.45 Closing Day1: SIE Society** (chairs: G. Ghione, R. Berta)



## **DAY 2 Friday 20 November**

**9.00-9.10 Intro of Day2 and of Industrial Keynotes** (chairs: S. Saponara, A. De Gloria)

**9.10-9.40 LEONARDO Industrial Keynote** (A. Massa, “Surveillance by sensors, drones and satellites”)

Break 9.40-9.45

**9.45-10.15 HUAWEI Industrial Keynote** (P. Gai, “Towards intelligent fully-connected automotive systems”)

Break 10.15-10.25

**10.25-11.40 Session S3 Electronics for Health and Assisted living** (chair: D. De Venuto)

Break 11.40-11.45

**11.45-13.00 Session S4 Digital Techniques for Mechatronics, Energy and Critical Systems** (chairs: M. Grammatikakis, C. Giaconia)

Break 13.00-13.30

**14.30-15.45 Session S5 Photonic Circuits and IoT for Communications** (chairs: M. Ruo Roch, D. Brunelli)

**15.45-16.00 Closing Conference:** (chairs: S. Saponara, A. De Gloria)



## SESSIONS WITH REGULAR PAPERS

### **S1 AI and ML Techniques**

**Chair: Riccardo Berta, Università di Genova**

**Session S1 10.30-11.45 Thursday 19 November 2020 5 papers**

Romina Molina, Valeria Gonzalez, Jesica Benito, Stefano Marsi, Giovanni Ramponi and Ricardo Petrino, Implementation of Particle image velocimetry for silo discharge and food industry seeds

Alessio Gagliardi, Marco Villeda, Luca Picciolini and Sergio Saponara, Analysis and Design of a Yolo like DNN for Smoke/Fire Detection for Low-cost Embedded Systems

Edoardo Ragusa, Christian Gianoglio, Filippo Dalmonte and Paolo Gastaldo, Video Grasping Classification Enhanced with Automatic Annotations

Abdussalam Elhanashi, Sergio Saponara, and Alessio Gagliardi, Enabling YOLOv2 Models to Monitor Fire and Smoke Detection Remotely in Smart Infrastructures

Francesco Bellotti, Riccardo Berta, Alessandro De Gloria, Joseph Doyle and Fouad Sakr. Exploring Unsupervised Learning on Mainstream Microcontrollers

### **S2 Environmental Monitoring and E-health**

**Chair: Ralf Seepold, HTWG Konstanz**

**Session S2 11.50-12.50 19 November 2020 4 papers**

Yurii Shkilniuk, Maksym Gaiduk and Ralf Seepold, Unobtrusive accelerometer-based heart rate detection

Marco Carminati, Davide Di Vita, Luca Buonanno, Giovanni Montagnani and Carlo Fiorini. A Lightweight SiPM-Based Gamma-Ray Spectrometer for Environmental Monitoring with Drones

Patrick Locatelli, Asad Hussain, Andrea Pedrana, Matteo Pezzoli, Gianluca Traversi and Valerio Re Winter: A Novel Low Power Modular Platform for Wearable and IoT Applications

Federica Zonzini, Matteo Zauli, Antonio Carbone, Francesca Romano, Nicola Testoni and Luca De Marchi, Hardware-oriented Data Recovery Algorithms for CS-based Vibration Diagnostics

### **S3 Electronics for Health and Assisted living**

**Chair: Daniela De Venuto, Politecnico di Bari**

**Session S3 10.25-11.40 20 November 2020 5 papers**

Francesco de Gioia, Massimiliano Donati, Luca Fanucci, Automatic generation of 3D printable tactile paintings for the visually impaired

Miltos Grammatikakis, Anastasios Koumarelis, Efstratios Ntallaris, Validation of Soft Real-Time in Remote ECG Analysis

Miltos Grammatikakis, Anastasios Koumarelis and Angelos Mouzakitis, Software Architecture of a User-Level GNU/Linux Driver for a Complex E-Health Biosensor



Marco Marini, Gabriele Meoni, Davide Mulfari, Nicola Vanello, Luca Fanucci, Enabling smart home voice control for Italian people with dysarthria: preliminary analysis of frame rate effect on speech recognition

Giovanni Mezzina, Daniela De Venuto, Brain-actuated Pick-Up and Delivery Service for Personal Care Robots: Implementation and Case Study

#### **S4 Digital Techniques for Mechatronics, Energy and Critical Systems**

**Chair: Miltos Grammatikakis, Hellenic Mediterranean University and Costantino Giaconia, Università di Palermo**

##### **Session S4 11.45-13.00 Friday 20 November 2020 5 papers**

Marica Poce, Giovanni Casiello, Lorenzo Ferrari, Lorenzo Flaccomio Nardi Dei and Sergio Saponara, Creation of a Digital Twin Model, Redesign of Plant Structure and New Fuzzy Logic Controller for the Cooling System of a Railway Locomotive

Mattia Stighezza, Valentina Bianchi and Ilaria De Munari, HDL code generation from SIMULINK environment for Li-Ion cells State of Charge and parameter estimation

Hariom Dhungana, Francesco Bellotti, Riccardo Berta and Alessandro De Gloria, Performance Comparison of Imputation Methods in Building Energy Data sets

Giuseppe Galioto, Antonino Sferlazza and G. Costantino Giaconia, Design and validation of a FPGA-based HIL simulator for minimum losses control of a PMSM

Nikos Mouzakitis, Michele Paolino, Miltos Grammatikakis and Daniel Raho, x86 System Management Mode (SMM) evaluation for Mixed Critical Systems

#### **S5 RF, Photonic Circuits and IoT for Communications**

**Chair: Massimo Ruo Roch, Politecnico di Torino; Davide Brunelli, Università di Trento**

##### **Session S5 14.30-15.45 20 November 2020 5 papers**

Yonas Muanenda, Stefano Faralli, Philippe Velha, Claudio Oton and Fabrizio Di Pasquale, A Novel Pulse Compression Scheme in Coherent OTDR using Direct Digital Synthesis and Nonlinear Frequency Modulation

Francesco Cosimi, Gabriele Ciarpi, Sergio Saponara, Design and Analysis of RF/High-speed SERDES in 28nm CMOS technology for Aerospace Applications

Alessandro Torrisi, Kasım Sinan Yıldırım and Davide Brunelli, Enabling Transiently-Powered Communication via Backscattering Energy State Information

Paolo Prospero, Gabriele Ciarpi and Sergio Saponara, Analysis and Design of Integrated VCO in 28nm CMOS Technology for Aerospace Applications

Massimo Ruo Roch, Maurizio Martina, vrLab: A Virtual and Remote low cost electronics lab platform



## SESSIONS WITH SHORT PAPERS

### SS1- Mechatronics, Energies and Industry 4.0

**Chair: F. Bellotti, Università di Genova**

**Session SS1 14.30-15.30 19 November 2020 6 papers short**

Valerio Vita, Luca Pugi, Lorenzo Berzi, Francesco Grasso, Raffaele Savi, Massimo Delogu and Enrico Boni. Mechatronic Design Optimization of an Electrical Drilling Machine for Trenchless Operations in Urban Environment

Matteo Petrelli, Sandro Giannetti, Francesco Cosimi, Pierpaolo Dini, and Sergio Saponara Analysis and Design of a Non-linear MPC Algorithm for Vehicle Trajectory Tracking and Obstacle Avoidance

Marco Ducci, Alessandro Peruzzi and Luca Pugi. Impact of Combined Roto-Linear Drives on the Design of Packaging Systems: Some Applications,

Andrea Carloni, Federico Baronti, Roberto Di Rienzo, Roberto Roncella and Roberto Saletti. Preliminary study of a novel Lithium-ion battery low-cost maintenance system

Roberto Di Rienzo, Federico Baronti, Daniele Bellucci, Andrea Carloni, Roberto Roncella, Marco Zeni and Roberto Saletti. Low cost and flexible battery framework for micro-grid applications

Luca Fronda, Francesco Bellotti, Riccardo Berta, Alessandro De Gloria and Paolo Cesario Survey of positioning technologies for in-tunnel railway maintenance

### SS2- IoT, AI and ICT applications

**Chair Natividad Martinez Madrid, Reutlingen University**

**Session SS2 15.40-16.40 19 November 2020 6 papers short**

Riccardo Berta, Andrea Mazzara, Francesco Bellotti, Alessandro De Gloria and Luca Lazzaroni Edgine, a Runtime System for IoT Edge Applications

Gian Carlo Cardarilli, Luca Di Nunzio, Rocco Fazzolari, Daniele Giardino, Marco Matta, Marco Re and Sergio Spanò, An Action-Selection Policy Generator for Reinforcement Learning Hardware Accelerators

Ali Daher, Hussein Chible, Marco Muselli, Ali Rizik and Daniele D. Caviglia Porting Rulx Machine Learning Software to the Raspberry Pi as an Edge Computing Device

Luis Guillermo García Ordóñez, Maria Liz Crespo, Sergio Carrato, Andres Cicuttin, Werner Florian, Romina Molina, Bruno Valinoti and Stefano Levorato High Voltage Isolated Bidirectional Network Interface for SoC-FPGA Based Devices

Maksym Gaiduk, Ralf Seepold, Natividad Martinez Madrid, Juan Antonio Ortega, Massimo Conti, Simone Orcioni, Thomas Penzel, Wilhelm Daniel Scherz, Juan José Perea, Ángel Serrano Alarcón and Gerald Weiss A comparison of objective and subjective sleep quality measurement in a group of elderly persons in a home environment

Michela Borghetti, Tiziano Fapanni, Nicola Francesco Lopomo, Emilio Sardini and Mauro Serpelloni. A Preliminary Study on Aerosol Jet-Printed Stretchable Dry Electrode for Electromyography