



Politecnico
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Department
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**12th international conference on
APPLications in Electronics Pervading Industry, Environment and Society**

APPLEPIES 2024

19-20 September 2024, Turin

www.applepies.eu (Free) registration required

DAY 1 Thursday 19 September

10.00-10.30 Opening and Introduction

10.30-11.30 Session S1 - Cybersecurity and cryptography

Break 11.30-12.00

12.00-13.00 Session S2 - RISC-V Ecosystem

Lunch break 13.00-14.00

14.00-15.30 Session S3 - Health applications

Break 15.30-16.00

16.00-17.30 Session S4 - Transportation systems

17.30-19.00 Session S5 - Sensing applications

**20:00 - Social dinner (self-paid) at “Stefano Fanti Al Ristorante Circolo Dei Lettori”,
located in the downtown, near the central Piazza Castello.**

DAY 2 Friday 20 September

9.15-9.30 Introduction of Day2

9.30-10.30 Session S6 - Image processing

**10:30-11:00 Tutorial on Open Science, Federica Cappellutti, Polytechnic University of
Turin**

Break 11.00-11.30

11.30-12.30 Industry panel: Challenges in EV electronics

Lunch break 12.30-13.30

13.30-15.00 Session S7 - Specialized IP design

15.00-16.30 Session S8 - AI applications



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16.30-17:00 Closing Conference

Session S1 - 10.30-11.30 Thursday 19 September - Cybersecurity and cryptography

Chair: [TBD]

Dini, Pierpaolo; Visconti, Sara; Soldaini, Ettore; Elhanashi, Abdussalam Elhadi; Saponara, Sergio. *Embedded Anomaly Detection System for In-Vehicle Networking Cybersecurity*

Cherry, Ali; Kourani, Hayat; Sbeity, Nadine ; Abou Ali, Mohamad; Salameh, Wassim; Dabbous, Ali; Hajj-Hassan, Mohamad. *Photoplethysmography-Based Biometric System: Evaluating Deep Learning Techniques for Enhanced Security*

Mirigaldi, Mattia; Martina, Maurizio; Masera, Guido. *Performance Comparison: Software vs. Hardware Implementation of Novel S-Box Designed to Resist Power Analysis Attack*

Della Sala, Riccardo; Scotti, Giuseppe. *Ask Less, Get More: On Reducing the Resource Consumption and Improving Statistical Performance of Ring Oscillator PUFs on FPGA*

Session S2 - 12.00-13.00 Thursday 19 September - RISC-V Ecosystem

Chair: [TBD]

Dolmeta, Alessandra; Masera, Guido; Martina, Maurizio. *Exploring the new CV-X-IF Interface to Customize RISC-V Instruction Sets: a Case of Study in Cryptography*

Bordonaro, Lorenzo; Rapuano, Emilio; Bocchio, Sara; Fanucci, Luca. *Integration of the open-source RISC-V Formal Verification Framework into the STMICROELECTRONICS toolchain and its application to the STRiVe2.4 CPU*

Barbirotta, Marcello; Angioli, Marco; Mastrandrea, Antonio; Cheikh, Abdallah; Menichelli, Francesco; Olivieri, Mauro. *Alternative Implementations of Error Correcting Codes in Register Files of a RISC-V Safety Critical Processor*

Re, Marco. *Automatic Tunable Floating Point Format in a Risc-V Ecosystem*

Session S3 - 14.00-15.30 Thursday 19 September - Health applications

Chair: [TBD]

El Khoury, Said; Mikael, Carl Angelo; El Helou, Santa; Yaacoub, Tina; Mikhael, Elio; Abou Boutros, Youssef; Mansour, Ali. *AI-Driven Automation of Medical Keyword Extraction and ICD10 Code Association in Gastroenterology Records*

Ria, Andrea; Contardi, Simone; Gagliardi, Francesco; Bruschi, Paolo; Piotto, Massimo. *A low-cost Real Time ECG/BIA monitoring system based on versatile miniASIC sensor interface*



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Celli, Roberto; Zauli, Matteo; Zonzini, Federica; Arcobelli, Valerio Antonio; Mellone, Sabato; Spadotto, Alberto; Diemberger, Igor; De Marchi, Luca. *Improving Auscultation in Wearable Health Devices integrating MEMS Microphones and Accelerometers*

Alzein, Zahraa; Ibrahim, Ali M; Wehbe, Alaa; Caviglia, Daniele. *Plane-Wave Ultrasound Imaging: Implementation and Evaluation of Different Interpolation Schemes.*

Coviello, Giuseppe; Florio, Antonello; Brunetti, Giuseppe; Ciminelli, Caterina. *Preliminary Characterization of a Non-Contact Breath Monitoring System for Infants*

Elhanashi, Abdussalam Elhadi; Saponara, Sergio; Dini, Pierpaolo; Zheng, Qinghe; Ali, Farzana ; Singh, Yashbir; Kuanar, Shiba; Huo, Yuankai; Younis, Khaled. *Advanced Deep Learning in Medical Imaging: Brain Tumor Detection and Localization with YOLOv9*

Session S4 - 16.00-17.30 Thursday 19 September - Transportation systems

Chair: [TBD]

Fornieris, Luca; Bellotti, Francesco; Berta, Riccardo; Lazzaroni, Luca; Oh, Changjae. *Exploring Decision Transformer for Highway Automated Driving*

Albanese, Andrea; Gotta, Danilo; Brunelli, Davide. *A tinyML-based Low-Power IoT Device for Advanced Shipping Monitoring*

Bellotti, Francesco; Berta, Riccardo; Soltanmuradov, Vafali; Martin Gomez, David; Dhonthi, Akshay; Hashemi, Vahid; Lazzaroni, Luca. *Robustness Verification of a Reinforcement Learning-based Agent for Automated Car Parking*

Tirolese, Vincenzo; Donadi, Alessandro; Disarò, Federico; Carminati, Marco. *A Rocket Payload Demonstrator for Real-Time Fault Detection of Pressure Sensors Based on Redundancy and Machine Learning*

Fornieris, Luca; Bellotti, Francesco; Berta, Riccardo; Cossu, Marianna; Fresta, Matteo; Rezaieamale, Raziye; Rojhan, Hadise; Soltanmuradov, Vafali; Tango, Fabio; Lazzaroni, Luca. *Setting up a Lightweight Simulation Environment for Automated Driving Dataset Collection*

Dini, Pierpaolo; Nardi, Damiano; Basso, Giovanni; Saponara, Sergio. *Model-based Analysis of a Smart Latch System in Automotive Application*

Session S5 - 17.30-19.00 Thursday 19 September - Sensing applications

Chair: [TBD]

Mohsin, Muhammad; Rovetta, Stefano; Masulli, Francesco; Cabri, Alberto. *Real-Time Detection of Electronic Components in Waste Printed Circuit Boards: A Transformer-Based Approach*



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Simonte, Gianluca; Di Rienzo, Roberto; baronti, Federico; Roncella, Roberto; Saletti, Roberto. *Development of a Partial Power DC/DC Converter based on buck-boost topology for Battery Parallelization Systems*

Fasolino, Andrea; Licciardo, Gian Domenico; Vitolo, Paola; Liguori, Rosalba; Di Benedetto, Luigi; Rubino, Alfredo; Pau, Danilo Pietro. *Hardware-aware depth image classification model for in-sensor AI integration*

Sandri, Cesare; Di Rienzo, Roberto; Nicodemo, Niccolò; Verani, Alessandro; baronti, Federico; Roncella, Roberto ; Saletti, Roberto. *Optimal sizing of PCB coils for Lithium-ion cell dilation measurement*

Nardello, Matteo; Perini, Marco; Livatti, Luca; Chini, Jasmine; Brunelli, Davide. *Monitoring Fruit Stress in Apple Grading Industrial Processes with low-power IoT Sensor*

Lorenzoni, Filippo; Rossi, Riccardo; Frati, Michele; Gentili, Andrea; Orcioni, Simone; Conti, Massimo. *Bridge condition monitoring using low-cost accelerometers*

Session S6 - 9.30-10.30 Friday 20 September - Image processing

Chair: [TBD]

Canese, Lorenzo; Cardarilli, Gian Carlo; D'Angelo, Giuseppe; Di Nunzio, Luca; Gabellini, Piero; La Cesa, Riccardo; RE, MARCO; Spanò, Sergio. *Onboard FPGA AI/ML Processing on Landsat-8 Satellite Images: A Case Study of Wildfires Detection*

Dabbous, Ali; Berta, Riccardo; Lazzaroni, Luca; Pighetti, Alessandro; Bellotti, Francesco. *Benchmarking microcontrollers with ultra-low resolution images classification*

Ballout, Hadi; Berta, Riccardo; dabbous, ali; Fresta, Matteo; Lazzaroni, Luca; Pighetti, Alessandro; Bellotti, Francesco. *Performance Comparison of YOLOv8 and YOLOv10 for Traffic Light Detection on a Jetson Nano Board*

Cossu, Marianna; Berta, Riccardo; Bagheri Orumi, Mohammad Ali; Lazzaroni, Luca; Sauvaget, Jean-Louis; Touil, Hind; Bellotti, Francesco. *Comparing Detection-Based and Motion-Based Preprocessing of Video Frames for Automated Driving Scenario Detection*

Session S7 - 13.30-15.00 Friday 20 September - Specialized IP design

Chair: [TBD]

Rossi, Federico; Cococcioni, Marco; Saponara, Sergio. *LLAMA-2 acceleration using the ARM Scalable Vector Extension*



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Wistoff, Nils; Heiser, Gernot; Benini, Luca. *Fence.t.s: Closing Timing Channels in High-Performance Out-of-Order Cores through ISA-Supported Temporal Partitioning*

Versari, Alessandro; Cococcioni, Marco. *Optimal Synthesis of Multi-Output Boolean Functions Using modern ILP solvers*

Grammatikakis, Miltos; Kornaros, Georg; Fortea, Mateo. *Simulated Annealing Scheduling on Kubernetes Clusters: An E-Health Digital Twin Use-Case*

Mestice, Marco; Ciarpi, Gabriele; Rossi, Daniele; Saponara, Sergio. *An Area-Oriented Approach to the System-Level Design of Charge-Pump Phase-Locked Loops*

Rathod, Rajender; Ciarpi, Gabriele; Genovesi, Simone; Rossi, Daniele. *Design of An Ultra-Wideband Multiple-Mode Resonator (MMR)-Based High Selectivity Bandpass Filter*

Session S8 - 15.00-16.30 Friday 20 September - AI applications

Chair: [TBD]

Fresta, Matteo; Berta, Riccardo; Capello, Alessio; Ballout, Hadi; dabbous, ali; Bellotti, Francesco. *Domain-Adversarial Neural Networks (DANN) for Cross-Sport Activity Recognition*

Capello, Alessio; Berta, Riccardo; Fresta, Matteo; Lazzaroni, Luca; Bellotti, Francesco. *Leveraging Neural Architecture Search for Structural Health Monitoring on Resource-Constrained Devices*

Cherry, Ali; Nasser, Aya; Abou Ali, Mohamad; Salameh, Wassim; Ballout, Hadi; Hajj-Hassan, Mohamad. *Optimizing Biometric Recognition with PPG Signals: A Comparative Study of Deep Learning Models and 2D Conversion Techniques*

Lazzaroni, Luca; dabbous, ali; Nardello, Matteo; Abu Lebdeh, Muath; Berta, Riccardo; Yildirim, Kasim Sinan; Bellotti, Francesco; Brunelli, Davide. *Green Machine Learning for the IoT (GEMINI): a position paper*

Cehade, Adel; Ragusa, Edoardo; Gastaldo, Paolo; Zunino, Rodolfo. *Tiny Neural Networks for Session-Level Traffic Classification*

Hammadi, Leila; ElKhansa, Fatima Zahraa; Yaacoub, Mohamad Asaad; Ibrahim, Ali M. *Embedded Neural Networks for Shape, Size, and Stiffness Recognition using Multisensory Glove*

Poster Session

Alfano, Tersa; Chiarello, Gianluigi; Sapienza, Salvatore; Lo Valvo, Fulvio; Baiamonte, Giacomo; Vella, Alberto; Galiato, Giuseppe; Giaconia, Costantino Giuseppe. *Portable multi-sensor system for digital processing of electrocardiographic signals.*

Awada, Sara Moustafa; Audi, Om Ibaneen; Yaacoub, Mohamad Asaad; Ibrahim, Ali M. *Optimized TinyML Implementation for Resource-Constrained Microcontrollers*



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Baiamonte, Giacom; Vella, Alberto; Lo Valvo, Fulvio; Chiarello, Gianluigi; Sapienza, Salvatore; Alfano, Teresa; Galioto, Giuseppe; Giaconia, Costantino Giuseppe. *Synchronized vibration data acquisition for Seismocardiography*

Ballout, Hadi; Berta, Riccardo; Bochenko, Igor; Lazzaroni, Luca; Dhonthi, Akshay; Hashemi, Vahid; Bellotti, Francesco. *Runtime Input Monitoring of a Reinforcement Learning-Based Agent for Automated Car Parking*

Berta, Riccardo; Bellotti, Francesco; Cossu, Marianna; Forneris, Luca; Lazzaroni, Luca; Pighetti, Alessandro. *RL-based Generation of a Synthetic Automotive Driving Scenario Dataset*

Botiet, Hawraa; Wehbe, Alaa; Ferraro, Federica; Dellepiane, Silvana. *Evaluation of Machine Learning Models for Movement Classification in Exergame-Based Rehabilitation*

Collu, Riccardo; Salis, Cinzia; Ferrazzano, Elena; Cadinu, Lorenzo; Makni, Nasreddine; Barbaro, Massimo. *An EEG based platform for emotion recognition*

Dhungana, Hariom; Mukhiya, Suresh Kumar; Dhungana, Pragya; Karic, Benjamin. *Deep learning-based fault identification in condition monitoring*

Dhungana, Pragya; Dhungana, Hariom; Khadka, Shyam Krishna; Baskota, Swechhya. *Data Imputation in IoT measurements: challenges and resolutions*

Dini, Pierpaolo; Bernardeschi, Cinzia; Canino, Nicasio; Rossi, Daniele; Dini, Gianluca; Rossi, Federico; Saponara, Sergio. *HARDNESS Hardware-Supported Post Quantum Over-the-Air Software Update and Intrusion Detection System for Next Generation Secure Cars*

Grammatikakis, Miltos; Kornaros, George; Kavvalos, Vasilis. *Software Design Patterns for Efficient Automotive Monitoring Systems: An Event Data Recorder Use-Case*

Greco, Danilo. *Security in e-learning: a systematic review*

Grilli, Michele; Guitini, Jennifer; Orcioni, Simone; Conti, Massimo. *Impact of Parameter Estimation Accuracy on State of Charge Estimation using Extended Kalman Filter*

Ibrahim, Ali; Hijazi, Zeinab; Bzeif, Fatima. *Architecture and Efficient Implementation of Digital Time-to-Digital Converter for Sensing Applications*

Ibrahim, Ali; Zein, Abbas; Abou Diab, Rand; Yaacoub, Mohamad Asaad. *Neural Architecture Search for Optimized TinyML Applications*

Kaafarani, Rima M; Nouredine, Hassan; Nasser, Abbass; Mansour, Ali; Ayaz, Muhammad. *Cultivating Trust: Advancing Agriculture through Blockchain*

Lazzaroni, Luca; Bellotti, Francesco; Dabbous, Ali; Pighetti, Alessandro; Berta, Riccardo. *Quantization of MobileNetV2 for Resource-Constrained Microcontrollers*

Makni, Nasreddine; Barbaro, Massimo; Loddo, Silvia. *Real-World Implementation of an Innovative Vineyard Water Management Platform: A Case Study*

Nardelli, Francesco Rocco; Coviello, Giuseppe; Brunetti, Giuseppe; Florio, Antonello; Avitabile, Gianfranco; Ciminelli, Caterina. *Enhancing Efficiency in Buck Converters through Dynamic Switched Inductor and Switching Frequency Control*

Nardello, Matteo; Pellegrin, Isaac; Doglioni, Maria; Pancheri, Lucio; Brunelli, David. *Characterization of Semiconductive Films for 3D Printed Flexible Electronics*



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Paoli, Vittoria; Mestice, Marco; Saponara, Sergio; Ronchi, Marco; Guidetti, Elio; Osnato, Fabio. *Design-space exploration of integrated frequency synthesis architecture for wake-up radio in low-power WI-FI applications*

Ramlawi, Bahaeddine; Fouani, Hadi; Hatoum, Yehya; Bou Assy, Ray; Yaacoub, Tina; Hajjar, Chantal. *Automated Class Attendance System With Image Processing And Ai Integration*

Santoro, Luca; Pellegrini, Giorgio; Fontanari, Elias; Fontanelli, Daniele; Brunelli, Davide. *Uwb-based target localization and following system for UAV*

Spinelli, Filippo; Addabbo, Tommaso; Fort, Ada; Vignoli, Valerio; Nadeem, Ali. *Remotely Controlled Test Bench for the Automated Characterization of Ultrasonic Anemometers*

Yaacoub, Mohamad Asaad; Vanlaeres, Matthias; SHEBLY, DANIELLA; Gianoglio, Christian ; Valle, Maurizio. *Data Glove System: Real-Time Resistance Classification with Embedded Machine Learning.*

Yang, shangyue; Zhu, Biran. *Research on E-Waste Risk Assessment Through the Construction of a Cloud Platform in the Context of a Big Data Environment*

Zilaie, Morteza. *Heart signal processing using wavelet analysis and deep learning algorithms based on artificial intelligence*