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23-24 April

1st Annual Meeting CEIMM

Electronics Enabling Solutions to New Healthcare Challenges

TOPICS

- Advanced Converter Architectures for Modern Power Systems
- Modelling and Characterization for Efficient Converter Design
- Energy Management: Batteries, WPT and Harvesting
- Image Processing in Healthcare and Animal Welfare
- Microelectronics and Custom RISC-V Processors
- Advanced Security and Networked Embedded Systems
- Embedded Intelligence for Next-Generation Applications
- Videogames in Rehabilitation Therapy

POLITÉCNICA
"Ingeniamos el futuro"

Thursday, April 23rd

SHORT COURSES & TALKS — 09:30 - 13:30

Attendees are invited to attend the following short courses:

- **MAGNETISiM: Platform for Fast and Easy Simulation and Modeling of Magnetic Components**
  Alberto Delgado & Alberto Vital (UPM) 9:30 – 12:00 (**rooms F4 and F5**)
- **Boosting New Implantable Active Medical Devices Through Wireless Power Transfer**
  Regina Ramos, Miguel Jiménez & Álvaro Rodríguez (UPM) 10:00 – 12:00 (**ROOM C – Aula C**)

And the following industry talk:

- **Electronics Engineering in the Space Sector - Thales Alenia Space** 12:15 - 13:30 **(ROOM C – Aula C)**

Registration at CEIMM Annual Meeting — 15:00 - 15:30

OPENING SESSION (Auditorium – Salón de Actos) — 15:30 - 16:00

Teresa Riesgo (Secretary-General of Innovation of the Ministry of Science, Innovation and Universities)

Luis Gómez Fernández (Vice-rector of Research and Doctoral Studies)

Sergio Domínguez (ETSII Director)

Jorge Portilla (CEIMM Director)

PLENARY SESSION (Auditorium – Salón de Actos) — 16:00 - 18:00

Norberto Malpica (URJC)

Gustavo M. Callicó (ULPGC)

Nicolás Barabino (ADCORPUS)

Antón Guimerà-Brunet (Institut de Microelectrònica de Barcelona)

Guiseppe Schiavone (University of South-Eastern Norwey)

CEIMM POSTER SESSION (Steam Engine Hall) — 18:00 - 21:30

You will have the opportunity to meet our young researchers and their activities, exchange interesting ideas and enjoy beverages and food that will be available during the poster session. Do not miss this great opportunity to know us better.

The poster session will be held in **the Steam Engine Hall of the ETSI Industriales.** Find the provisional list of the posters on the last page.

Friday, April 24th — Room C

TECHNICAL SESSIONS — 9:00 - 13:30

TECHNICAL SESSION A — 9:00 - 11:00

SESSION CHAIRS: JAIME SANCHO, JOSÉ A. MIRANDA

Integration of AI modules in rehabilitation systems to improve motivation
Xiya Tao (CEIMM)

Spectral Separability of Hyperspectral Data Through Structured Illumination
Alberto Martín-Pérez (CEIMM)

Aspects of Solid State Isolation in Capacitively-Isolated Converters
Gabriel Maldonado Roldán (CEIMM)

From Digital Twin to Intelligent Railways: Deep-Learning based detection and multimodal classification on the edge of IoT
Inés Pérez & Blanca Poves (CEIMM)

Power Gyrator for EV Charging Applications
Luis Ruiz Chamorro (CEIMM)

Coffee Break — 11:00 - 11:30

TECHNICAL SESSION B — 11:30 - 13:30

SESSION CHAIRS: DANIEL RÍOS, MIGUEL CHAVARRÍAS

Multimodal tissue segmentation applying weakly supervised learning
Guillermo Vázquez (CEIMM)

SLIMBRAIN Database: A Multimodal Image Database of In vivo Human Brains for Tumour Detection
Alberto Martín-Pérez (CEIMM)

Cybersecurity at the Edge in the Post-Quantum Era: A Strategic Perspective from CEIMM
Jaime Señor Sánchez (CEIMM)

End-to-End SoC Design with RISC-V: The CEIMM Experience
Luis Waucquez (CEIMM)

Enabling Wireless Recharging of Miniaturized Active Implantable Medical Devices through Closed-Loop MHz Rectification
Álvaro Rodríguez Fuentes (CEIMM)

At 13:45 h. photo group at the **ETSII Main entrance.**
COCKTAIL will be served in the **Steam Engine Hall** at 14:00 h.

POSTER SESSIONS

Advanced Converter Architectures for Modern Power Systems

Pushing GaN Parallelization Limits: Device Mismatch Effects in Half-Bridge Configurations	Alexander de Miguel Lamminen
Electric Arc Mitigation in a High-Voltage Forward-Flyback Converter with a Cockcroft-Walton Multiplier for Electrohydrodynamic Loads	Daniel Franco García
Desbalance de un LLC Trifásico con Magnético Acoplado	Echedey Luis Álvarez
A Novel Capacitively-Isolated Resonant Switched Capacitor Topology with Semiconductor Galvanic Isolation	Gabriel Maldonado Roldán
Gyrator Based Low Profile Current Source Converter	Guiseppe Dimaggio, Luis Ruiz Chamorro
Power Gyrator for EV Battery Charging Applications	Luis Ruiz Chamorro
SiC-based Synchronous Floating Interleaved Boost Converter for PV Applications Operated in DC uGrid	Luis Ruiz Chamorro, Catalin Muntean
Two-Stage DC/DC Converter for Hydrogen Fuel Cell Integration into an Aeronautical DC Microgrid	Luis Ruiz Chamorro, Catalin Muntean
Multiport Architecture based on Capacitively Isolated Resonant Switched Capacitor Converters	María Paula Jiménez Güiza
High-Isolation Design in Novel Four-Quadrant Resonant Switch Capacitor Converters	Victoria Carcedo Bobadilla

Modelling and Characterization for Efficient Converter Design

MAGNETISiM: 3D Thermal Simulation of Magnetic Components using Open-Source Tools	Adrián Riveiro Varela
Model-Adaptive Optimal Control for Three-Phase Inverters with Asymmetrical Loads	Alberto Leamus
MAGNETISiM: Platform for Fast and Easy Simulation and Modeling of Magnetic Components	Alberto Vital Pagola
Towards Automatic Extraction, Modeling and Simulation of PCB Parasitic Components for Speeding Iterative Design Processes	Alberto Vital Pagola
Modeling and Stability Assessment of DC Microgrids with Blackbox Polytopic Wiener-Hammerstein Models	Fernando Pérez
Modeling and Digital Control of a Triangular Conduction Mode Buck for Space Application	Guillermo Núñez Rodríguez
Characterization of Switching Losses in Gallium Nitride (GaN) Transistors	Ignacio Basterra Esteban-Hanza
Analytical Modelling and Design of a Novel Planar Transformer With Controllable Inductances for High Power and High Frequency Applications	Lufan Zhou
Comparison and Analysis of Probe Designs for High-Performance Instrumentation	María de los Llanos Gonzalez Ferrando
Glioma Growth Prediction by Means of Diffusion-Reaction Equations with Real-Case Optimized Parameters	Nicolás Tajuelo Arenas
Genetic Algorithm Optimization for the Electromagnetic Design of Magnetic Components	Rubén Abajo Manzanero
FOGUITOS: Voxel-Based Multiphysics Modelling for Power Electronics Digital Twins	Xianghao Mo

Energy Management: Batteries, Wireless Power Transfer and Harvesting

Dynamic Impedance Matching System Optimization for Variable Reluctance Energy Harvesters in Space-Constrained Applications	Alejandro Redondo, Fernando Pérez
Power Management System Design for a Variable Reluctance Energy Harvester in a Smart Bearing Application: the LoLiPoP IoT Project	Alejandro Redondo, Fernando Pérez
Compact Active Rectifiers for Load Regulation of Wirelessly-Powered Implantable Medical Devices	Álvaro Rodríguez Fuentes
Wireless Power Transfer Coils Misalignment Determination with Temperature Measurement of Transmitter Coil Ferrite Tiles	Andrés Ferrer López
Experimental Validation of a Battery Aging Model	Beatriz García Tomé
Neural Signal Acquisition, Processing and Wireless Transmission in an AIMD	Diego Molina
Wi-UFO: Design of Adaptive Multi-Winding Inductive Couplers for Misaligment-Tolerant WPT in Space Apps. with Heterogeneous Power Demands	Eduardo Andina González
Monte Carlo–Based Reliability Modeling and Protection Strategy Development for IPT Modules in Mars Rover Platforms	Miriam Páez Escurín
Trends in Multi-Source Energy Harvesting and Power Management Systems for Zero-Power IoT Sensor Networks	Wei Sun

Image Processing in Healthcare and Animal Welfare

Profilometry and Hyperspectral Imaging for Intraoperative Segmentation of Pathological Tissues	Adrián Casillas
Spectral Signatures of Brain Tissues: A Machine Learning Approach for Tumor Detection	Lorenza Silvia Saccoccia
Genetic algorithms applied for dimensionality reduction in hyperspectral images of brain tumours	Nerea Adeva
Optimizing embedded operating system configuration for heterogeneous platform in health applications	Yingying Gao
Blood vessels segmentation with limited annotations based on pseudo-labels	Guillermo Vázquez
Multimodal classification for the delineation of brain tumours using hyperspectral imaging and polarimetric data	Sara Fernández García-Morales
Multimodal HSI-MRI System for Tumor Delineation in Neurosurgical Guidance	Manuel Villa
Multimodal detection of brain tumours using hyperspectral and magnetic resonance imaging on synthetic models	Daniel Yeara Peláez
Monocular depth estimation in endoscopic images	Ana Garrido
Leveraging Annotation-Free Pseudo-Labels for Few-Shot Fish Monitoring with Vision Transformers	Pedro L. Cebrián Castel & Iván Moreno Vallejo

Microelectronics and Custom RISC-V Processors

Run-Time Reconfigurable Extensions for RISC-V Processors	Alberto Gago Lalana
Cognitive Ultrasound: Self-Adaptive Tissue-Aware Sensing	Álvaro Casado, Andrés Diaz
Hardware Accelerated RISC-V Vector Extension for High-Performance Embedded Computing	Ane Corral Margeli
ULEO-Flow: An Ultra-Lightweight and Resource-Efficient Event-Based Optical Flow Algorithm with FPGA Implementation	Carmen Sánchez García
Specializing Coarse-Grained Reconfigurable Architectures for Machine Learning Applications	Daniel Vázquez
D2D Interfaces for Chiplet Integration: Evaluating Performance from SoC to SiP	Iñigo Díez de Ulzurrun
Hardware Acceleration for ECG Analysis: Optimization and Evaluation for CGRA Platforms	Isabel Isla Fernández
A RISC-V Based Platform for Mixed-Criticality Automotive Systems with TSN-Enabled Determinism	Jonathan Sebastian López Valdivieso
A Reconfigurable RISC-V-Based Platform for Adaptive Edge Computing Offloading	Jorge Brihuega Segura
Tightly Coupled Near-Memory Matrix Unit for RISC-V Embedded Computing	Juan Granja Garijo
Reconfigurable Processor-Centric Accelerators with Hardware Extensions for Safety-Critical Applications	Luis Waucquez
Kubernetes-Based Cloud-Edge Continuum Support for RISC-V Multi-Core Systems	Milos Dordevic
Fine-Grain Heterogeneous Multi-Core RISC-V Systems: An FFT Butterfly Extension as Proof of Concept	Rodrigo Olmos Cánovas

Advanced Security and Networked Embedded Systems

Hardware-Based Key Manager for Quantum Key Distribution	Adrián Martín Martín
Enabling Post-Quantum Secure Boot in Heterogeneous SoCs with XMSS Signatures	Javier Sanz Parada
Bringing Post-Quantum Security to Orbit	Jorge Señor
Image-Based Location Recognition in Collaborative Mobile IoT Sensor Networks	Leyre Cerrillo Fernández de Gobeo
Mitigating Side-Channel Leakage in FrodoKEM via RISC-V ALU Modifications	Óscar Flórez Gil
A CARLA-Based Digital Twin Framework for Railway Train Integrity Monitoring Using IoT Sensor Networks	Paula González de Dueñas
A Hierarchical Learning-Based Approach for Dynamic Resource Allocation in Clustered Wireless Sensor Networks	Paula González de Dueñas
Hardware-Based Key Distillation for Discrete-Variable QKD	Rafael Bonmatí de la Prida

Embedded Intelligence for Next-Generation Applications

LsmGrid: A Data-Aware Neuroevolution Framework for Designing Minimal Liquid State Machines	Andrés Ignacio Romo Moena
Multimodal Object Classification on IoT Edge Devices for Railway Applications	Blanca Poves Arjona
Neuroevolution for DL Topology Search and Weight Optimization in Image Classification Applications	Enrique Maseda González
Real time Deep Learning 3D Object Detection and Classification at the Edge of IoT	Inés Pérez Delgado
Towards Intelligent Railway Trains: On-Board Integrity Detection based on UWB Technology on the Edge of IoT	Jaime Pérez Pérez
Data-Driven Resource Management of Reconfigurable Multi-Accelerator Systems in the Cloud-Edge Continuum	Juan Encinas
Feature-Informed Learning and Cloud–Edge Adaptation using GCN for Self-supervised Emotion Recognition	Junjiao Sun
ChiperEdge: A Hybrid Spiking Neural Architecture for Fear Detection	María Elena Somoza Beristain
Multimodal Edge Intelligence for Autonomous Railway Systems	Rogelio Hernández Lorite

Videogames in Rehabilitation Therapy

Phiby's Toyland: A Modular VR Exergame with Adaptive Difficulty Adjustment for Upper-Limb Rehabilitation	Peng Chen
Blexer v3: A Modular AI-Driven Ecosystem for Self-Adaptive Rehabilitation Serious Games	Xiya Tao
Gamified therapy for Central Auditory Processing Disorder (CAPD)	Martina Eckert, Flavio Carrasco, Keying Chen
Reliability of FOA Arrays in Room Acoustic Measurements	Chenyi Xu

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