DoCEIS 2025

16th Advanced Doctoral Conference on Computing, Electrical and Industrial Systems

Technological Innovation for AI-Powered Cyber-Physical Systems

July 2-4, 2025

Caparica (Lisbon) – Portugal

Including the associated event:

YEF-ECE 2025

9th Young Engineers Forum on Electrical and Computer Engineering

CONTENTS

Welcome Message

The 16th Advanced Doctoral Conference on Computing, Electrical, and Industrial Systems (DoCEIS 2025) aims to serve as a central hub, bringing together Ph.D. students, professors, researchers, engineers, and specialists from various countries around the topic of Technological Innovation for AI-Powered Cyber-Physical Systems.

AI-powered Cyber-Physical Systems (AI-CPS) are intelligent and interconnected systems that monitor and analyse the physical world in real time, while some may directly interact with it. They consist of sensors, actuators, software, and networks with AI algorithms. These systems can learn from data, make autonomous decisions, and adapt dynamically to changing environments. These are present across various domains such as autonomous vehicles, smart manufacturing, healthcare, energy systems, and infrastructure. As such, these systems are quintessential with Industry 5.0 and Society 5.0 bringing new technology to everyday human experiences, ensuring that innovation serves both industrial and societal purposes in a balanced manner.

DoCEIS 2025 promotes innovative thinking and the exchange of cutting-edge ideas capable of driving research breakthroughs within a multidisciplinary context. The sixteenth edition of this conference aims to advance the field of AI-powered CPS by fostering interdisciplinary approaches to address present-day challenges, ultimately contributing to the development of a more efficient, resilient, and sustainable society. With a strong focus on early-career researchers, this conference provides a valuable opportunity for doctoral students and young researchers to present, share and refine their ideas, engage in constructive discussions, and receive valuable feedback from a highly qualified audience. Aligned with this, DoCEIS offers a collaborative and supportive environment that brings together researchers, academics and company stakeholders to share expertise, discuss concerns and co-develop future directions. Thus, it represents a significant opportunity to help young researchers improve their skills for their academic and professional development.

DoCEIS 2025, sponsored by SOCOLNET, IFIP, and IEEE IES, attracted 59 paper submissions from PhD students and their supervisors. Out of these submissions, 29 were selected by the International Program Committee for inclusion in the main program and covers a spectrum of application domains. As such, research results and ongoing work are presented, illustrated, and discussed in areas such as:

- AI in Business Applications
- AI in Industry 4.0
- Smart Systems in Sustainable Development
- AI-Powered Healthcare
- AI in Systems, Decision & Control
- Intelligent Sensing & Communication Systems

- Smart Power Systems
- Electronic Systems

We envisage that this compilation of papers will offer participants a captivating set of novel concepts and intellectually stimulating challenges spanning multiple disciplines. The diverse nature of the included findings is intended to spark and invigorate further research and development initiatives, encouraging a broader exploration of innovative multidisciplinary pathways.

We would like to express our sincere gratitude to all the authors for their valuable contributions to this year's conference. We also thank the PhD students involved in the organizing committee that are essential for the success of the conference. Additionally, we would like to extend our deepest appreciation to the dedicated members of the DoCEIS International Program Committee. Their assistance in the article selection process as well as their insightful comments have immensely contributed to enhancing the overall quality of the papers.

This year we are pleased to also include, as an associated event, the YEF-ECE 2025, the 9th International Young Engineers Forum on Electrical and Computer Engineering, which also attracted a good number of submissions.

We hope that all participants will take the opportunities offered by these events to exchange experiences and knowledge with colleagues from different universities and areas of research.

Prof. Luis M. Camarinha-Matos
Conference Chairman

Prof. Filipa Ferrada
Program Co-Chair

Message from the Organizers

Greetings and welcome to DoCEIS 2025!

We are delighted to have your participation, and we hope that the conference will meet your expectations as well as your sojourn in Lisbon will be pleasant. We are celebrating the 16th edition of the Advanced Doctoral Conference on Computing, Electrical and Industrial Systems and whether you are attending for the first time or have been part of all fifteen editions, we would like you to know that your attendance is an essential part of the success of this event.

The conference, held from July 2nd to the 4th, is organized in the context of the Electrical and Computer Engineering doctoral programme of the School of Science and Technology of NOVA University of Lisbon, by PhD students from the doctoral programme. The process, which entails program definition, dissemination, venue identification, and sponsorship solicitation, has proved a unique and rewarding experience that will hopefully serve as a foundation to develop the set of skills needed to contribute to the greater scientific community.

With submissions from several countries, it is our conviction that the 16th edition of DoCEIS, will give opportunities for sharing and exchanging original research ideas and opinions, especially for PhD students, who will have the opportunity to share and present their work in an international conference, often for the first time, gaining inspiration for future research. Additionally, this forum provides a networking platform for attendees to connect, collaborate, and communicate with fellow researchers, broadening knowledge about various fields in computing, electrical and industrial systems.

We would like to express our gratitude to our keynotes and invited speakers for taking time out of their busy schedules to share their knowledge at this event. We also want to express our sincere appreciation to all participants, for your interest, and for having submitted your papers and posters to the conference. We would also like to give a special thanks to the International Program Committee, for their critical review of the submitted papers.

We wish everyone a very pleasant and remarkable conference and we look forward to sharing with you a memorable event in DoCEIS 2025!

The Local Organizers.

DoCEIS 2025 Conference Organisation

Conference and Program Chair:

Luis M. Camarinha-Matos, NOVA University Lisbon, Portugal

Program Co-Chair:

Filipa Ferrada, NOVA University Lisbon, Portugal

Organizing Committee Co-chairs:

Pedro Pereira, NOVA University Lisbon, Portugal

Sanaz Nikghadam-Hojjati, NOVA University Lisbon, Portugal

Rodolfo Oliveira, NOVA University Lisbon, Portugal

Luis Oliveira, NOVA University Lisbon, Portugal

International Program Committee

António Abreu, Portugal

Valentina Emilia Balas, Romania

Anne-Marie Barthe-Delanoe, France

Marko Beko, Portugal

Bachir Benhala, Morroco

Luis Bernardo, Portugal

Xavier Boucher, France

Hadj Bourdoucen, Oman

Luis M. Camarinha-Matos, Portugal

Wojciech Cellary, Poland

Noelia Correia, Portugal

Filipa Ferrada, Portugal

Pedro Ferreira, United Kingdom

Florin Filip, Romania

Maria Fino, Portugal

Adrian Florea, Romania

José Fonseca, Portugal

Fabio Fruggiero, Italy

Orhan Gemikonakli, Turkey

Sukhpal Singh Gill, United Kingdom

Luis Gomes, Portugal

Juanqiong Gou, China

Bruno J.N. Guerreiro, Portugal

Tomasz Janowski, Poland

Vinod Karar, India

Nour Eldeen Mahmoud Khalifa, Egypt

Sachin Kumar, Armenia

Arianit Kurti, Sweden

Paulo Leitão, Portugal

Paula Louro, Portugal

Marin Lujak, Spain

João Martins, Portugal

João Pedro Matos-Carvalho, Portugal

Paulo Miyagi, Brazil

Saraju Mohanty, United States of America

Eric Monmasson, France

Filipe Moutinho, Portugal

Vincent Naessens, Belgium

Phu Nguyen, Norway
Sanaz Nikghadam-Hojjati, Portugal
Paulo Novais, Portugal
Nnamdi Nwulu, South Africa
Ana Inês Oliveira, Portugal
Luis Oliveira, Portugal
Rodolfo Oliveira, Portugal
Angel Ortiz, Spain
Reinaldo Palhares, Brazil
Venkata Reddy Palleti, India
Luís Brito Palma, Portugal
Nuno Paulino, Portugal
Pedro Pereira, Portugal
Paulo Pinto, Portugal
Armando Pires, Portugal
Ricardo J. Rabelo, Brazil
Luis Paulo Reis, Portugal
Enrique Romero-Cadaval, Spain
Carlos Roncero-Clemente, Spain
Ioan Stefan Sacala, Romania
Claudio Sassanelli, Italy
Thilo Sauter, Austria
Thomas Schuster, Germany
Catarina Silva, Portugal
Thomas Strasser, Austria
Zoltán Ádám Tamus, Hungary
Slavisa Tomic, Portugal
Zita Vale, Portugal
Oleksandr Veligorskyi, Ukraine
Manuela Vieira, Portugal

Local Organizing Committee (PhD Students)

Ali Sousaraei, Iran
Clarisse Feio, Portugal
Emanuel Mango, Angola
Eurico Clemente, Portugal
Fábio Gregório, Portugal
Francisco Silva, Portugal
Gelson Pembele, Angola
Hugo Matias, Portugal
Hugo Viana, Portugal
João Cabacinho, Portugal
José Calandula, Angola
José Luis, Angola
Rui Guerreiro, Portugal
Sérgio Sousa, Portugal
Tiago Reis, Portugal

Invited Keynote Speakers

Keynote 1: ***Rita Cunha,*** *IST, Portugal*
Title: Aerial Robotics: Advances in Motion Planning and Control
Short Bio: *Rita Cunha received her Ph.D. degree in Electrical and Computer Engineering from Instituto Superior Técnico (IST), Universidade de Lisboa, Portugal, in 2007. Since 2019 she has been with the Department of Electrical and Computer Engineering of IST, where she teaches in the areas of Control and Robotics. She is currently an Associate Professor of IST, member of the Executive Board of the Department of Electrical and Computer Engineering, and a senior researcher with the Institute for Systems and Robotics (ISR). Her research interests and expertise include dynamical systems, nonlinear control systems, motion planning and control of autonomous vehicles, distributed control systems, vision-based control, and aerial robotics. She has participated in several research projects, including 2 EU projects as coordinator of IST's participation and 4 national projects as principal investigator and 3 national projects as co-PI. Selected projects for which she coordinated IST's participation include: MULTIDRONE – Multiple Drone platform for media production (H2020), LOTUS - Load Transportation using Unmanned Aerial Vehicles (FCT, Portugal2020), and SCARVE - Sensor-based Control of Autonomous Aerial Vehicles (FCT).*

Abstract: Unmanned Aerial Vehicles (UAVs), commonly known as drones, are rapidly evolving to become versatile sensing platforms, capable of navigating and tracking trajectories with remarkable accuracy. While motion control in free flight is now well established, new challenges are driving the field toward richer interaction with the environment and greater cooperation between multiple vehicles. In this talk, I will first give a brief overview of past work on trajectory tracking and path following control of quadrotor UAVs, which leverages Lyapunov stability theory to provide high-performance autonomous flight. I will then highlight developments related to three topics of research: i) formation planning and control for multi-vehicle systems; ii) visual servoing control using optical flow for reactive landing, and iii) and motion planning and control for aerial transportation of slung loads.

Keynote 2: ***Filippo Sanfilippo,*** *University of Agder, Norway*
Title: Human-Robot Teaming, a Forward Leap into Real Life Applications

Short Bio*: Filippo Sanfilippo holds a PhD in Engineering Cybernetics from the Norwegian University of Science and Technology (NTNU), Norway, with a focus on intelligent control approaches for robotic manipulators. His research interests include robotics, wearables, human-robot teaming, artificial intelligence, and control theory. He is currently appointed as a Professor at the Faculty of Engineering and Science, University of Agder (UiA), Grimstad, Norway. He is also an adjunct Professor at the Faculty of Informatics, Kaunas University of Technology, Kaunas, Lithuania. He is also the Director of Science at Twilligent AS, Norway, a company that is at the forefront of creating intelligent digital twins to visualise, simulate and optimise the operation of complex facilities, production lines and processes. He carries a vast experience in participating in European research programs and various national projects from the Research Council of Norway (RCN). He is an IEEE Senior Member. He is the former Chair of the IEEE Norway Section. He is the Chair of the IEEE Robotics and Automation, Control Systems and Intelligent Transportation Systems Joint Chapter. He is the Chair of the Norway Section Life Members Affinity Group. He is currently a member of the IEEE Region 8 Chapter Coordination Committee, of the Conference Coordination Committee, of the IEEE Public Visibility Committee, of the IEEE R8 Awards and Recognitions Committee, and of the Professional and Educational Activities Committee. He is also the Treasurer of the Norsk Forening for Kunstig Intelligens (NAIS), the Norwegian Association for Artificial Intelligence. He has authored and co-authored several technical papers in various journals and conferences. He is a reviewer for several international conferences and journals.*

Abstract: Human-robot interaction (HRI) is the study of how humans and robots interact, as well as how to develop robots that can adapt to human behavior. Human-robot cooperation (HRC) expands on this by creating new approaches and technologies that allow robots to collaborate with people in shared environments. The field of human-robot teaming (HRT) goes one step further, by studying how to create teams of humans and robots that can work together effectively and efficiently to achieve common goals. In this talk, an overview of the possible real-life applications for HRT will be presented.

Keynote 3: ***José Machado****, University of Minho, Portugal*
Title: Low-Power Real-Time Machine Learning Approach using IMU Data on FPGA

Short Bio: *José Machado is a Full Professor at the University of Minho, Portugal, and a senior researcher at the ALGORITMI Research Center, where he coordinates the Computer Science and Technology (CST) group and the Knowledge Engineering Laboratory. He is also a member of the coordination committee of LASI-Intelligent Systems Associate Lab. His research spans Artificial Intelligence, Data Science, and Medical Informatics, with a particular focus on intelligent decision-support systems, responsible AI, and digital health. He has led several national and international R&D projects and has supervised numerous Ph.D. and M.Sc. theses. He is actively involved in scientific committees and serves regularly as a reviewer and evaluator for international journals, conferences, and funding agencies.*

Abstract: This talk presents a low-power, real-time machine learning approach for processing inertial data on FPGA platforms. Leveraging data from Inertial Measurement Units (IMUs), the system performs efficient classification tasks directly on hardware, enabling immediate response with minimal energy consumption. Designed for embedded and mobile applications, it addresses critical constraints such as latency, power usage, and data privacy. By executing all processing locally on the FPGA, the solution avoids transmitting raw sensor data to external servers, thereby preserving user privacy. This architecture is particularly suited for smart vehicles, wearable devices, and autonomous systems, where energy efficiency, real-time responsiveness, and privacy protection are essential. Experimental results demonstrate the feasibility of deploying lightweight ML models on FPGA with high performance and privacy-aware operation.

Program Overview

	Morning	Afternoon
Day 1 **2 July**	▪ **Opening Session** ▪ **Keynote 1: *Rita Cunha*** ▪ **Sessions:** **A.** AI in Business Applications	▪ **Horizontal Session:** The Future Engineer: Skills Beyond Technology ▪ **Sessions:** **B.** AI-Powered Healthcare ▪ **Posters** ▪ **Welcome Reception**
Day 2 **3 July**	▪ **Sessions:** **C.** AI in Systems, Decision & Control **D.** Smart Power Systems ▪ **Sessions:** **E.** AI in Industry 4.0 **F.** Smart Systems in Sustainable Development	▪ **Keynote 2: *Filippo Sanfilippo*** ▪ **Sessions:** **G.** Electronic Systems ▪ **Panel:** From Lab to Field: Scaling AI Innovations ▪ **Conference Dinner**
Day 3 **4 July**	▪ **Opening YEF-ECE 2025** ▪ **Sessions:** **Y1.** Power Electronics and Energy Conversion **Y2.** Image Analysis and Machine Learning **Y3.** Embedded Systems and Distributed Architectures ▪ **Sessions:** **Y4.** Energy Systems and Smart Grids **Y5.** Sensors and Biomedical Systems **Y6.** Advanced Electronic and Photonic Devices	▪ **Keynote 3: *José Machado*** ▪ **Sessions:** **H1.** Intelligent Sensing **Y7.** Mobile and Vehicular Networks **Y8.** Sign Language and Human-Centric AI ▪ **Sessions:** **H2.** Communication Systems **Y9.** Modelling and Simulation of Energy Conversion Systems **Y10.** AI and Visible Light Communication for Traffic Management ▪ **Posters** ▪ **Closing Session & Awards**

Detailed Schedule DoCEIS 2025

Day 1 – Wednesday 2 Jul 2025

09:00 – 09:30 Opening session

09:30 – 10:30 Keynote 1

Aerial Robotics: Advances in Motion Planning and Control

Rita Cunha *– University of Lisbon, Portugal*
Moderator: Filipa Ferrada

10:30 – 10:45 Coffee break

10:45 – 12:45 Session A

A – AI in Business Applications

Chairs: *Ali Sousaraei, Clarisse Feio*

- **A Collaborative Approach to Last-Mile Logistics**
  Dionisio Fama Noque, Luis M. Camarinha-Matos and Ana Inês Oliveira
- **Processes Classification Tool Development Based on BERT for Logistics Laboratory**
  Rene Maas, Eduard Shevtshenko, Hendrik Laanemets, Tatjana Karaulova
- **An Access Control Method Against Unauthorized and Noncompliant Behaviors Leveraging Large Language Models**
  Nastaran Farhadighalati, Sepideh Kalateh, Luis A. Estrada-Jimenez, Sanaz Nikghadam Hojjati, and José Barata
- **A Pattern-Based Approach to Data Privacy in Business Processes**
  Lukas Waidelich and Thomas Schuster

12:45 – 14:15 Lunch

14:15 – 15:30 Horizontal Session

What to value in your career? An HR market-based perspective.

José Pedro Silva *- Critical Manufacturing*
Ricardo Cardoso *– Impactwave*
Moderator: Pedro Pereira

15:30 – 15:50 Ice Breaking Session

Mystery Lab Challenge: Decode the Research! Step into the shoes of a scientific detective... In this interactive and fun-filled activity, teams will craft clever clues about their research area—without giving it all away. The goal? To stump the other teams while they try to crack the code!

15:50– 16:05 Coffee break

16:05 – 18:05 Session B

B – AI-Powered Healthcare

Chairs: *Emanuel Mango. Eurico Clemente*

- **Device Prototype for Kinematic and Electromyographic Analysis of the Upper Limb**
  Patrícia Santos, Filipa Marquês, Carla Quintão and Cláudia Quaresma
- **Explainable Normative Modeling: Subcortical Changes in Frontotemporal Dementia Subtypes**
  Helena Rico Pereira, José Manuel Fonseca, and Hugo Alexandre Ferreira
- **User-Centered and Technical Requirements for Myoelectric Pediatric Arm Prosthesis Design: A Preliminary Study**
  Ana Oliveira, Ana Londral, Ana Giordano, Bruno Soares, Cláudia Quaresma
- **Embedding Predecessor Information in Optimization of Genetic Algorithm (GA) based Blind Image Restoration**
  Chaudhary Muhammad Shahbaz Anjum and Aftab Khan

18:05 – 18:50 Posters I

Chairs: Fábio Gregório, Francisco Silva

- **Design and Optimization of Hybrid Photovoltaic Systems for Off-Grid Telecommunication**
  José Francisco Calandula, João Murta Pina and Nuno Vilhena
- **Hybrid Lyapunov and Barrier Function-Based Control with Stabilization Guarantees**
  Hugo Matias and Daniel Silvestre
- **Improving Hydrogen Production Through Pulsed Electrolysis**
  Emanuel Mango, Stanimir Valtchev, Manuela Vieira and Rui Lobo

19:00 - Welcome reception

Day 2 – Thursday 3 Jul 2025

09:00 – 11:00 Sessions C, D

C – AI in Systems, Decision & Control

Chairs: Hugo Matias, Hugo Viana

- **Deep Learning Models for GNSS-denied Target Navigation**
  Ricardo Serras Santos, João P. Matos-Carvalho, Carlos T. Calafate, Sérgio D. Correira, Slavisa Tomic, Marko Beko, and Pietro Manzoni
- **Coarse-Grained Reconfigurable Arrays for High-Performance Low-Power Deep Neural Networks on Embedded Devices**
  João D. Lopes, Horácio C. Neto, and José T. de Sousa
- **Autonomous Vehicle Decision Making Through Multi- Grid Markov Decision Processes**
  Tiago Caldeira, Majid Khonji, Jorge Dias, Pedro U. Lima
- **High-Level Petri Nets for Modeling Cyber-Physical Multi-Agent Systems**
  Rui Guerreiro, João Paulo Barros, Luís Gomes

D – Smart Power Systems

Chairs: *João Cabacinho, José Calandula*

- **Detection and Mitigation Using PCA -Adaptive Sliding Mode Controller**
  Seema Yadav, Nand Kishor, Shubhi Purwar
- **Analytical Modeling and Simulation of a Superconducting Saturated Core Reactor**
  Leonardo Miúdo, João Murta-Pina, Nuno Amaro, Nuno Vilhena
- **Control of a Multiphase Superconducting Axial Machine Drive for Electric Aircraft**
  Fábio Encarnação-Gregório, João Murta-Pina, Mohammad Yazdani-Asrami and Vitor Fernão Pires
- **Investigation of the Impact of Geometrical and Operational Parameters on AC Transport Losses in HTS Pancake Coils Using Extensive FEM Simulations and Regression Analysis: Insights into Design Acceleration**
  Masoud Ardestani, João Murta-Pina, Simone Sparacio, Roberto A.H. de Oliveira, Mohammad Yazdani-Asrami

11:00 – 11:15 Coffee break

11:15 – 12:45 Sessions E, F

E – AI in Industry 4.0

Chairs: *José Luis, Rui Guerreiro*

- **Large Language Models to Support Altruistic Collaborative Healing in Smart Manufacturing**
  Luis A. Estrada-Jimenez, Nastaran Farhadighalati, Sepideh Kalateh, Sanaz Nikghadam Hojjati, and José Barata
- **Data Pre-processing of Hard Disk Drive Data for failure prediction in the context of Industry 4.0**
  Kazeem Balogun, Lai Xu
- **Forecasting Power Demand in Complex Buildings Using Machine Learning: A Shopping Center Case Study**
  Bruno Palley, Hermano Bernardo, João Poças Martins, Rosaldo Rossetti

F – Smart Systems in Sustainable Development

Chairs: *Sérgio Sousa, Tiago Reis*

- **Ensemble Deep Learning Model for AI-Powered Cyber-Physical Systems in Precision Agriculture**
  Laura Cosma, Ștefan Vasile Oniga, Ovidiu Cosma
- **An Integrated Framework for the Development of a Multi-Sensor Node to Support Wildfire Management**
  Miguel Lourenço, Luís Bica Oliveira and Henrique Oliveira
- **Detection and Characterization of Plume-Dominated Wildfires**
  Afonso Oliveira, Nuno Fachada, João P. Matos-Carvalho

12:45 – 14:15 Lunch

14:15 – 15:15 Keynote 2

Human-Robot Teaming, a Forward Leap into Real Life Applications

Filippo Sanfilippo - *University of Agder, Norway*
Moderator: Luís Camarinha-Matos **(TBC)**

15:15 – 16:45 Session G

G – Electronic Systems

Chairs: *Ali Sousaraei, Emanuel Mango*

- **A Comprehensive Study of the Reference Voltage Buffer Design for CR- and CS-based SAR-ADCs**
  Hugo Viana, Pedro Barquinha and João Goes
- **A Physically Unclonable Function Systematic Performance Analysis Methodology**
  João Cabacinho, João Casaleiro, Luis B. Oliveira
- **Recent Trends in Audio Power Amplifiers for Battery-Powered Applications**
  José Francisco Luís and Nuno Paulino

16:45 – 17:00 Coffee break

17:00 – 19:00 Panel Session

From Lab to Field: Scaling AI Innovations

Moderator: José Manuel da Fonseca

Hugo Plácido da Silva, IST/IT
Catarina Reis, IPL
João Magalhães, NOVA FCT
Ivo Bernardo, DareData
José Pedro Nunes, Unbabel

19:30 – 23:00 Conference Dinner

Day 3 – Friday 4 Jul 2025

09:00 – 09:10 Opening session YEF-ECE

09:10 – 10:50 YEF-ECE Sessions Y1, Y2, Y3

Y1 – Power Electronics and Energy Conversion

Chairs: Nuno Vilhena, Nuno Amaro

- **Full-Bridge vs. T-Type: A Comprehensive Comparison of Three-Phase Power Converters with Variable DC-Link Voltage for EV Fast Chargers**
  Tiago Soares, Pedro Pereira, Saghir Amin, Muhammad Awais, Sergio Coelho, Joao Afonso and Vitor Monteiro
- **Design and Analysis of a Capacitive Charge Pump**
  Renato Longo Makariewicz, Hamilton Klimach and Pedro Toledo
- **Planar Transformer Design for a LLC DC-DC Converter with Variable Input and Wide Output Voltage Range**
  Pedro Loureiro, Saghir Amin, Muhammad Awais, João Luís Afonso and Vitor Monteiro

- **Design of a Low Power DC-DC Inductorless Step Up Converter for Energy Harvesting**
  Diego Nyland, Hamilton Klimach and Pedro Toledo
- **Sensorless Current Control: An Experimental Validation Applied to a DC-DC Boost Converter**
  Ana Dias, Rosalina Morais, Joao Afonso and Vitor Monteiro

Y2 – Image Analysis and Machine Learning

Chairs: Alessandro Fantoni, André Moura

- **Applying Machine Learning to SENTINEL satellite images to predict the operational state of floating offshore wind turbines**
  Tiago Mota, Mário Vieira, Leonardo Filipe, Daniel Fernandes, Nuno Garcia and João Carvalho
- **Applying AI and Remote Sensing to Water Resource Management: A Case Study in Almada, Portugal**
  Maria André, Filipa Ferrada and Ricardo Peres
- **Machine Learning Techniques for Pattern Recognition in Technical Swimming**
  Gabriel Diaz, Rui Jesus, Carlos Goncalves, Ricardo Povoa, Mario Assuncao and Pedro Teodoro
- **Quantizing Deep Learning Vision Models – A Systematic Approach**
  João Pedro Matos-Carvalho and Sérgio D. Correia
- **Fast Semantic Segmentation of Medical Images**
  António Carvalho and Mário Véstias

Y3 – Embedded Systems and Distributed Architectures

Chairs: Luís Oliveira, Ana Inês Oliveira

- **Comparative Study of Quantized CNN Inference on ARM and RISC-V Microcontrollers**
  André Julião, Gonçalo Rombo and João P. Oliveira
- **Cross-Device Platform for Collaborative and Immersive Experiences in Mixed Reality**
  Letícia Lucas, Carla Costa and Pedro Jorge
- **A Unified Communication Architecture for Smart Locker Networks and Mobile Access**
  João Silva, Rogério Rebelo, Nuno Datia, António Serrador, Matilde Pato, José Simão and Pedro Sampaio
- **Fixed-Wing UAV Simulation in PX4 and Gazebo: An AVL-Based Approach**
  Filipe Cavalheiro and Bruno Guerreiro
- **IoT Sensor-Node Generic Metamodel supporting real time device emulation**
  Pedro dos Santos, Rogério Campos-Rebelo and Rui Mesquita

10:50 – 11:05 Coffee break

11:05 – 12:45 YEF-ECE Sessions Y4, Y5, Y6

Y4 – Energy Systems and Smart Grids

Chairs: Anabela Pronto, Rui Lopes

- **Robust Energy Management of Hybrid Thermo-Electrical Microgrids under Uncertainty Using a Fuzzy Monte Carlo-Based Dispatch Strategy**
  Mahdi Azimian, Xinwei Shen and Umar Farooq

- **Hybrid Storage System Based on SMES and Batteries for Wind Farms**
  José Ángel Velaz Martín, Alfredo Alvarez, Belén Rivera, João Murta-Pina, Pilar Suárez and Vitor Fernão Pires
- **Optimisation-Based Sensitivity Analysis of PV and Energy Storage Sizing in Commercial Buildings**
  Tomás Barosa Santos, Carlos Santos Silva and Hermano Bernardo
- **Black start capability from PV inverters – real-time simulation and validation of control model**
  Joaquim Lopes, Nuno Amaro and Nuno Vilhena
- **A Hybrid Particle Swarm Optimization – Crow Search Algorithm for Robust MPPT in Photovoltaic System**
  Djihane Bougandoura, Sabrina Titri and Cherif Larbes

Y5 – Sensors and Biomedical Systems

Chairs: João Pedro Carvalho, João Pedro Oliveira

- **A Wearable IoT-Based System for Gait Cycle Duration and Symmetry Assessment in Lower-Limb Amputees**
  Bruna Alves, Alessandro Fantoni, José Pedro Matos and Joao Ramos Da Costa
- **Smart Object Detector System for Visually Impaired**
  Marco Pinto, Gustavo Jacinto, Rui Policarpo Duarte and Mário Véstias
- **Design of a Multichannel Biosensor based on Directional Couplers**
  Eduardo Serra, João Costa, Alessandro Fantoni and Paolo Di Giamberardino
- **Low-Power IoT Seismic Detection with Machine Learning Integration**
  Rúben Azevedo, Luis Pires and Vitor Fialho
- **Optical sensor system to monitor the pH of circulating media on biomimetic microsystems**
  Fernando Mendes, Ines Miranda, Raquel Rodrigues, Gabriel Ferreira, Helmut Schütte, Stefan Gassmann, Rui Lima, Paulo Sousa and Graca Minas

Y6 – Advanced Electronic and Photonic Devices

Chairs: João Costa, Rui Tavares

- **Is There a ZTC biasing Point in the Leading-Edge FET Intrinsic Gain $g_m r_{DS}$?**
  Miguel Coelho, Rafael Martins, Pedro Toledo, Alexandra Matos, Rafael Ferreira, Subrahmanyam Boyapati, José Augusto, Luis Oliveira and João Oliveira
- **Design of a 2 × 2 Programmable Matrix of Silicon Photonic Switches Based on Mach-Zehnder Interferometer Structures Using the Thermo-Optic Effect**
  Ernesto Velazquez
- **Powering ultra-low consumption IoT sensors through energy harvesting**
  João Cardoso, Luís Oliveira and Pedro Mendonça dos Santos
- **Fully Automatic Evaluation of IGZO-TFT Model Parameters**
  Carolina Almeida and M. Helena Fino
- **A Robustness Analysis of Hot Spots Bias Points on the FinFET: A Simulation-Based Approach**
  Rafael Martins, Miguel Coelho, Pedro Toledo, Alexandra Matos, Rafael Ferreira, Subrahmanyam Boyapati, Luis Oliveira, João Oliveira and José Augusto

12:45 – 14:15 Lunch

14:15 – 15:15 Keynote 3

Low-Power Real-Time ML Approach using IMU Data on FPGA

José Machado – *Universidade do Minho, Portugal*
Moderator: Sanaz Nikghadam

15:15 – 16:15 DoCEIS Session H1, YEF-ECE Sessions Y7, Y8

H1 – Intelligent Sensing

Chairs: *Clarisse Feio, Eurico Clemente*

- **Electronic Noses for Cyber-Physical Systems: Preliminary Results on TiO2 Thin Film as a Humidity Sensor**
  Tiago Reis, Paulo A. Ribeiro, Susana Ribeiro, Maria Helena Fino and Maria Raposo

- **AI for Plasmonic Nanoparticles: a Tool to Improve the Colorimetric Detection of PoC Devices**
  Caterina Serafinelli, Alessandro Fantoni, Elisabete C.B.A. Alegria, Manuela Vieira

Y7 – Mobile and Vehicular Networks

Chairs: Nuno Amaro, Paula Louro

- **The Case for Switched-Mode Transmitter Architectures in Efficient 5G/6G Mobile Networks Based on Power Amplifier Survey**
  Marius Diacu, João P. Oliveira and João Guerreiro
- **Social and Geographical Routing for Vehicular Delay-Tolerant Networks**
  Inês Fernandes and Paulo Pereira
- **A Systematic Review and Comparison of Calibration Techniques for UWB Localization Anchors**
  Sancho Amaral Simões, Hélder Araújo and Pedro Henriques Abreu

Y8 – Sign Language and Human-Centric AI

Chairs: Filipa Ferrada, Anikó Costa

- **Application of Language Learning Methodologies in Portuguese Sign Language Translation**
  Bernardo Seabra, Ana Inês Oliveira, Joana Coutinho Sousa and João Ferreira
- **Continuous Sign Language Recognition through Transformers and MediaPipe Landmarks**
  Tiago Gonçalves, Pedro Jorge and Arnaldo Abrantes
- **Enhancing Service Quality and Accessibility in Airports: Insights from Automated Social Media Analysis**
  Fedor Anashchenkov, Luis Martin-Domingo, Lili Aunimo and Karla Vittori

16:15 – 16:45 Coffee break

16:45 – 17:45 DoCEIS Session H2, YEF-ECE Sessions Y9, Y10

H2 – Communication Systems

Chairs: *Fábio Gregório, Hugo Matias*

- **Low Complexity and High Performance in Selective LIS Systems**
  Ali Gashtasbi, Mario Marques da Silva and Rui Dinis
- **Improved Channel Estimation for LIS Systems Using Regularized RLS in SC-FDE Frameworks**
  Ali Gashtasbi, Mario Marques da Silva and Rui Dinis

Y9 – Modelling and Simulation of Energy Conversion Systems

Chairs: João Pedro Oliveira, Luís Oliveira

- **Efficiency Map of Synchronous Reluctance Motor (SynRM) through Two-Dimensional Finite Element Analysis**
  Waldemiro Kubucama, Ricardo Luís and Rita Pereira
- **Towards a digital model for emulation of an electrolyzer in real-time: An initial study**
  Mariano Afonso João and Rui Esteves Araújo
- **Permanent Magnet-Assisted Synchronous Reluctance Motor for Traction Systems**
  Rodrigo Beato, Ricardo Luís and Rita Pereira

Y10 – AI and Visible Light Communication for Traffic Management

Chairs: Anikó Costa, Ana Inês Oliveira

- **Decoding Algorithms for Urban Traffic Management System supported by Visible Light Communication**
  Afonso Gaspar, Gonçalo Galvão, Paula Louro and Manuela Vieira
- **Red Light Running Detection Using AI-Powered Object Tracking on Embedded Systems**
  Tiago Silva, Tiago Dias and Pedro Jorge
- **Integration of Visible Light Communication and Deep Reinforcement Learning to Enhance Urban Traffic Management**
  Gonçalo Galvão, Manuela Vieira, Manuel Augusto Vieira, Mário Véstias and Paula Louro

17:45 – 18:15 Posters II

DoCEIS Posters II

Chairs: *Hugo Viana, João Cabacinho*

- **Digital Twins in Co-Creative Robotics: Enhancing Human-Robot Collaboration through Virtual Modelling**
  Zahra Babaei, Sanaz Nikghadam-Hojjati, José Barata and Paulo Leitão
- **Using Artificial Intelligence to Predict Gunfire Deaths**
  Eurico Clemente

18:15 – 18:45 Closing Session & Awards

Horizontal Session

What to value in your career? An HR market-based perspective.

José Pedro Silva *– Critical Manufacturing*

José Pedro Silva has a diverse work experience in various roles and industries. José Pedro is currently working as a Technology Director at Critical Manufacturing since 2023. Previously, they worked at Anchorage Digital as a Country Manager, Engineering Manager, and Interim Head of Engineering from 2021 to 2023. José also served as a Professor at Instituto Politécnico do Cávado e do Ave as a Professor since 2019. In addition, they have held leadership positions at IEEE Portugal, including Past-Chair, Section Chair, Vice Chair, and Section Secretary from 2014 to 2021. Prior to that, they had multiple roles at Critical Manufacturing, such as Product Engineering Director, Principal Software Engineer, Area Manager, Senior Software Engineer, Software Engineer, and Junior Software Engineer from 2013 to 2021. José has also worked as an Undergraduate Teaching Assistant at Faculdade de Engenharia da Universidade do Porto / FEUP and Faculdade de Engenharia da Universidade do Porto, where they provided assistance in various computer science courses.

Ricardo Cardoso – Impactwave

Ricardo Cardoso is a Portuguese entrepreneur and technology executive, best known as the founder and CEO of Impactwave and JSIO. Graduated in Design, Ricardo began his career as a designer and web designer before moving into technology leadership roles. Over the past two decades, he has spearheaded multiple innovative ventures in Portugal, always with a focus on creating digital solutions that address real market needs.

His background in design has been instrumental in shaping his approach to technology projects, emphasising user experience, intuitive interfaces, and the seamless integration of aesthetics with functionality. This design-driven mindset has enabled Ricardo to lead teams in developing accessible and impactful software and hardware products, setting his companies apart in competitive markets

As a leader, Ricardo is recognised for fostering teamwork, dedication, and a results-oriented culture. He champions economic, social, and environmental sustainability, guiding his teams with integrity and ambition. His management style promotes collaboration and innovation, empowering people to contribute creatively and ensuring that Impactwave and JSIO are seen as benchmarks for technological excellence and responsible business conduct

Panel

Hugo Plácido da Silva
IST/IT

Hugo is an award-winning inventor, researcher, and entrepreneur, having co-founded multiple innovative technology-based companies, operating in the fields of biomedical devices and data science for healthcare and quality of life. He obtained his Habilitation in Biomedical Engineering and completed his PhD in Electrical and Computers Engineering both from the Instituto Superior Técnico (IST), University of Lisbon (UL), where he is currently an Invited Assistant Professor. Hugo is also a Senior Researcher at the IT - Instituto de Telecomunicações, to which he is affiliated since 2004.

Both at a technical and scientific level, he has actively contributed to and participated in more than 60 national and international projects, funded by grants from Horizon Europe, Portugal 2030, Fundação para a Ciência e Tecnologia (FCT), and several other private and public institutions (e.g. Vodafone, Nokia, and others). Hugo has 10 granted patents and published 270+ papers in peer reviewed journals, international refereed conferences, and book chapters.

His work has been distinguished both internationally and domestically with several awards, including the IEEE Entrepreneurship Impact Award, "Career Award alumniIPS", the "Best Industrial and Enabling Technology" at the European Commission's DG-CONNECT Innovation Radar Prize, or the Ordem dos Engenheiros Young Engineer Innovation Award, just to name a few.

Hugo is an IEEE Distinguished Lectured since 2025, IEEE Senior Member since 2018, and IEEE Member since 2010, affiliated with the IEEE Engineering in Medicine and Biology Society. Furthermore, he is an active member of the IEEE Portugal Section, where he is currently Vice-Chair of the IEEE EMBS Portugal Chapter. More recently, he has also been appointed Member of the European Laboratory for Learning and Intelligent Systems (ELLIS) / Lisbon Unit for Learning and Intelligent Systems (LUMLIS).

Catarina Reis
IPL

Catarina Reis is an experienced Professor with +20 years in higher education. She holds a PhD in Computer Science from the Polytechnic University of Catalonia (UPC) and has been a researcher on several topics (mHealth, mobile development (android and iOS), software engineering). She specialises in Blockchain and DLT and has a track record of implementing solutions for diverse industries. She is a Scrum Master and has been coaching, mentoring, but also practicing, Agile methodologies, optimizing software development processes for enhanced efficiency and adaptability. She is a Senior Member of

IEEE, and Vice-Chair of the IEEE Portugal Section, and she is passionate about bridging academia and industry, seeking collaborations to drive impactful technological advancements.

Ivo Bernardo

DareData

Ivo Bernardo is a passionate professional in the field of Data Science and Analytics. He is currently a partner at DareData, a startup that specializes in implementing machine learning systems for companies of all sizes around the world. He holds a Master's degree in Statistics and Business Intelligence from NOVA University Lisbon and has extensive experience as an instructor in various data science academies over the years.

João Magalhães

NOVA FCT

João Magalhães (PhD, Imperial College London, UK, 2008) is a Full Professor at the Department of Computer Science at the Universidade NOVA de Lisboa. His research interests cover the different problems of vision and language understanding, in particular: foundational vision and language models, multimedia search, multimodal conversational AI, and multimodal temporal models. He has coordinated and participated in several research projects, where he aims to generalize his vision and language research to solve real-world problems across different domains. The work of his group has been awarded or nominated for several awards and distinctions: in 2023 and 2022 his group was awarded the 1st place and 2nd place respectively in the Amazon Science Alexa TaskBot Challenge, a conversational AI challenge to incorporate multimodal (voice and vision) user data, in 2020 a best paper award at the Portuguese NLP conference (PROPOR), in 2018 two nominations for best paper at ACM Int'l Conference on the Theory of Information Retrieval and at ACM Int'l Conference in Multimedia Retrieval.

José Pedro Nunes

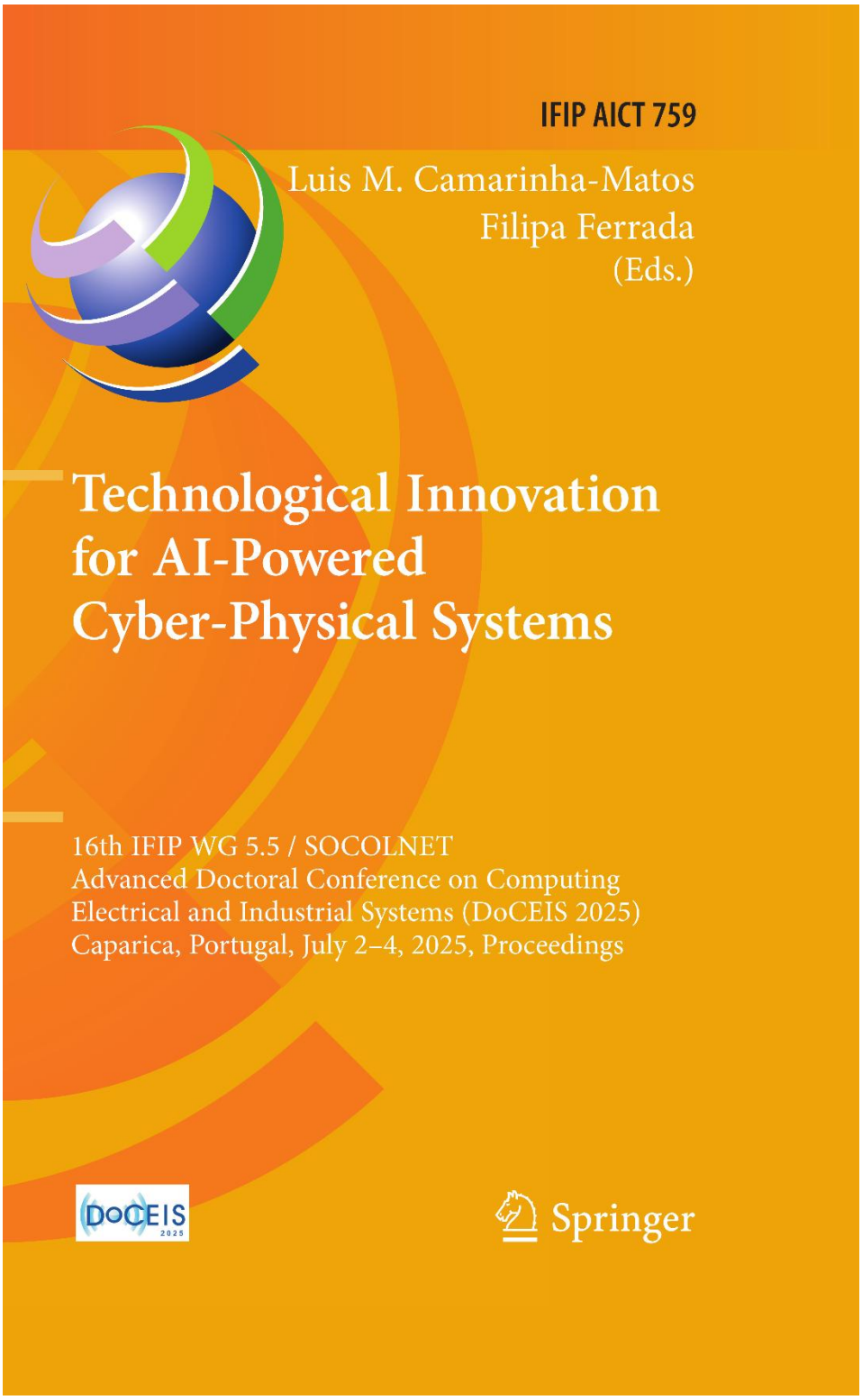
Unbabel

José Pedro Nunes is VP of Engineering at Unbabel, with a background in leading engineering teams in AI-focused companies like BeReal and Reachdesk. He works on bridging research and product, particularly in systems that apply AI to real-world problems. His focus is on building teams, processes, and infrastructure that help turn ideas into scalable software.

Proceedings

DoCEIS 2025 Proceedings are published by Springer, under its IFIP AICT series.

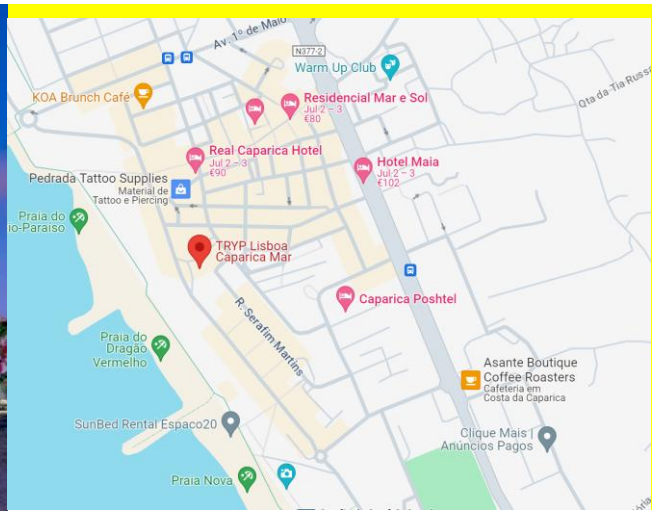
Proceedings in digital format are available through a link provided at the conference website.



Similar to previous years, these proceedings will be submitted to indexing in ISI Web of Science, SCOPUS and DBLP.

Local

The conference will be held at [TRYP Lisboa Caparica Mar Hotel in Caparica](#).



How to Arrive at the Conference

🚗 By Car

Directions via [Google Maps.](#)

🚢 By Boat

From Cacilhas, take bus TST no. 124 to "Costa de Caparica". Timetables available [here](#).

🚕 By Taxi

Approximate cost is €30 during the day. Make sure the meter is running. Higher fares at night.

🚖 By Uber

An often cheaper and convenient alternative to taxis.

Internet Access Information

During the conference, the credentials for accessing the Internet within the Hotel TRYP Caparica are:

Network: tryplisboacaparicamar

Password: HTRYPCAPARICA

Social Events

Welcome Reception

The welcome reception will take place on **July 2nd at 19:30 PM** at the **Tarquinio Beach-Bar**, with a unique view and access to the beautiful beach of Costa de Caparica. The how to get instructions can be accessed through this link.

Address: Muralha da praia, apoio 14, 2825-382 Costa da Caparica

Conference Dinner

The conference dinner will be held at **Pezinhos no Tejo** on July 3rd, from **19:30 PM to 23:00 PM**. Pezinhos no Tejo offers an exceptional vantage point overlooking the Tagus River and Lisbon. This firm excels in event planning and premium catering, supported by a team of skilled and seasoned professionals. Transportation to Pezinhos no Tejo will be assured by a bus leaving from the hotel at 19:00 PM. The how to get instructions can be accessed through this link.

Address: R. do Joinal 2825, Caparica

Scope

Following the success of the previous editions we are proud to announce the organization of the 9th edition of the International Young Engineers Forum on Electrical and Computer Engineering – YEF-ECE 2025.

Electrical engineers apply electrical and electronic theory to obtain solutions for problems related to the development, design and operation of electrical hardware and software, control systems, electrical machines and communications systems. Computer engineers are concerned with the design, development, and implementation of new and challenging computer technology in a myriad of consumer, industrial, commercial, and military applications. Besides development, design, operations, and research, electrical and computers engineers are typically involved in the manufacture, installation, and maintenance of computational devices, electrical and electronic equipment and systems employed by a wide variety of organizations that produce, use or provide services to such equipment, and ranging from tiny electronic devices to large complex systems.

The International Young Engineers Forum combines the latest developments and applied research in electrical and computer engineering, dealing with systems' design and utilization, looking forward to efficient devices and systems with appropriate control algorithms to meet the needs of business and industry in a global economy. This event will be a unique opportunity for young engineers to connect with each other enabling experience sharing and becoming internationally active.

General Co-Chairs:
Luis M. Camarinha-Matos (Portugal)
Filipe Moutinho (Portugal)

Program Co-Chairs:
João Martins (Portugal)
Paula Louro (Portugal)
Enrique Romero-Cadaval (Spain)
Anikó Costa (Portugal)

Finance Chair:
Luis Oliveira (Portugal)

Publications Chair:
Ana Inês Oliveira (Portugal)

Publicity Chair:
João Pedro Matos-Carvalho (Portugal)

Volunteers:
Carolina Lagartinho-Oliveira (Portugal)
Afonso Oliveira (Portugal)

International Program Committee

A. Luís Osório (Portugal)
Adriano Fiorese (Brazil)
Alexander Krylatov (Russia)
Alexandros Paspatis (Greece)
Ana Inês Oliveira (Portugal)
André Mora (Portugal)
Andrei Karatkevich (Poland)
Antoni Grau (Spain)
Antonio Luque (Spain)
Antonio Xavier Zavala-Alcívar (Ecuador)
Aurélie Montarnal (France)
Beatriz Andres (Spain)
Carlos Roncero-Clemente (Spain)
Daniele Spoladore (Italy)
Deniss Stepins (Latvia)
Diogo Gomes (Portugal)
Duarte Sousa (Portugal)
Eric Monmasson (France)
Eva González-Romera (Spain)
Fabio Fruggiero (Italy)
Feng Chu (France)
Filipa Ferrada (Portugal)
Frede Blaabjerg (Denmark)
Garyfallos Fragidis (Greece)
Géza Haidegger (Hungary)
Giovanni Petrone (Italy)
Graca Minas (Portugal)
Houda Harkat (Morocco)
Hugo Serra (Portugal)
Jan Haase (Austria)
Janis Zakis (Latvia)
Joao Casaleiro (Portugal)
João Mendonça Da Silva (Portugal)
João Murta-Pina (Portugal)
João Oliveira (Portugal)
João Paulo Barraca (Portugal)
João Pedro Matos-Carvalho (Portugal)
José Machado (Portugal)
Laurent Navarro (France)
Lili Aunimo (Finland)
Lucian Toma (Romania)
Luis Gomes (Portugal)
Luis Oliveira (Portugal)
Maria do Rosário Alves Calado (Portugal)
Maria Fino (Portugal)
Maria Isabel Milanes-Montero (Spain)
Mário Véstias (Portugal)
Nagham Saeed (UK)
Nuno Paulino (Portugal)
Patricia Macedo (Portugal)
Paulo Leitao (Portugal)
Paulo Miyagi (Brazil)
Pedro Brandão (Portugal)
Rastko Fiser (Slovenia)
Ricardo J. Rabelo (Brazil)
Rui Esteves Araújo (Portugal)
Rui Neves Madeira (Portugal)
Rui Santos-Tavares (Portugal)
Sanaz Nikghadam-Hojjati (Portugal)
Shu-Ling Lu (UK)
Silvio J.P.S. Mariano (Portugal)
Thomas Schuster (Germany)

Thomas Strasser (Austria)
Valentina Emilia Balas (Romania)
Vanja Ambrozic (Slovenia)
Vitor Pires (Portugal)

Organizational Sponsors

Technical Sponsor

Contacts

DoCEIS Secretariat

NOVA University Lisbon
School of Science and Technology
Dept. Electrical and Computer Engineering
2829-516 Caparica, Portugal

Tel: (+351) 21 294 85 45
Fax: (+351) 21 294 85 32
Monday - Friday 09:00 a.m. - 06:00 p.m.
Closed Saturday and Sunday
E-mail: doceis@uninova.pt

Acknowledgements

Technical Sponsors

Society of Collaborative Networks

IFIP WG 5.5

Co-Operation infrastructure for Virtual Enterprises and electronic business

Organizational Sponsors

Commercial Sponsor

Organized by:

PhD Program in Electrical and Computer Engineering,

School of Science and Technology - NOVA University Lisbon

Program Overview