Center of Technology and Systems

NEWSLETTER

July 2025

CTS Evaluation

As part of the multi-annual program for funding R&D units, CTS was recently evaluated by an international panel appointed by the Portuguese Foundation for Science and Technology (FCT). The last stage of the evaluation process included a visit to the center's facilities at the Caparica Campus.
The evaluation focused on the scientific and technological activities carried out by the CTS between January 1, 2018 and December 31, 2023 and on the objectives, strategy, activity plan and organization for the period 2025 to 2029.
As a result of this assessment, CTS was awarded a rating of **EXCELLENT** by the Evaluation Panel. As the evaluators mentioned:

"The center is committed to perform high-quality research in electrical and computer engineering as their main goal is advancing engineering systems. … The applied nature of the research, combined with successful technology transfers and industry collaborations, underscores the practical impact and relevance of the unit's work…. The top publications are from the best journals in the field, which is witnessing to the impact that the team has made on the advancement of knowledge."

All CTS members that contributed to the great scientific and technological activities are to be congratulated for this achievement!

Achieving the rating of Excellent in two consecutive assessment exercises is a result of hard work and dedication of our community of researchers and students. And an incentive to pursue this trajectory towards continuous excellence and impact creation.

Excellence in scientific research is not easily achieved and should not be confused with "political" impact. It demands hard work and a continuous commitment to deep inquiry aimed at expanding knowledge. It involves rigorous methodology, high-quality publications, and the capacity to effectively communicate and apply scientific findings.

This requires that we do not yield to simplifications or take the path of "ease," but that we continue - with humility and sobriety - to advance toward new knowledge and leave a true scientific legacy for future generations.

Let us pursue the path of continuous excellence with courage and determination.

Luis Camarinha-Matos, Director of CTS

Editorial

In the Summer 2025 edition of the CTS Newsletter, a resounding theme emerges: the dynamic interplay between innovation and collaboration. Our center's commitment to high-quality research in electrical and computer engineering is not just about advancing engineering systems in isolation. It's about promoting a vibrant ecosystem where technology transfer, industry collaborations, and knowledge sharing converge to create practical impact. As a result CTS has been rated Excellent in the last FCT evaluation. The international evaluation panel considered CTS "committed to perform high-quality research in electrical and computer engineering as their main goal is advancing engineering systems" whose research "is highly relevant to significant societal challenges".

This newsletter showcases the scope and scale of our accomplishments. These engagements underscore our "commitment to addressing pressing global issues", using the evaluation panel words.

The accreditation of the PhD program in Electrical and Computer Engineering reaffirms our dedication to excellence in education and research. With a significant number of graduates contributing to academia, research, and industry both in Portugal and abroad, our program continues to be a facilitator for scientific productivity and international collaboration.

We are also motivated to highlight the new R&D projects funded by FCT and EC. These initiatives exemplify our commitment to addressing pressing challenges in digital security, artificial intelligence, and maritime security through innovative solutions and collaborative partnerships.

The success of the Seasonal School on Advanced AMS IC Design, with participants from both academia and industry, demonstrates the importance of bridging the gap between education and practice. By fostering collaboration and knowledge exchange, we are empowering the next generation of innovators to tackle the complex challenges of analog and mixed-signal integrated circuit design.

As we move forward into the future, let us continue to embrace the spirit of innovation and collaboration that defines CTS. By working together across disciplines and sectors, we can drive meaningful progress and make a lasting impact on society.

João Martins, CTS Communication Officer

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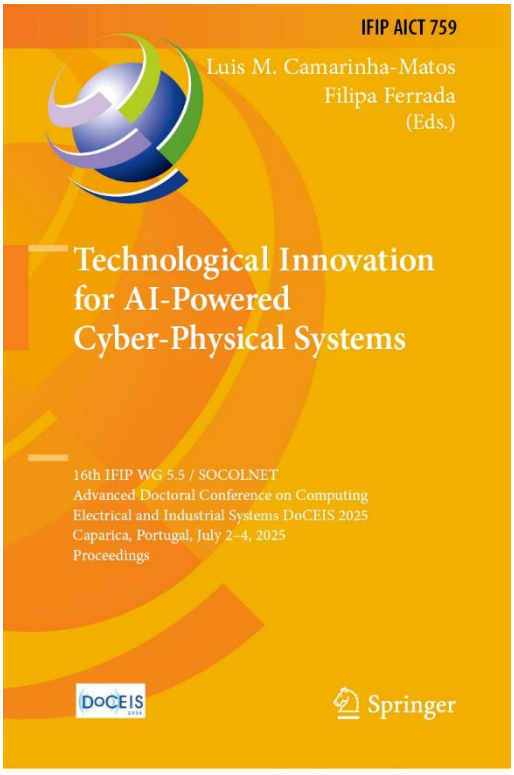
DoCEIS 2025 proceedings



Proceedings of DoCEIS 2025 were publiched by Springer under its IFIP Advances in Information and Communication Technolofies series.

The book is available for free download during this month through the conference website:

https://doceis.dee.fct.unl.pt/

Proceedings from YEF-ECE 2025 will be publisehd later through IEEE Xplore.

Funded by FCT

SECURE - Physically Unclonable Functions for Digital Secure Systems using hybrid technologies: printed-electronics and silicon CMOS (250k€).

SECURE is focused on the research and development of low cost PUF IDs that can be used in authentication, encryption key generation, and identity functions, which can be employed in document validation, authentication seals and also in all sorts of internet-of-things (IoT) related applications requiring authentication procedures. To further improve PUFs' reliability, randomness, energy-efficiency and stability the project will combine the best of two quite different technologies namely, printed-electronics and silicon CMOS. On the one hand, the required static entropy will be extracted mainly from mismatch variation of an innovative matrix of passive metal contacts (VIAS) directly printed on sustainable substrates. On the other hand, the digitization and the most sophisticated error-correction coding (ECC) digital techniques will be used, to remove and correct all existing unstable bits and to deal with possible temperature and ageing effects. This will be done in a dedicated and ultra-small (< 1.5 x 1.5 mm^2) CMOS integrated-circuit (chip), which can be easily hidden into the document itself. This hybrid combination of large-area electronics with deep nanoscale CMOS will provide fully reliable keys and unique IDs.
This project is led by Luis Oliveira and has the collaboration of CTS members: João Goes, Nuno Paulino, João Pedro Oliveira, Marko Beko, and João Casaleiro.

smartADC- Design of a ultra high-speed time-interleaved ADC using genetic algorithms with intelligent mismatch and timing calibration (250k€).

This project consists of the development and experimental evaluation of an energy-efficient, 12-bit, 8 GS/s TIADC. The integrated-circuit prototypes will be designed and fabricated in a standard 28 nm bulk-CMOS (TSMC HPC+), which is, approximately, 10x and 5x cheaper than the more sophisticated SiGe and FD-SOI/fi nFET technologies, respectively. Regarding benchmarking, the TIADC is expected to reach a conversion-rate of 8 GS/s, a dynamic resolution better than 9 bits at Nyquist-rate and an energy-efficiency corresponding to a Walden figure-of-merit better than 50 fJ/conv.-step; the entire TIADC will fit into 1 mm2. These are unprecedented features, far beyond the state-of-the-art.
This project is led by Nuno Paulino and has the collaboration of CTS members: João Goes, João Pedro Oliveira, and Hugo Serra.

Funded by EC

CAIOC - Cyber Artificial Intelligence Operational Capability

Grant agreement ID: 101190339 (Via FCT-NOVA)

The EU-Founded CAIOC project aims to build modular artificial intelligence tools, capable of analysing large amounts of both structured and unstructured data, to identify potential cyber threats, develop effective mitigation strategies and provide recommendations to support the response to cyber incidents.
Status: This project already officially started.
CTS participants: Prof. José Barata, A. Prof. André Rocha, Dr. Sanaz Nikghadam-Hojjati, PhD students: Nelson Fereitas, Miguel Arvana, Nastaran Farhadi

COLOSSUS - Multi-Purpose Unmanned Vehicle Swarm Patrol Intelligence Platform For Port Security And Resilience

Grant agreement ID: 101225980 (Via UNINOVA)

The EU-Founded COLOSSUS project presents an integrated solution for digital security, resilience, and maintenance of port infrastructures, providing real-time data access from autonomous vehicles and sensors. Developed in response to the increasing demand for maritime security, COLOSSUS aims to revolutionize the protection of EU maritime infrastructures, aligning with the updated EU Maritime Security Strategy (EUMSS 2023). By bringing together Small and Medium-sized Enterprises (SMEs) from various Member States, the project leverages their innovation potential to tackle key challenges outlined in the EU's Blue Growth strategy and the European Green Deal.
Status: Recently got the results, and will officially start at the end of 2025.
CTS participants: Prof. José Barata, Dr. Sanaz Nikghadam-Hojjati, PhD student: Luis Estrada

Seasonal School on Advanced AMS IC Design

Kicking Off the at UNINOVA Auditorium!

The Seasonal School on Advanced Analog and Mixed-Signal (AMS) IC Design 2025 was organized by CTS members **João Goes, Luís Oliveira, João Pedro Oliveira, Nuno Paulino, Hugo Serra, and Rui Tavares,** is a key initiative of POEMS, strongly committed to promoting advanced training in AMS IC design with a particular emphasis on state-of-the-art CMOS technologies. The program offers an immersive, hands-on learning experience focused on the design of complex AMS building blocks, targeting applications in automotive, IoT, and wireless/wireline communications

The **Seasonal School** officially opened its doors at the UNINOVA Auditorium, marking a significant milestone in fostering collaboration between academia and industry in the world of analog and mixed-signal integrated circuit design.

Bridging Academia and Industry for Tomorrow's Talent

This initiative stands as a shining example of how deep collaboration between universities and industry partners can build a strong, future-ready talent pipeline. When academic institutions and industry leaders come together, real magic happens:

✨ *Students gain hands-on experience with cutting-edge technology*

✨ *Industry gains access to fresh perspectives and emerging talent*

✨ *The skills gap narrows through targeted, practical education*

On behalf of the organizing committee from CTS, we would like to extend our heartfelt thanks to everyone who took part, whether attending in person or joining us remotely (in total 150 people registered for the event)

A Powerful Start: Keynote by a Visionary Leader

The event began with an inspiring keynote from **Prof. José Franca**, founder of *#Chipidea*, a groundbreaking company in analog and mixed-signal design later acquired by *Synopsys Inc.* in 2009. His words set the tone for a program full of insight, innovation, and forward-thinking dialogue.

Distinguished Speakers and Cutting-Edge Topics

Participants were treated to a series of thought-provoking presentations from internationally respected experts, each offering a unique lens on the challenges and opportunities in AMS IC design:

- **Dmytro Cherniak**, CTO at *Infineon Technologies*, Austria
  "Circuits and Techniques for Next Generation Wireless"
- **Mirjana Banjevic**, *Sensirion*, Switzerland
  "Inside the World of IC Design for Sensor Applications"
- **Boris Glass**, Microelectronics Engineer, *European Space Agency*, The Netherlands
  "Ultra-Deep Submicron Technologies for European Space Sovereignty: Advancing Next-Generation Processors and System Integration"
- **Ricardo Reis**, Executive Director at *Synopsys*, Portugal
  "Challenges of Advanced Circuit Design of Giga Bit SerDes (Serializer/Deserializer) PHYs"

This year's opening day was not just a celebration of engineering excellence—it was a call to action to continue building strong bridges between education and industry, ensuring that today's students become tomorrow's innovators.

WORKSHOP “Generative AI: Pedagogical Ally or Enemy?”

On May 24, 2025, CTS-UNINOVA researcher Dr. Sanaz Nikghadam-Hojjati delivered a workshop titled “Generative AI: Pedagogical Ally or Enemy?” as part of the 5th International Conference on Psycho-Pedagogical Theories, Values and Practices.

The 2.5-hour interactive session welcomed over 63 participants, including university students, professors, and researchers from diverse disciplines. The workshop fostered critical reflection and lively dialogue on the opportunities and challenges posed by generative AI in educational and research contexts.

Participants actively engaged in discussions about how generative AI is reshaping pedagogical models, raising thoughtful questions around trust, creativity, and academic integrity. The session also highlighted practical examples and strategies for integrating AI in a way that empowers rather than replaces human learning and teaching capacities.

AMICSA 2025 brought together global experts in space microelectronics in Lisbon

From June 16 to 18, 2025, Lisbon hosted the 10th edition of the renowned AMICSA Workshop (Analogue and Mixed-Signal Integrated Circuits for Space Applications), co-organized by CTS/UNINOVA and the European Space Agency (ESA). The event took place at the Rectorate of NOVA University Lisbon, in Campolide, marking the return of the workshop after its previous edition in 2022, held in Madrid.

AMICSA 2025 gathered over 100 participants, including international experts, researchers, and students, providing a top-tier platform for presenting and discussing recent advances in analogue, mixed-signal, and custom integrated circuits designed for operation in harsh environments. The program focused on radiation resilience, ageing durability, and reliable performance under cryogenic conditions — key factors for aerospace and scientific applications.

More than 50 final-year master’s and PhD students actively participated, reflecting strong academic involvement and a commitment to advanced education in electronic engineering.

The event was widely regarded as a resounding success, featuring three keynote lectures by world-renowned experts: Dr. Soumyajit Mandal (Brookhaven National Laboratory, USA), Dr. Jorge Lagos (IMEC, Belgium), and Prof. João Varela (PETsys, Portugal).

AMICSA 2025 was sponsored by IMEC and showcased several leading companies in microelectronics and instrumentation, including Microchip, IMEC, SERMA, ALTER, Rhode &Schwartz, and PETsys.

The local organizing committee consisted of six PhD members of CTS and professors from the Department of Electrical and Computer Engineering (DEEC) at NOVA School of Science and Technology (FCT NOVA): João Goes, Luís Oliveira, João Pedro Oliveira, Nuno Paulino, Rui Tavares, and Hugo Serra. The event stood out as a major scientific and academic milestone for the European space electronics community.

DoCEIS 2025

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

This edition was a great success, highly appreciated by all external attendees. DoCEIS continued to be a space for multi-disciplinary dialogue, while keeping a high-quality profile.

Accepted papers:

A – AI in Business Applications

- **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

B – AI-Powered Healthcare

- **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

C – AI in Systems, Decision & Control

- **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

- **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

E – AI in Industry 4.0

- **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

- **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

G – Electronic Systems

- **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

H1 – Intelligent Sensing

- **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

H2 – Communication Systems

- **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

Invited keynotes:

Aerial Robotics: Advances in Motion Planning and Control

Rita Cunha *– University of Lisbon, Portugal*

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

Filippo Sanfilippo *- University of Agder, Norway*

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

José Machado – *Universidade do Minho, Portugal*

Horizontal *session:*

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

José Pedro Silva *- Critical Manufacturing*
Ricardo Cardoso *– Impactwave*

Panel:

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

Posters:

- **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
- **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

YEF-ECE 2025

9th Young Engineers Forum on Electrical and Computer Engineering

This year's edition attracted a record number of submissions from which 42 were selected for inclusion in the program. For many young engineers this was the first time they had had the chance to make a presentation at an international event.
Accepted papers:

Y1 – Power Electronics and Energy Conversion

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

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

- **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

Y4 – Energy Systems and Smart Grids

- **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

- **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

- **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

Y7 – Mobile and Vehicular Networks

- **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

- **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

Y9 – Modelling and Simulation of Energy Conversion Systems

- **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

- **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

e-REDES Award

The master's thesis of Miguel Cardinha, supervised by Professors Rui Amaral Lopes and Nuno Amaro, members of CTS, won second place in the national competition "Open Data Academy Challenge," promoted by the company e-REDES. The thesis, entitled *"Analysis of the Impact Introduced by Electric Vehicle Charging on the Lisbon Electricity Distribution Network,"* used data from multiple sources, including the e-REDES Open Data platform, and applied genetic algorithms to model and implement an innovative methodology. This approach not only enables an understanding of the distribution of electric vehicle consumption by postal code but also allows for analysis of its impact on each substation in the network. As a result of this work, a manuscript was also prepared and is currently under review for publication in an international scientific journal. The award ceremony took place on March 31st at EDP headquarters and included participants from various universities across the country.

Journal editor's choice

Open Access | Editor's Choice | Article

Modeling Collaborative Behaviors in Energy Ecosystems

by **Kankam O. Adu-Kankam** and **Luis M. Camarinha-Matos**

Computers 2023, *12*(2), 39; **https://doi.org/10.3390/computers12020039** - 13 Feb 2023

Dear authors,

Thank you for choosing /Computers/ as the venue for your publication:

Title: Modeling Collaborative Behaviors in Energy Ecosystems
https://doi.org/10.3390/computers12020039

We are pleased to inform you that your paper has been selected by our Academic Editor as being of special interest and will be featured in a special edition of Computers entitled "Editor's Choice Articles".

IEEE IES Recognition

Luis Gomes was appointed **2025 Vice-President for Conference Activities** of the IEEE Industrial Electronics Society (IES) during last March AdCom meeting (https://www.ieee-ies.org/governance/officers).

Best paper awards

Two works associated with CTS got the best paper award at DoCEIS 2025:

- Noque, D.F., Camarinha-Matos, L.M., Oliveira, A.I. (2025). **A Collaborative Approach to Last-Mile Logistics**. In: *Technological Innovation for AI-Powered Cyber-Physical Systems. DoCEIS 2025*. IFIP AICT, vol 759. Springer, Cham. https://doi.org/10.1007/978-3-031-97051-1_1

- Santos, R.S., Matos-Carvalho, J.P., Calafate, C., Correia, S. D. (2025). **Deep Learning Models for GNSS-Denied Target Navigation**. In: *Technological Innovation for AI-Powered Cyber-Physical Systems. DoCEIS 2025*. IFIP AICT, vol 759. Springer, Cham. https://doi.org/10.1007/978-3-031-97051-1_15

CSCWD 2025 - 2025 IEEE 28th International Conference on Computer Supported Cooperative Work in Design

May 5 - 7, 2025, Compiègne, France

Prof. Luis Camarinha-Matos, director of CTS, gave an Invited Keynote at CSCWD 2025. The talk entitled "**Trends in Collaborative Networks**" presented an overview of this research area.

Abstract. Over the past decades, the rise of a networked society has been driven by rapid advancements in information and communication technology (ICT), particularly in computer networking. This has enabled unprecedented hyper-connectivity among organizations, individuals, smart machines, and intelligent systems. As a result, new forms of coworking and collaboration have emerged, composed of distributed, autonomous, and heterogeneous entities. This evolution first led to the establishment of Collaborative Networks (CNs) as a distinct discipline with a socio-technical character, followed by a series of milestones that have progressively shaped its development.

Nowadays CNs play a key role in the ongoing digital transformation across industries and services. Although still a relatively young field, CNs have evolved through several generations over the past decades. As we move toward Society 5.0, the complexity of interactions among a diverse range of agents continues to intensify. The unpredictability of modern environments—shaped by volatility, uncertainty, complexity, and ambiguity (VUCA)—further highlights the need for advanced collaborative networks. At the same time, Artificial Intelligence (AI) is revolutionizing work dynamics, enabling new ways for humans and AI-driven systems to collaborate effectively across a wide range of tasks. In an increasingly interconnected global economy, collaboration constitutes a fundamental pillar of development. However, the design, support, management, and supervision of hybrid human-AI collaborative networks present significant scientific and technological challenges.

As such, we are now entering a new phase—Collaborative Networks 5.0—characterized by features such as: collaborative cyber-physical systems, collaboration between humans and intelligent autonomous systems, collaborative distributed cognitive systems, increased focus on collaborative accountability, handling ethics and coping with risks and disruptions, managing large amounts of collaborative data, monetization of collaboration, creating a collaboration culture, supporting collaboration creativity, handling mass collaboration, and supporting collaborative value creation through new business models, among others.

IE 2025 – 24th International Conference on Informatics in Economy

15-18 May 2025, Bucharest, Romania

Prof. Luis Camarinha-Matos gave an Invited Keynote at IE 2025 on the topic "**Sustainable Collaborative Business Ecosystems**".

The keynote discussed both the contribution of Collaborative Networks to the achievement of sustainability goals, and the challenges of keeping the business ecosystems sustainable, i.e., supporting continued engagement of its members in successful collaboration. The challenges of hybrid human-AI networks as well as examples of related research at CTS were also addressed.

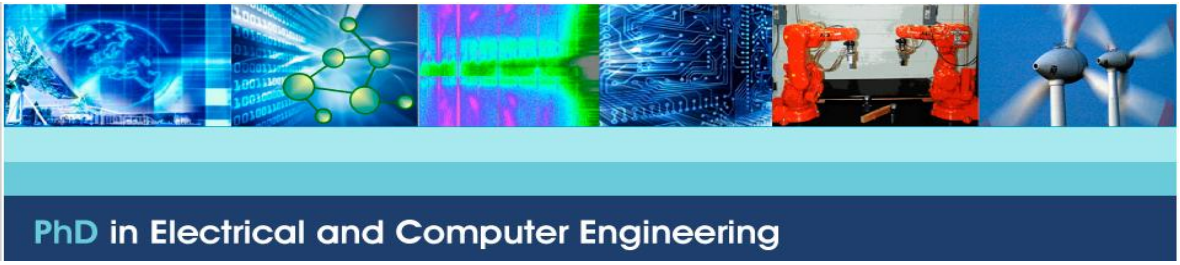
2025 CPE-POWERENG – 19th IEEE International Conference on Compatibility, Power Electronics and Power Engineering

20-22 May 2025, Antalya, Turkey.

Prof. João Martins gave an Invited Keynote at 2025 CPE-POWERENG on the topic "**Power Grids Resilience Towards Extreme Weather Events**".

Abstract: The increasing frequency and severity of extreme weather events, due to climate change, poses significant challenges to the resilience of power grids globally. Ensuring the reliability and robustness of these critical infrastructures has become a paramount concern for utility operators, policymakers and stakeholders. Multifaceted strategies are necessary to enhance the resilience of power grids against extreme weather phenomena, such as hurricanes, floods, heatwaves, and ice storms. Key approaches include the hardening of physical infrastructure, the integration of advanced grid technologies, the implementation of robust grid management practices, and the adoption of adaptive and proactive maintenance protocols. The deployment of distributed energy resources, the enhancement of microgrids and renewable energy systems, offers great potential to increase localised power stability during centralised grid failures. Real data based impact forecast is a valuable tool in order to help Distribution System Operators better plan their long term investments in order to increase power grids resilience.

PDEEC Accreditation



The PhD program on Electrical and Computer Engineering of NOVA University Lisbon, supported by CTS, was again accredited by the national agency A3ES for the next 6 years. This is a recognition of the excellence of the program.
Until March 2025 PDEEC was coordinated by Prof. Camarinha-Matos, director of CTS. A total of **122** high quality PhD theses were completed during this period. Currently **55%** of graduates are in academia, **10%** in research institutions, and **35%** in industry and services. **79.5%** are working in Portugal, while the remaining are spread across **13** other countries. On average, PDEEC students contribute about 64 publications per year, which is very important for the scientific productivity indices of the department, CTS, and university. A notable achievement of PDEEC is its international Doctoral conference – DoCEIS – that already had **16** editions. All editions have been co-sponsored by IFIP WG5.5, the IEEE Industrial Electronics Society, and Socolnet – Society of Collaborative Networks. The proceedings have been consistently published by Springer and indexed in Scopus. The conference typically attracts 80 to 100 participants from 15 to 20 countries.

For the next period, coordination will be ensured by Prof. João Martins, an integrated member of CTS. We wish continued success to PDEEC in this new phase and hope that the new coordination will uphold scientific quality within their revised PhD model. Only a program grounded in scientific rigor and excellence can contribute meaningfully to the success of CTS. In times when the pressure for "facilitation" is very high, maintaining prestige based on scientific merit demands **strong commitment and courage**! Simply copying less demanding PhD models without paying attention to serious studies on the needed PhD education is a fast path to losing prestige.

ISGTA'25: International Symposium on Green Technologies

Comes to Portugal in November

The 2nd International Symposium on Green Technologies and Applications (ISGTA'25) [www.isgta-conf.org] will take place from November 19 to 21, 2025, at the Portalegre Polytechnic University, Portugal, in a hybrid format (on-site and virtual). This key scientific event is jointly organized by the Portalegre Polytechnic University and CTS – UNINOVA (Portugal), as well as the Hassan II University of Casablanca (Morocco).
Following the success of the first edition in 2023, held in Casablanca, Morocco, ISGTA returns to provide an international forum for sharing and debating innovative solutions in green technologies, smart sustainable cities, renewable energies, and green computing.
The program features keynote speeches from internationally recognized experts, technical sessions, tutorials, and networking opportunities, providing a platform for researchers, companies, and decision-makers to present and discuss the latest scientific and technological advancements. The accepted papers will be published in the Springer Proceedings in Physics series, indexed in Scopus, INSPEC, and EI Compendex.
Sergio D. Correia, a member of CTS, is General co-chair, and João P. Matos-Carvalho is publication co-chair.

PRO-VE 2025

26th IFIP/SOCOLNET Working Conference on Virtual Enterprises

Co-sponsored by CTS

AI is deeply transforming working modes, opening new ways to achieve a very large diversity of operational tasks where human expertise and artificial intelligence work synergistically. In a worldwide interconnected economy, where collaboration is constantly re-enforced as a key pillar of development, the design, support, management and supervision of hybrid human-AI organization networks open strong scientific challenges.

www.pro-ve.org

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