

2023 NEWSLETTER



EDITORIAL

Welcome to the 2023 issue of CISE newsletter!

In 2023 CISE endeavoured in the realisation of activities at the scientific, technical, and public domains.

CISE network of dedicated research facilities was strengthened, through the establishment of two novel research premises, representing an important milestone towards the expansion of CISE capability to carry out industry-oriented research and consultancy.

The R&D Unit internationalisation was consolidated. Collaboration initiatives with industry and PhD cotutelle programmes were initiated.

Still, CISE activity went far beyond classical I&D. Following the tradition of promoting scientific and technological culture, the R&D Unit took part in multiple knowledge dissemination activities. CISE C&B was also very active, promoting leisure activities.

Enjoy your reading!

Prof. Antonio J. Marques Cardoso
CISE Director



IN THIS ISSUE

NEW RESEARCH PREMISES

VISIT OF ESSAC

PARTICIPATION IN EVENTS

VISIT TO CISE FACILITIES

INTERNSHIPS@CISE

SEMINARS@CISE

TEAM BUILDING ACTIVITIES

AWARDS & DISTINCTIONS

New Research Premises

The year 2023 was definitely marked by the accomplishment of important milestones towards the reinforcement of CISE network of dedicated research facilities, particularly in the already established ones.

Since May 2023, the **Electromechatronic Systems Laboratory (CISE | LSE)**, established at Covilhã, comprises two distinctive research-oriented premises: the already available experimental premise and the new premise dedicated to modelling and simulation activities.



Motivated by the ongoing cooperation initiatives with industrial partners, CISE took an important step towards the strengthening of its testing capability. In addition to the already available indoors and outdoors research premises of **Guarda International Research Station on Renewable Energies (CISE | GIRS-RES)**, established at Guarda, CISE took the first steps towards the implementation of a Living Lab, with plenty of space and conditions suitable to host high-power and heavy-duty test procedures. With this new research premise, CISE expands its capability to carry out consultancy and research activities specifically targeted at today's industry needs.





Visit of ESSAC to CISE

On 08 September 2023, CISE facilities were visited by two members of its **External Standing Scientific Advisory Committee** (ESSAC). **Prof. Francesco Profumo**, Chair of Compagnia di San Paolo (Italy), and **Dr. Peter Barbosa**, R&D Director at Milan M. Jovanović Power Electronics Lab, Delta Electronics, Raleigh (USA), visited CISE to analyse the performance of the R&D Unit since last visit, in 01 December 2017.

During the morning, **Prof. Antonio J. Marques Cardoso**, Director of CISE, presented the expansion of the facilities, outputs and achievements accomplished during the period under consideration.

The presentation was followed by a visit to the new facilities of **CISE | LSE**.



During the afternoon, the ESSAC members visited **CISE | GIRS-RES** indoors and outdoors facilities, including the new premises targeted at industry-oriented activities.



At the end of the visit, ESSAC members made an overall balance and perspective of CISE activity, providing recommendations of improvement.



Participation in Events

Electromechanical Engineering Days



On May 3rd 2023, CISE participated in the 25th edition of the Electromechanical Engineering Days, organised by **NEUBI** - *Núcleo de Estudantes de Engenharia Eletromecânica da Universidade da Beira Interior* (association of students enrolled in Electromechanical Engineering at UBI). The presentation, made by **Prof. Antonio J. Marques Cardoso**, CISE Director, demonstrated how the latest technologies for electromechatronic systems may help addressing some of today's societal challenges.

The event counted with the participation of BSc and MSc students, who were presented with a brief introduction to the main research subjects and projects under development at the multiple CISE facilities.



ENERTECH SABUGAL 2023

CISE participated, as institutional partner and exhibitor, in the sixth edition of **ENERTECH SABUGAL – Technology for Energy Fair**, that took place in Sabugal, Portugal, from the 12th to the 14th of October 2023. This event aimed to bring together academia and companies, promoting synergies between them, while disseminating some of the latest technologies for renewable energies and energy efficiency among both specialised and non-specialised audiences.

CISE stand attracted a lot of interest from visitors of all ages and from the most diverse professional areas. The young attendees were particularly captivated by the science demonstrations prepared by CISE PhD student João Dinis, for this ENERTECH edition.





Visit to CISE Facilities

Aiming to promote the activities developed by the research centre among the public in general, and to attract new students and researchers, CISE has organised several visits to the centre facilities:

On 02 February 2023, Prof. Dr. Fatih Çaliskan (Head of the Graduate Education Institute), Prof. Dr. Zafer Tatli (Dean of the Faculty of Technology), Prof. Dr. Yusuf Çay (Academic at the Faculty of Technology) and Assoc. Dr. Halil Arslan (Erasmus Coordinator of the Faculty of Technology), from the **Sakarya University of Applied Sciences, Turkey**, visited the indoor and outdoor facilities of the Guarda International Research Station on Renewable Energies (CISE | GIRS-RES).



On 08 March 2023, the indoor and outdoor facilities of CISE | GIRS-RES were visited by a class of the Professional Course in Industrial Maintenance from the **Campos Melo Secondary School, Covilhã**. The event counted with the participation of 22 students who were presented a brief introduction to the work and the different research activities currently being developed there and in the various CISE facilities.



On 21 March 2023, two classes from the **Secondary School of Fundão**, visited CISE | GIRS-RES. The event counted with the participation of 20 students, who were presented with a brief introduction to the work and the different research activities on renewable energies currently being developed at CISE facilities.



On 04 April 2023, a class of Wind Energy from the **IEFP - Institute for Employment and Vocational Training, Guarda**, visited CISE | GIRS-RES. The event counted with the participation of a group of students, who were presented with a brief introduction to the work and the different research activities on renewable energies currently being developed at CISE facilities.



On 23 May 2023, two Professors from the **University of Zielona Góra, Poland**, visited the indoor and outdoor facilities of CISE | GIRS-RES.



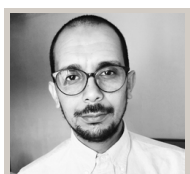
On 27 October 2023, three classes from Mechatronics and Electronics from the **Felismina Alcântara Secondary School of Mangualde** visited CISE | GIRS-RES.





Internships@CISE

Continuing with the strong tradition in creating advanced training opportunities for foreign visitors from other universities and industry worldwide, CISE facilities hosted internships, during the year of 2023. Those opportunities were definitely an interesting mean of exchange of research experiences.

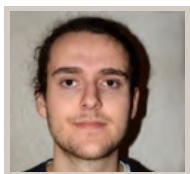


Abdelmadjid Gouichiche, PhD Researcher

LGEP - Laboratoire de Génie Electrique et Plasmas, Tiaret, Algeria

"DC-DC Converters Fault Diagnosis and Reconfiguration Using Harmonic Selection Calculation"

CISE | LSE, June 2023

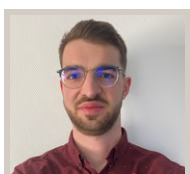


Audric Agier, MSc Student

ENSGTI - Université de Pau et des Pays de l'Adour, France

"Thermal Model of a Fuel Cell"

CISE | GIRS-RES, June - September 2023

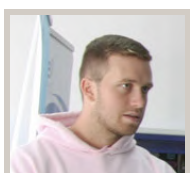


Clément Lizère, MSc Student

ENSGTI - Université de Pau et des Pays de l'Adour, France

"Infrared Thermography-Based Condition Monitoring of Solar Photovoltaic Systems"

CISE | GIRS-RES, June - September 2023



Laurent Couderc, MSc Student

ENSGTI - Université de Pau et des Pays de l'Adour, France

"Model and test of a PVT"

CISE | GIRS-RES, June - September 2023

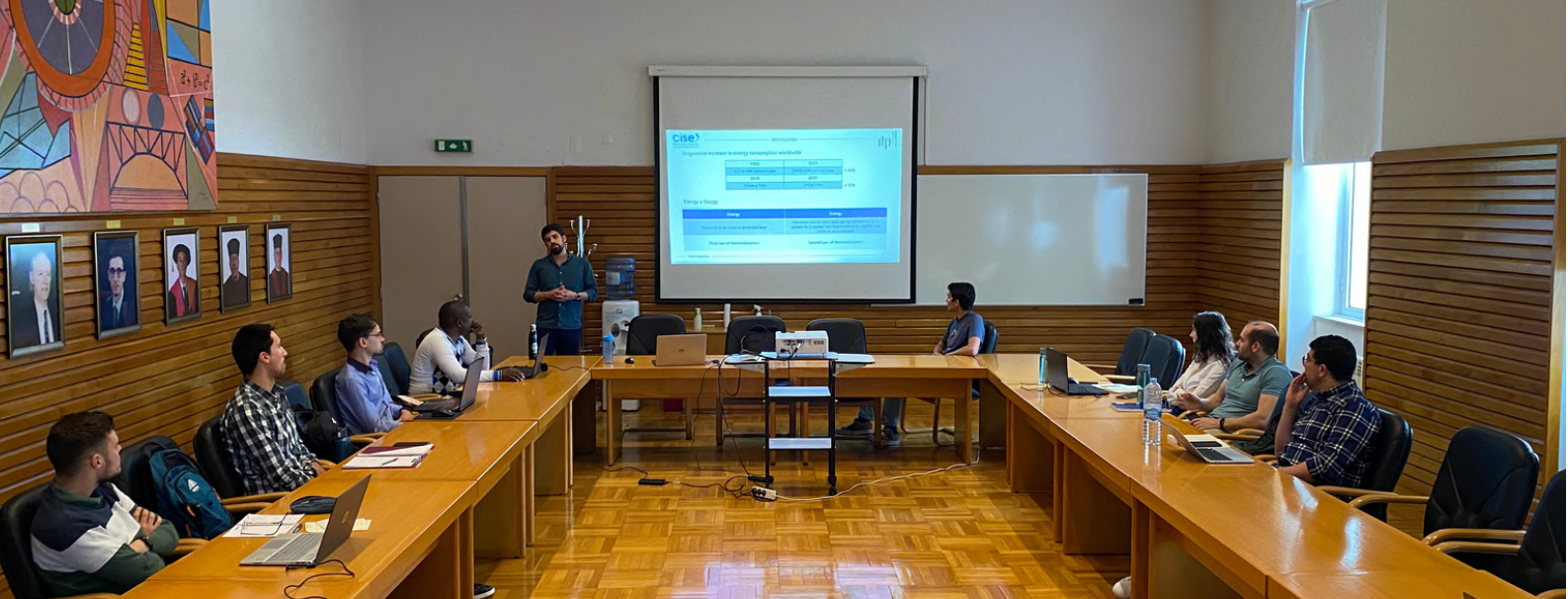


Maël Albouy, MSc Student

ENSGTI - Université de Pau et des Pays de l'Adour, France

"Design and Build a Low Power Air Quality Monitoring System for Indoor Environments"

CISE | GIRS-RES, June - September 2023



Seminars@CISE

CISE continued with the implementation of its strategic plan directives in terms of seminars organisation. These events, mostly organised by PhD Students, were indeed an excellent mean to provide formal training on public presentations to students and researchers, in general, while introducing CISE members to the on-going research activities.



C. A. Figueiredo Ramos, PhD Researcher

Solar Technology: Photovoltaic-Thermal Collectors
Online

UNITA Weekly Talks, 12 January 2023



Abdelmadjid Gouchiche, PhD Researcher

LGEP - Laboratoire de Génie Electrique et Plasmas, Tiaret, Algeria

DC-DC Converters Fault Diagnosis and Reconfiguration Using Harmonic Selection Calculation

CISE | LSE, 07 June 2023



Khaled Laadjal, PhD Researcher

A Novel Indicator-Based On-line Diagnosis Technique of Inter-Turn Short Circuit Faults in Asymmetrical Six-Phase Induction Machines, Adopting a Model Predictive Controller

CISE | LSE, 07 June 2023





C. A. Figueiredo Ramos, PhD Researcher

Numerical and Experimental Study of a Photovoltaic-Thermal (PVT) Solar Collector

CISE | LSE, 07 June 2023



Pedro Andrade, PhD Student

Output Current Control for Two-Switch Boost Buck Converters in Fuel Cell Applications for DC Microgrids

CISE | LSE, 07 June 2023



Pedro Barandier, PhD Student

Exergy Analysis of Aerothermal and Geothermal Heat Pumps in a Critical Environment Application

CISE | LSE, 13 June 2023



Hugo Antunes, PhD Student

Alpha-Beta Plane Current Modulus Slot Harmonics in Symmetrical Six-Phase Induction Motors Fed by Unbalanced Voltages and Under Stator Faults

CISE | LSE, 27 July 2023



Davide Fonseca, PhD Researcher

The Use of Line Impedance Symmetrical Components for Stator Faults Detection and Location in Symmetrical Six-Phase Induction Motors

CISE | LSE, 27 July 2023





Rafaela Bento, PhD Student

A Novel DC Circuit Breaker with an Absorbing Branch Based on TVS Diodes

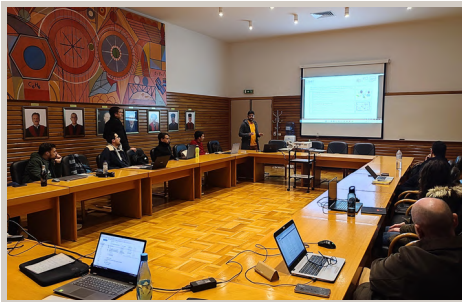
CISE | LSE, 09 November 2023



João Dinis, PhD Student

Adaptative Termination and Control Algorithm for Resonant Arrays used in Inductive Wireless Power Transfer Systems for Vehicle Charging

CISE | LSE, 09 November 2023



Adnan Fazal, PhD Student

Development and Optimization of a Trigeneration System based on Adsorption Machine Technology

CISE | LSE, 21 December 2023



CISE Merchandising





Team Building Activities



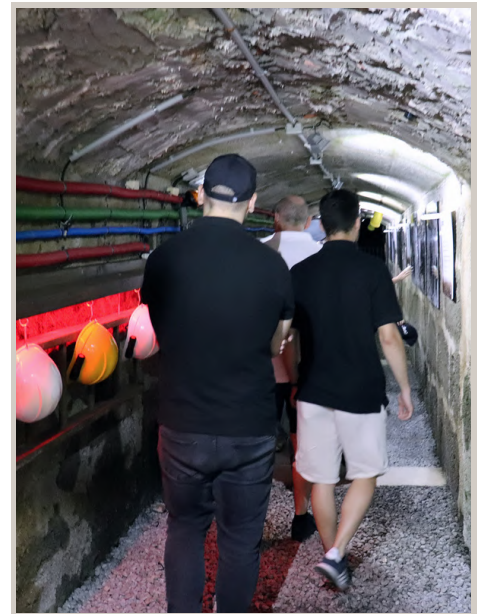
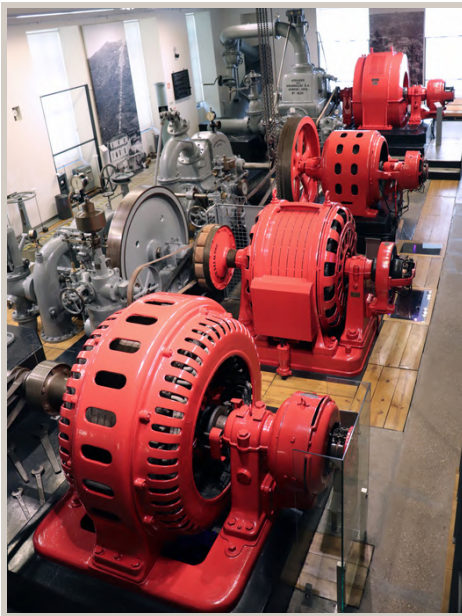
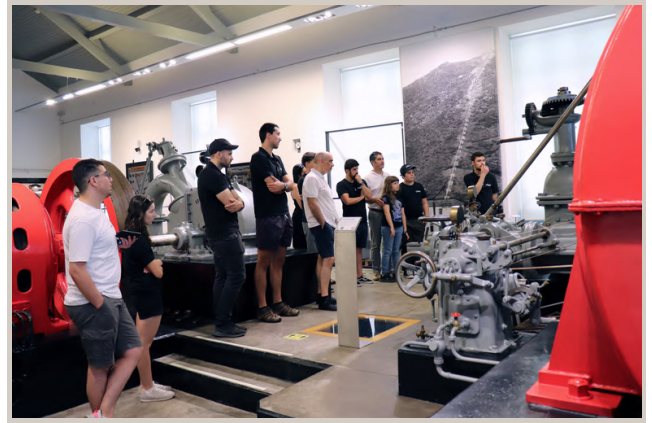
“Caminho do Xisto de Álvaro”

On 28 April 2023, a group of CISE researchers carried out the **Álvaro Schist Trail**. The 6,3 km walking trail was followed by a lunch at “Adega dos Apalaches”, to enjoy the “Cabrito Estonado” (roasted lamb), speciality of Oleiros, and by an afternoon of relaxation and recreative activities.



“Central da Senhora do Desterro”

On 11 July 2023, in the scope of a Team Building activity, a group of CISE researchers carried out a technical visit to the Serra da Estrela Natural Electricity Museum, installed in the former facilities of **Senhora do Desterro Power Station**, the oldest hydroelectric power station in Portugal, whose construction began in 1907. After the morning activity, the group enjoyed an afternoon of relaxation and recreative activities by the river.





Awards & Distinctions

Machines 2022 Young Investigator Award

In February 2023, **Fernando José Figueiredo Bento**, CISE PhD Researcher, was granted, from MDPI journal *Machines*, the first prize of the ***Machines 2022 Young Investigator Award***.



Young Engineer Innovation Award 2022

CISE PhD Student **Alexandre Martins** was granted the second prize of the ***Young Engineer Innovation Award 2022***, from the Portuguese Engineers Association (*Ordem dos Engenheiros*). The award ceremony took place during the celebration of the Regional Engineer's Day 2023, on 20 May 2023.



Highly Cited Paper

The publication *Online Interturn Short-Circuit Fault Diagnosis in Induction Motors Operating Under Unbalanced Supply Voltage and Load Variations, Using the STLSP Technique*, by **A. Alloui, K. Laadjal, M. Sahraoui and A. J. M. Cardoso**, in *IEEE Transactions on Industrial Electronics*, Vol. 70, N° 3, pp. 3080-3089, March, 2023

has been listed by **Clarivate Web of Science**, as of July / August 2023, as **Highly Cited Paper** for receiving enough citations to place it in the top 1% of the academic field of Engineering based on a highly cited threshold for the field and publication year [Data from Essential Science Indicators].



Editor's Choice Article

In June 2023, the publication *Stator Faults Detection in Asymmetrical Six-Phase Induction Motor Drives with Single and Dual Isolated Neutral Point, Adopting a Model Predictive Controller*, by **K. Laadjal, J. Serra and A. J. M. Cardoso**, in MDPI journal *Machines*, Vol. 11, Issue 2, Paper 132, February, 2023, was selected as an **Editor's Choice Article**.



PhD Defense - Balduino Mateus

On 26 July 2023 CISE PhD Student **Balduino Patrício César Mateus** successfully defended his PhD thesis on "Production Optimization Indexed to the Market Demand Through Neural Networks".



First Prize Paper Award of the IES EMTC

The publication *A Novel Stator Faults Indicator in Three-Phase Induction Motors, Based on Voltage and Impedance Symmetrical Components*, by **K. Laadjal, A. J. M. Cardoso, M. Sahraoui and A. Alloui**, presented at the 48th Annual Conference of the IEEE Industrial Electronics Society (IECON 2022) was granted the **First Prize Paper Award of the Electrical Machines Technical Committee (EMTC) of the Industrial Electronics Society (IES)**. The award certificate was given to the authors during the EMTC Annual Meeting organised during IECON 2023 Conference, in Singapore, on 18 October 2023.



PhD Defense - João Rodrigues

On 08 November 2023 CISE PhD Student **João Carlos Antunes Rodrigues** successfully defended his PhD thesis on "A Predictive Maintenance Model Based on Multivariate Analysis with Artificial Intelligence".



PhD Defense - Alexandre Martins

On 22 December 2023 CISE PhD Student **Alexandre Daniel Batista Martins** successfully defended his PhD thesis on "Industrial Sensors Online Monitoring and Calibration Through Hidden Markov Models".



HAPPY HOLIDAYS



Future Events

IECMA
2024
Conference

**The 2nd International Electronic Conference
on Machines and Applications**
18-20 June 2024 | Online

Chaired by **Prof. Dr. Antonio J. Marques Cardoso**