

UNIVERSIDADE DA BEIRA INTERIOR
Covilhã | Portugal

r&d units

research.development

Scientific research is a key activity developed within the academic framework of any given University.

It is in the context of the above paragraph that this booklet is presented. It contains a brief description of UBI Research Units, covering a wide range of topics. These Units constitute the main structure conveying the scientific work implemented at UBI, supporting several graduate training programs. These comprise a significant set, ranging from 2nd cycle (MSc) up to post-doctoral and European networks, including as well the vast majority of 3rd cycle students (PhD).

A clear and unequivocal commitment towards innovation and entrepreneurship guides UBI research work.

The information in this booklet is therefore intended to constitute the basis for a constructive dialogue between UBI and the business community, so that both will increasingly produce common projects of mutual benefit. In other words, this brochure aims to demonstrate the abilities and potential of the scientific research carried at UBI. More specifically, our compromise is towards a responsible transfer of knowledge, supporting the gradual integration of researchers in the job market, contributing the for economic growth, namely by adhering to Centro 2020: Ofoco nos resultados (<http://www.centro.portugal2020.pt/index.php/item/74-centro-2020-o-foco-nos-resultados>).



Paulo Moniz
Vice-Reitor para a Área da Investigação

CISE

Electromechatronic Systems Research Centre



R&D Unit Presentation

The Electromechatronic Systems Research Centre (CISE) established at the University of Beira Interior (UBI) is focused on the study of electromechatronic systems, integrating into a single domain the following three main engineering areas: electrical, mechanical and electronic engineering.



<http://www.cise.ubi.pt/>

CISE comprises two dedicated research facilities: the Electromechatronic Systems Laboratory (LSE) of the University of Beira Interior (UBI), and the Guarda International Research Station on Renewable Energies (GIRS-RES), at the Polytechnic Institute of Guarda. LSE is equipped for simulation studies and experimental tests in some of the research areas of the electromechatronic systems domain. The research activities are complemented by GIRS-RES, which is especially dedicated to the renewable energies study. Due to the need for the installation of bulky equipment, outdoor area and proper conditions, this facility provides the required conditions.

Team

Integrated Members

- António João Marques Cardoso
- Acácio Manuel Raposo Amaral
- Adérito Neto Alcaso
- Américo Vicente Teixeira Leite
- Ângela Paula Barbosa da Silva Ferreira
- Carlos Manuel Pereira Cabrita
- Davide Sérgio Baptista da Fonseca;
- João Manuel Milheiro Caldas Paiva Monteiro
- Jorge Oliveira Estima
- Rui António Pitarma Sabino Cunha Ferreira

- Natália Santos Gameiro
- Nuno Miguel Amaral Freire
- Sejir Khojet El Khil

PhD Students

- Carlos Alberto Figueiredo Ramos
- Diogo Melo Bento de Matos
- Filipe Neto Caetano
- Imed Jlassi
- Luís Miguel Lopes Lourenço

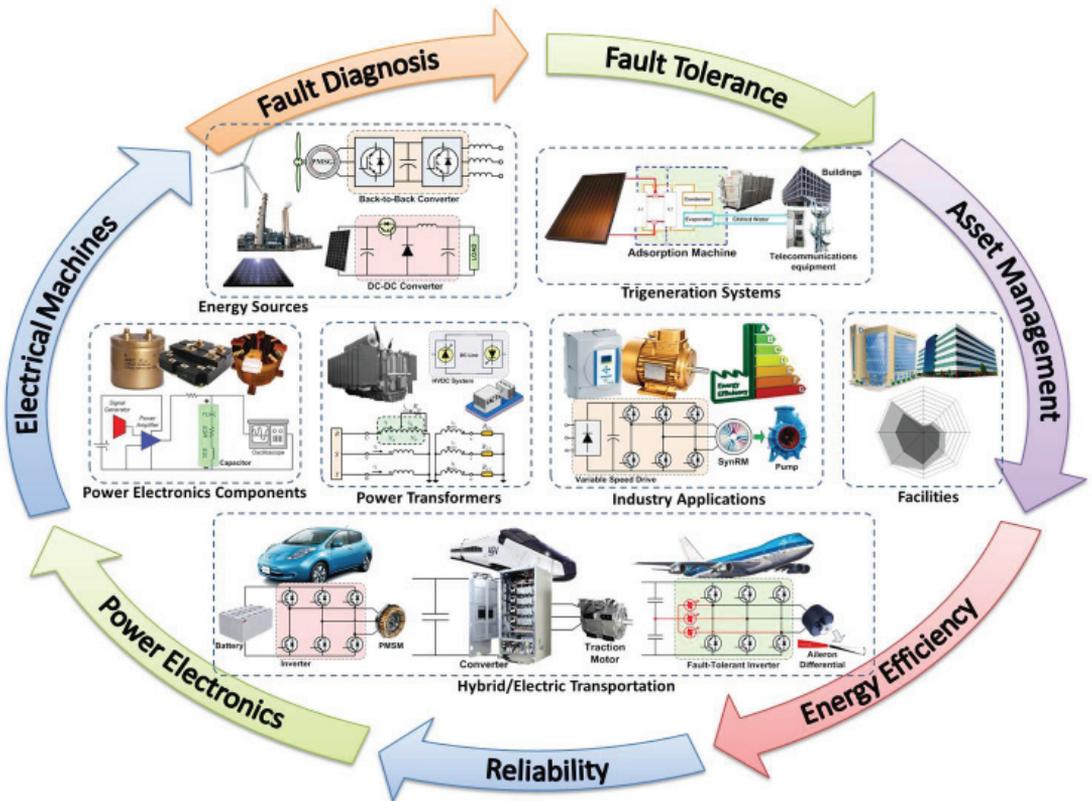
PhD Collaborators

- Alexandre Borges de Miranda
- Ana Carla Vicente Vieira
- Chiara Boccaletti
- Eunice de Fátima Fragoso Ribeiro
- Guettaf Abderrazak
- Khaled Yahia
- Luís Manuel Ramos de Oliveira
- Mohamed Sahraoui
- M'hamed Drif

Objectives

The general objectives of CISE scientific plan are focused on the areas of:

- Fault diagnosis;
- Fault tolerance;
- Reliability;
- Energy efficiency;
- Asset management;
- Control, design and characterization of electrical machines and power electronics.





Major Achievements

- Knowledge transfer to companies by providing services or developing technologies supported by industry contracts with companies such as Cimpor Indústria de Cimentos, S. A. - Centro de Produção de Souselas and Cimpor Indústria de Cimentos, S. A. - Centro de Produção de Alhandra, Pegop Energia Eléctrica S. A., Alstom, Olivieri Group, EPS - Pumping & Treatment System Ltd. and Amreyah Cement Company. There is also a close cooperation with electrical drives manufacturers such as Yaskawa, WEG, Reel and KSB, in order to test new products;
- Construction of several prototypes on different research areas: wind turbines, test benches, thermal-photovoltaic modules, power converters and electric vehicle prototypes in partnership with the Italian company Picchio SPA;
- Organisation of the next IEEE International Symposium on Diagnostics for Electrical Machines, Power Electronics & Drives in 2015 (the scientific reference event on monitoring and diagnostics research applied to electromechatronic systems).

Further Indicators

- CISE has two dedicated research facilities: the LSE located in UBI, and the GIRS-RES at the IPG. This collaboration between both institutions (UBI and IPG) takes maximum advantage of their available infrastructures, contributing for the regional technological development while fostering the territorial cohesion.
- CISE presents a wide range of real opportunities that contribute for advanced training, thanks to the available resources in three major areas, namely the CISE human resources, the resources provided by the host institution and the available physical resources.
- The research unit members have already a great experience in contributing to knowledge and technology transfer through the registration of patents, prototypes construction on different research areas and knowledge transfer to companies by providing services or developing technologies supported by industry contracts.
- This new research unit, through its international research team, has been actively contributing towards a high internationalization level by its actions and involvement in various important international scientific activities.

Internationalization

- Periodic participation and publishing in international solid venues (mostly IEEE conferences);
- Strong tradition in creating research and advanced training opportunities for foreign researchers (nine researchers from Spain, Brazil, Italy, Algeria, Colombia and Tunisia in the last eight years);
- Coordination of standardization activities on condition monitoring and diagnostics, namely ISO/TC 108/SC 5 Advisory Group C, Advisory Group D and Working Group 10, participation in the IEEE Standards Association, as well as in several Working Groups and Balloting Committees of ISO, IEC and CEN;
- Involvement in COST (European Cooperation in Science and Technology) Actions in order to strengthen the cooperation and interaction between European researchers;
- Evaluation of research projects for the Ministero dell'Istruzione, dell'Università e della Ricerca (Italy) and for the National Centre for Research and Development (Poland);
- Involvement in the Executive Board of the IEEE Industry Applications Society;
- Coordination of the Fault Diagnosis and Fault Tolerance Subcommittee of the IEEE Industrial Electronics Society;
- Memberships of several IEEE societies (Industrial Electronics, Power Electronics, Industry Applications, Power and Energy);
- Coordination, participation and evaluation of European Commission-funded research projects;
- Coordination/participation in international industry research projects;
- Strong collaboration with important worldwide electric drives' manufacturers.



Outputs (2008-2014)

- Publications: 276 papers, 70 of which published in international journals with high impact factor and indexed in the most important scientific databases, such as SCOPUS and ISI, 163 papers published in international conference proceedings (mostly IEEE conferences), 26 national journal published papers, 2 books and 15 published book chapters.
- Advanced training: supervision of 51 concluded MSc theses, 16 concluded PhD theses and 7 concluded post-doctoral activities. Besides, it is worth mentioning that the research team members have organized 19 conferences and seminars.
- Scientific Projects: 9 prototypes were designed and constructed, 3 patents were registered (1 pendant) and a pilot plant (Guarda International Research Station on Renewable Energies) was conceived and installed. Additionally, the new unit members participated and coordinated 7 institutional projects with funds from FCT, 4 national projects, 4 European commission-funded projects, 8 other international projects, and 28 industry research contracts.

Relevant Publications

- Estima, J. O.; Cardoso, A. J. M., "Efficiency Analysis of Drive Train Topologies Applied to Electric/Hybrid Vehicles", IEEE Transactions on Vehicular Technology, vol. 61, no. 3, pp. 1021-1031, March 2012.
- Buiatti, G. M.; Martin-Ramos, J. A.; García, C. H. R.; Amaral, A. M. R.; Cardoso, A. J. M., "An Online and Noninvasive Technique for the Condition Monitoring of Capacitors in Boost Converters", IEEE Transactions on Instrumentation and Measurement, vol. 59, no. 8, pp. 2134-2143, August 2010.
- Oliveira, L. M. R.; Cardoso, A. J. M., "A Permeance-Based Transformer Model and Its Application to Winding Interturn Arcing Fault Studies", IEEE Transactions on Power Delivery, vol. 25, no. 3, pp. 1589-1598, July 2010.
- Drif, M.; Cardoso, A. J. M., "Discriminating the Simultaneous Occurrence of Three-Phase Induction Motor Rotor Faults and Mechanical Load Oscillations by the Instantaneous Active and Reactive Power Media Signature Analyses", IEEE Transactions on Industrial Electronics, vol. 59, no. 3, pp. 1630-1639, March 2012.

