Inter-Open MSCA project - Doctoral position @CITCEA-UPC

Inter-oPEn offers a unique doctoral training program for 10 researchers that integrates multi-sectorial knowledge, gathering electrical engineering and legal researchers. To achieve the common goal of the interoperable PE-dominated power system, openness will be a pivotal factor across the different doctoral projects, tackling fundamental aspects of modern PE-based electrical systems such as control, protection, interoperability, governance, and intellectual property challenges.

Comprised of 8 academic partners and 13 industrial associated partners, Inter-oPEn offers a broad industry and transmission system operator expertise for doctoral trainings, research, and secondments. Compared to previous EU projects and doctoral training networks on the interoperable PE-dominated grid, Inter-oPEn is innovative by including two fundamental and new aspects: (1) the interplay of technical and legal perspectives is considered, and (2) openness principles are the heart of engineering and legal research, as well as, training.

The project will provide training through doctoral research to talented Doctoral Candidates. InterOpen Doctoral Candidates will enrol on PhD degree programmes and be employed for 36 months in a network of universities and industry with expertise in the field of power electronics, HVDC and modern power systems.

Please find below more information on the doctorate position that we offer at CITCEA-UPC.

Project title: Data-driven control of power converters for modern power networks

Objectives: This thesis aims to develop data-driven controllers to be implemented in VSC-based grid-connected power converters. The transition of the power networks towards a system of black-boxed systems interconnected together with their highly variable nature driven by renewable energy variation, requires new technology capable of operating in such an environment.

Optimization-based data-driven-based predictive controllers thrive in such an environment as they are capable of construct high performance, reliable and adaptable controllers fully based on network captured data, without requiring detailed models.

The thesis will provide the methodology to synthetize such controllers, starting from the system data capture process, model identification (if needed), construction of the optimization-based controller and then simulation verification in simulation benchmark power systems implemented in Simulink and PSCAD. As an example of this class of controllers, the thesis will further develop and expand the concept of Data-enabled Predictive Control (DeePC) further.

The key applications for the developed techniques will be HVDC, FACTS and renewable energy systems controllers.

Supervisors: Eduardo Prieto (UPC) - Linbin Huang (ETH Zürich)

Expected results
- Facilitate the massive deployment of data-driven-based optimization controllers in the power electronics dominated power networks, bridging the gap between the theoretical control developments and real implementation platforms.
- Industry-ready data-driven optimization-based control design tool, including from the data-capturing process to the control synthetization.
- Validation and implementation of the controllers in real converter control boards.

Secondments

In addition, three secondments will be carried out during the project (RWTH, Göbel, ETH)

Additional information

- On the date you start work (likely to be January – June 2024), you as researcher must not have lived in Spain for more than 12 of the previous 36 months, must have less than four years' full-time equivalent research experience and must not have a doctoral degree
- You will be employed by the university for a total of 36 months throughout the project duration
- The network offers you competitive salaries (plus allowances) and funding for technical and personal skills training and participation in international research events
- You will develop both theoretical and applied work as you will be in close contact to real applications
- You will participate in international secondments to other organisations in the InterOpen network and in outreach activities with audiences beyond the research community
- Project secondments may require that you will have to move to another country during that period

Assessment and information sharing:

The candidates will be assessed by a commission defined between UPC and ETH members. The position is also part of a large industrial doctoral network and information will be shared among the partners.

Preferred skills for candidates include:

- Strong academic qualification with an internationally recognized degree at Masters level in Mathematics, Computer Science, Electrical Engineering, Power Systems Engineering, or any related field.
- Preferred knowledge: dynamic power converters and power system modelling and analysis, power converter control, data-driven techniques, optimization techniques.
- Software development experience in Matlab and/or Python and/or relevant tools in the field.
- Experience that demonstrates your team-oriented, independent, innovative, and strategic working styles.
- Fluency in English, both written and spoken.
- Candidates not fulfilling the previous requirement but interested in working with us are encouraged to contact us explaining the situation, as we may have other opportunities available.

Candidates are asked to upload in a single zip file the following documentation

- Complete CV
- Copies of academic transcripts and degree certificates (Bachelor and Master or equivalent) in English
- 2 reference letters
- Letter of motivation, including the list of different Inter-Open vacancies (in other partner institutions) where the candidate is applying
- Dates when he/she would be available to start working

Deadline: 7th July 2024