PhD Call for Applications

Title: Proactive Management of Micro-Grids for Energy Efficiency in Industrial Sites

Keywords: Micro-Grids, Industry of the Future, Renewable Energy Sources, Energy Management, Control, Predictive maintenance, Fault diagnosis, Fatal energy, Supervision.

Position: PhD
Field: Electric Engineering & Automation
Contract: 3 years.
Type of Contract: CDD
Funding : Communauté Agglomération Pays Basque
Assignment units: ESTIA Institute of Technology, ESTIA-Recherche, Bidart (64210).
Doctoral School: Ecole doctorale Sciences physiques et de l'ingénieur de l'Université de Bordeaux

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Host Institution:

ESTIA (http://www.estia.fr) develops three activities: the training of trilingual generalist engineers and bachelor (200 graduates per year), research and transfer by the management of 3 business incubators and a technopole. ESTIA trains trilingual engineers in 3 years in the fields of energy, embedded systems, mechanics, IT and industrial organization. ESTIA is a member of the “Conférence des Grandes Ecoles » and is accredited by the Commission of Engineering Degree. In addition to the training mission, ESTIA develops collaborative projects with industrial companies in the Aquitaine region, France and Europe, in both applied and fundamental research projects through its multidisciplinary Estia-Recherche team. To enhance the value of all these activities, ESTIA animates and uses several technical platforms: CompositAdour, ENERGEA, PEPSS, SIMECOMP and the new ADDIMADOUR platform.

Estia-Recherche (https://www.estia.fr/recherche) is a Research Unit of ESTIA, registered at the RNSR under the n° 201420655V Estia- Recherche, associated with the doctoral schools SPI (Sciences pour l' Ingénieurs) and MI (Mathematics and Informatics) of the University of Bordeaux. We expect from the recruited PhD to be part of the "Smart and Empowering Interfaces" research project. More specifically, considering the profile, he/she will work within the research axis linked to renewable energy on the following issue: *"**how to make possible a better integration of renewable energy sources and storage into the electric grid**"*.

Subject:

The transition to the *Factory of the Future* is not only the implementation of new technologies or innovations but their combination with the new manufacturing and maintenance processes. This new

concept is also inseparable from how electrical energy is produced, its management and the overall *energy efficiency of industrial sites*.

To achieve these ambitions and reduce greenhouse gas emissions, an innovative response lies in the concept of micro-grid for industrial sites. It is entirely in line with the energy transition and contributes to the transformation of the architecture of electrical networks. Micro-grids relate directly to energy efficiency, renewable energies, energy storage, electric cars, power electronics and the techniques of controlling or supervising these assemblies. The interest is to provide answers to the scientific and technological obstacles by proposing architectures of electrical networks adapted to industrial sites.

This project proposes the development of Proactive Energy Management solutions for Industrial Micro-Grids. Different solutions will be studied based on predictive models and artificial intelligence. Also fault diagnosis strategies will be included, to optimally manage industrial micro-grids made up of various renewable energy sources, storage systems, and recovery of fatal energy as well as electric vehicles. In a research approach, the tools developed will be validated in the industrial site "Compositadour" and the ESTIA building MicroGrid. Then, these solutions could be used subsequently by other industrial players in the territory.

Research laboratory and Platforms:

The research work will be carried out as a collaboration between:

- ESTIA-Recherche Laboratory, ESTIA Institute of Technology, Technopole Izarbel, Bidart (64210).
- EneR-GEA, research platform, Technopole Izarbel, Bidart (64210).
- COMPOSITADOUR, technological platform, Parc Technocité, Bayonne (64100).

ESTIA-Research has been developing research activities in the fields of renewable energy, energy storage and distribution for more than two decades. The research areas are related to electrical engineering, automation and electrical engineering. Its main topics of investigation concern the integration of renewable energy sources and storage in MicroGrids and weak electricity grids. The research support tools are based on simulation software and rapid prototyping tools, as well as on a MicroGrid platform designed to answer several issues concerning hybrid energy systems, including design, control and interaction with a main grid.

EneR-GEA is a research platform in power and control electronics for the integration of renewable energy sources and storage (hybrid energy storage systems), for energy management and its optimization, through the quality management of power supply and network stability, but also demand management.

COMPOSITADOUR (https://www.compositadour.com) is a technological platform specialised in advanced processes: Composites, Robotics and Additive Manufacturing. Compositadour provides high-tech equipment and mobilises its network of skills, from laboratories, Compositadour initiates and carries out R&D programmes for new parts and manufacturing processes with outstanding research teams.

Candidates Profile

Electrical, Automation and Industrial Informatics engineer, graduate of an Engineering School or a University, having a Master's degree or an equivalent degree.

The following competencies will be strongly appreciated:

- Linear and nonlinear control to drive different power sources.
- Modelling and simulation of dynamic systems and/or electrical grids.
- Energy management on energy systems optimization.
- Experience with Matlab/Simulink and real-time simulation.
- Electrical grids.
- Good practice of the French and English language.

This subject requires multidisciplinary skills in power electronics, electrical engineering, automation and industrial computing for real-time simulation and implementation of control algorithms. The candidate must have a methodical and rigorous approach for his/her investigations and a real interest in teamwork. A good English level is required.

Your rigor, sense of responsibilities and scientific curiosity will be your main assets for this PhD thesis.

Submission of applications:

The application (CV with a cover letter and all necessary documents to justify your skills, including the names and contact details of two leading scientific figures who could be contacted to give their opinion on the candidate's work and abilities) have to be sent electronically to: a.aguilera-gonzalez@estia.fr.

The formal assessment of candidates will begin on Jun 15, 2020, and continue until the position is filled.

Position Start Date: October 2020.