

Who are we ?

Founded in 1885, Junia trains tomorrow's engineers to meet the great challenges of a world in transition. It has 7 preparatory cycles, 3 engineering degrees -HEI ISA ISEN-, research activities and business services. Located in Lille, Chateauroux and Bordeaux, Junia has more than 5,000 students (including 530 apprentices), 450 employees and 25,200 engineers worldwide, through the JUNIA Alumni network. JUNIA is part of the Catholic University of Lille.

What characterizes us: Versatility of missions, close contact with students, applied and transdisciplinary research, strong proximity to companies and involvement in educational innovation.

Junia is recruiting a PhD student in Automatic, applied to an energy management, attached to the CRISAL laboratory in Lille (UMR CNRS 9189 – PERSI Team), who will bring his expertise on a multidisciplinary project, and will participate in several of the major stages of this project in collaboration with the thesis supervision team composed of researchers in the fields of automatic and electrical networks.

Funding: 3 years, expected start date is October 2022

Localization: JUNIA-HEI, Smart Control Systems team, 13 Rue de Toul, 59000 Lille (France)

Doctoral school: MADIS-631

Supervision team: Dr. Mathieu BRESSEL (co-director), Pr. Belkacem OULD BOUAMAMA (co-director), Pr. Dhaker ABBES, Dr. Arnaud DAVIGNY, Dr. B. DURILLON

Context:

This thesis proposal is held in the frame of a multidisciplinary project which aims at creating a tool for joint sizing and supervision of energy sources with hydrogen storage, which will be applied to a commercial building considering several objectives.

The candidate will develop models and algorithms for the joint optimization of multi-energy systems (usually composed of photovoltaic generators, batteries, fuel cell and grid) sizing and supervision. Many objectives (reducing Levelized Cost of Energy - LCOE, reducing CO₂, increasing self-consumption, etc.) will be considered for optimization. Interaction with new loads, such as electric vehicles, will be investigated. Consideration will be given to the possibility of removing the CO₂-emitting, fossil-powered backup generator usually used in commercial buildings, which represents a significant financial cost.

To achieve this result, the candidate will work on:

- The definition of a generic, controllable model of the energy system
- The formulation of cost and environmental objectives and constraints for the optimization
- The development of the algorithm for the optimal joint sizing and management of the multi-Energy system and its validation

Expected profile:

Candidates should have a master's degree or engineering degree on electrical engineering and/or control. Also, the candidate with the following knowledge will be preferred:

- Strong capability in coding languages: Matlab/Simulink and Python.
- Good knowledge on micro-grids and renewable energy systems.
- Knowledge about hydrogen systems would be a plus.

As a PhD is a qualification for work in research positions, a traineeship related to research activities will be appreciated. The candidate must have the ability to work independently and to well organize himself. Good communication and writing skills in English are mandatory.

How to apply:

The application must include:

- Curriculum vitae (CV).
- Motivation letter
- Grades obtained during your last year of graduate studies and program of courses attended
- Academic works - published or unpublished - that you would like to be considered in the assessment

Send your application to the following email address: mathieu.bressel@junia.com

Keywords: Energy system modeling, Joint sizing and management algorithms, consumer involvement, hydrogen energy, smart energy grids, human sciences and energy