Multi-objective optimisation of energy sources generation and conversion in an eco-neighbourhood

Université de Lorraine

NICOLAS BAUDIN
INTERNSHIPS IN FRANCE INITIATIVE

Name of the hosting institution in France	Université de Lorraine
Name of the host laboratory / research team	ERPI – Equipe de Recherche sur les Processus Innovatifs
Address	8 Rue Bastien Lepage 54010 Nancy, France
Web site	http://erpi.univ-lorraine.fr
Name of the supervisor	Mauricio CAMARGO
Function	Professeur des Universités
Email	mauricio.camargo@univ-lorraine.fr
Phone number	33 6 84 73 29 94

Internship offer

Topic of the internship (title)	Multi-objective optimisation of energy sources generation and conversion in an eco-neighbourhood			
Proposed dates of the internship*	Start	2020-11	End	2021-02

* The supervisors have indicated the dates proposed are flexible and are able to be postponed subject to COVID-19 border closures.

Scientific and academic objectives of the internship (detailed description of the internship content, work expected from the intern and expected outcomes):

Technologies to produce hydrogen from renewable and non-renewable sources are still at the early stage of development. So, parameters such as the maturity level technological learning should be taken into account when designing new energy hubs. These hubs need an integrated approach of the entire system due to the interaction effect among the various energy sources, since different constitutive elements inside a local hub have different characteristics, with different energy sources and associated cost. Several researches have already tackled this problem from the economical point of view. However, as economical is not the only dimension that must be evaluated within this type of problems an integrated vision including simultaneously other dimensions of sustainability (i.e. environmental, technological or social), must be included within the design of a potential hub.
This research will bring then, the basis to propose a methodological approach to design the context adapted energy hubs under the sustainability dimensions with a real case study in mind from a region in France. The output will consist in an optimisation framework or algorithms to propose optimal energy hubs based on several energy and material converters defined as technological bricks to minimize simultaneously several factors such as: energy consumption, total costs and environmental rejections.

Name of the Australian partner institution	UTS University of Technology in Sydney
Name of lab/department/team involved in the collaboration at the Australian partner institution	Future Mobility Lab
Main contact in the Australian partner institution	Dr. Adriana-Simona Mihaita.
Function of the main contact in the Australian partner institution	Senior Lecturer
Email	adriana-simona.mihaita@uts.edu.au
Outside of this ongoing collaboration, will applications coming from students of other eligible Australian universities be considered by the hosting institution in France?	Yes

Expected profile of applicant

Level of study	Bachelor/ Master Degree or PhD
Discipline	Computer Sciences
Required qualities, knowledge and skills	• software programming capabilities in object-oriented language (Python/ Java, C++), • algorithmic optimization knowledge of any kind would be desirable but not mandatory (e.g. evolutionary algorithms, c-plex, etc.), • energy sources/renewable energy knowledge and teamwork capabilities, • Interest for multidisciplinary approaches.
Other specific eligibility criteria	• English and/or French. • Well-written CV and good transcript grades. • Any previous internship experience is a plus. • Curiosity and motivation to learn new techniques and achieve both developing and research capabilities.

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