Titre Thèse (subject)	Integration of a machine learning module for on line optimal adjustment in an energy management system	
Directeur (supervisor)	Bruno FRANCOIS	E-mail : bruno.francois@centralelille.fr
Laboratoire (research unit)	L2EP	Web :
Equipe (research team)		Web :
Financement prévu ☐	Contrat Doctoral Etablissement ☐ Région ☐ – Autre **X** Contrat de recherche ☐ Préciser :	ULille ☐ UPHF ☐ Centrale Lille **X** UGE ☐ IMT ☐ Autre

Résumé du sujet (abstract):

From the predictions of electricity demand and the production of generators based on intermittent renewable energy (mainly PV and wind power), the research team has developed deterministic and stochastic optimization methods allowing to plan, the day before for the next day, the hourly profiles of the set points of controllable conventional generators in an urban micro-grid. This allows:
- the minimization of operating costs (fuel, etc.),
- the minimization of emissions linked to the use of fuels,
- the planning of a power reserve in the event of the appearance of uncertainties.
The objective of this PhD is to apply auto adaptive methods for updating power references according to observed variations in real time by applying machine learning techniques derived from artificial intelligence. More specifically, two methods will be explored: one using a cost function with variable parameters in a specified domain and one based on the integration of the cost function in the learning algorithm of an artificial neural network for mapping the corrective control function. Orthogonal ANN and Support Vector Machines will be considered as AI technologies.

Funding : ANR (Agence Nationale de la Recherche) project : AI_Engineering_PhD@Lille

Research team: Electrical network

Expected profile :
Candidates should have a Master degree in Electrical Engineering or in …. The candidate with the following knowledge will be preferred:
- Knowledge about machine learning algorithms hardware integration.
· Fundamental knowledge about the power system operation, control and analysis
· Good knowledge in optimization theory and stochastic problems, familiar with one of the optimization software, such as Cplex or Conopt.
· Knowledge/experience about distributed networks, energy systems modelling and operation
- Strong capability of coding using Python and Matlab

Skills :
The PhD-position's main objective is to qualify for work in research positions, a past experience 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. The following tests can be used with following minimum scores:
- TOEFL: 600 (paper-based test), 92 (Internet-based test).
- IELTS: 7.0, with no section lower than 6.5 (only Academic IELTS test accepted).
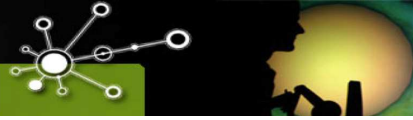- CAE/CPE: grade B or A.

How to apply :
The application template is downloadable here :
http://www.isite-ulne.fr/wp-content/uploads/2021/02/Dossier_candidature_a_un_contrat_doctoral_IA1.doc

The application must include in the first round:
- Curriculum vitae (CV).
- Motivation letter

- Obtained grades obtained during your last 3 years of graduate studies and program of courses attended by students graduated from a university abroad. Official academic transcripts must be provided for each semester of each year. If you do not have a transcript (examples: internships, breaks,...), you must enclose a justification. Academic works - published or unpublished - that you would like to be considered in the assessment

And in the second round:

- Photocopy of diplomas. For students with foreign degrees, the translation must be certified by a consular officer.
- Copy of your personal works (internship reports, professional experience, employment contracts, etc...)
- Letter, name and email address of two referees

Send your application to the following email address: bruno.francois@centralille.fr

Deadline: March 26th 2021