PhD research pre-proposal

Code: LEAP-RE/PhD2/2022	
Title: Managing Microgrid Interconnection and Energy Exchanges: Application to Local Farms	
Supervisors: Serge Pierfederici (UL-LEMTA, France), Mohamed Bakhouya (UIR-LERMA, Maroc) **Co-supervisor:** Ehsan Jamshidpour (UL-GREEN, France), Radouane Ouladsine (UIR-LERMA, Maroc), Najib Mehdi (UIR-TICLab, Maroc)	
Host college: UIR-IA/UL	**Host research unit:** UIR-LERMA/UL-GREEN/UL-LEMTA

SUMMARY OF THE RESEARCH PRE-PROPOSAL

The PhD research deals with the development of an energy management strategy allowing exchange of energy between farmers, and eventually the main utility grid through a central storage system. All the inverters connected to the AC link will operate in grid forming for a better immunity to energy shortage of a farm. The exchanges of information will be required. To limit the cost of the communication network and stay compatible with an evolutive microgrids aggregation, a distributed control will be developed to ensure first the voltage/frequency stability of the distributed microgrids and secondly, the control of the state of charge of farm's storage systems and/or the powers exchange with the main grid. Research aspects include the power (active and reactive) balance algorithm, the distributed voltage/frequency restoration algorithms and the dynamical stability of the microgrids aggregation. The PhD student will spend one month at TUB-EET (partner 5) facilities to take into account the battery's constraints (SOC min/max, SOH, Pmax) in order to optimize its life duration. The PhD student will spend half of his/her doctoral study at Nancy, France (UL LEMTA lab) and the other half in Morocco (UIR-LERMA lab) with frequent missions to Green Energy Park.

This PhD thesis is a part of the LEAP-RE project MF-FARM "Smart microgrids as a solution for agriculture farms electrification" with the contribution of the following partners: Université de Lorraine (UL-LEMTA and UL-GREEN), IECORP SA, UDES-CDER, Univ. de Tlemcen, LAT (UT), TU Berlin (TUB-WIP and TUB-EET), MicroEnergy Int. GmbH (MEI), Intern. Univ. of Rabat (UIR), Green Energy Park (GEP), Ecole Nationale des Sciences Appliquées d'Oujda (ENSAO).

REQUIRED ACADEMIC QUALIFICATIONS & SKILLS

The candidate must have an engineering degree (or M.Sc) in power electronic and/or control engineering. The candidate must also be highly motivated for research and enjoy working in a multidisciplinary and international team. Excellent written and oral communication skills in English are essential.

Application: https://www.adum.fr/as/ed/voirproposition.pl?matricule_prop=43860