Open postdoctoral position:

Robust multi-objective control of electrical vehicles charging islands

Summary : As electric and hybrid mobility is on the rise, the charging offer is booming: France should go from 30,000 charging stations to around 500,000 by 2030. In certain points of the power grid, the installation of conventional charging stations is difficult as it may require a modification of the existing network through complicated and expensive connections. To overcome this issue, charging "islands" combining network power and renewable energy sources are emerging, in particular through the addition of photovoltaic panels. Such charging islands allow to reduce power consumption from the network as part of the energy produced by photovoltaic panels is used for self-consumption. One of the limitations of these stations is the storage of intermittent solar energy. This can however be achieved by stationary batteries. In this context, this postdoctoral project aims at optimizing the charging performance and the environmental impact of such charging islands coupling photovoltaic panels, charging stations and recycled batteries for stationary energy storage.

Objectives: This project aims at proposing an innovative and robust control law for this kind of charging islands, allowing the best possible use of the available degrees of freedom, in order to offer a service that is both efficient and flexible.

1. Proposal and digital implementation of advanced control strategies to control energy flows in charging islands: such control strategies should maximize the quality of service while minimizing the draw on the power network. The proposed solution must be robust and responsive to uncertainties (intermittency and contingencies on the prediction of solar energy sources, uncertainty on the charging needs, etc.). The results will be compared with the elementary control law used currently.

2. Evaluation of the proposed strategy on the experimental microgrid platform at ENSEEIHT: a representative microgrid of a charging island will be emulated in real time at a reduced scale.

3. Transfer of the proposed control strategy on the test sites developed within the project by the partners.

Practical information: 2-years posdoctoral contract, or 1 year with possibility to reconduct for another year (salary: 2000€/month). Start-up possible from March 2022, subject to administrative deadlines (access to a restricted ZRR area).

Funding: This postdoctoral project is part of the I-REVE project, funded by ADEME. This project will be carried out at LAPLACE, on the ENSEEIHT site, within the CODIASE group, which focuses on control and diagnosis of electrical systems.

Prerequisites: The candidate must have a solid training in automatic control (PhD), good programming skills (Matlab or Julia), a strong interest in the applicative part of the project, as well as an aptitude for teamwork. Research experience in micro-grids or energy management will be appreciated.

To apply, provide a CV + cover letter + 2 names of references. For more information, do not hesitate to contact us.

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