

PhD proposal : Statistical modelling and uncertainty analysis of battery lifetime.

Total (Palaiseau, France). In partnership with University
of Lorraine (Nancy, France) and Saft (Bordeaux, France)

1 Context

In a global context to reduce the energy consumption and the carbon footprint in order to fight against the climatic change, a lots of efforts are engaged in particular in transportation with electrification of vehicle and in the energy production with more and more renewable like solar or wind. In this context part of Lithium-Ion batteries in the modern energy management solutions are quickly growing and is becoming one of the critical components in modern electric vehicles or in energy storage solution. However, the cost of such battery remains important in the overall system. In addition the battery performances degrades as long as the battery is used. Indeed, the accurate prediction of how fast the battery will degrade and then how long the battery will be able to be used in the system before having to be replaced is critical. This critical knowledge should avoid to over-size the battery and so is a key advantage for a battery supplier for its competitiveness. Such prediction are adressed today by models which require a lot of intensive tests. In addition the determination of the uncertainty of such model is a key information for battery company to assess the financial risk for commercial bids where they are engaged on the battery lifetime. The goal of the PhD thesis is to develop machine learning methods to estimate in the same way the lifetime of a battery as well as the associated uncertainty.

Saft is a world leader in batteries for lots of different markets and is part of group Total which has the ambition to become one of the major company in energy. Recently Saft and Total has announced an alliance in particular with PSA to create an European company to adress the volume market of batteries for electrical vehicle in order to help Europe to be competitive and independant against Asian compagnies.

2 Candidate profile

The ideal candidate is strongly motivated by environmental questions, passionate about artificial intelligence and engineering, has a solid background in applied mathematics, statistics, and has good scientific writing skills. A proven experience and taste for computer programming and data analysis is required.

Candidates should hold a MSc in Computer Science, Applied Mathematics, Engineering or related fields. A strong command of English language is also required.

3 Funding and localisation

The successful PhD candidate will be funded by the group Total. He/she will also be affiliated to the mathematics research center Institut Elie Cartan de Lorraine (<http://www.iecl.univ-lorraine.fr/>) at University of Lorraine (Nancy, France) and work with Saft (Bordeaux, France).

4 Application

Application files must be sent to `sebastien.benjamin@saftbatteries.com`, `antoine.bertoncello@total.com` and `marianne.clausel@univ-lorraine.fr` before September 30th and must include :

- A cover letter or email,
- A CV, including contact information for two or more referees
- A research outcome (Master's thesis or paper) written by the candidate
- A transcript of grades

Incomplete application files will not be considered.