

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Given names :

Status (prof., assistant prof., ...):

Laboratory :	Femto-ST	Website address :	https://www.femto-st.fr/fr
Institution :	UTBM	Website address :	www.utbm.fr

Scientific competence of the supervisor:

Dr. Daniela Chrenko's expertise covers electric mobility, battery and hybrid energy storage systems, modelling, diagnostics/prognostics and energy management. Her recent work includes Li-ion battery temperature/state estimation, cell parameter identification and EV energy management.

Daniela Chrenko was recently invited by Dr. Jing MA from School of Automobile, Shang'an University in China to apply for a collaboration under the State Foreign Experts Program of China, a nationally founded program to engage in joint research and academic research, via support of travel expenses. A common phd under the CSC program would show our commitment to this collaboration.

Two major publications in the field proposed for the PhD :

1. Vaidya S.H., Depemet D., Laghrouche S., Chrenko D., "State of temperature detection of Li-ion batteries by intelligent gray box model", Journal of Power Sources, 585, 233624, 2023.
2. Al Rafei T., Yousfi Steiner N., Chrenko D., "Genetic Algorithm and Taguchi Method: An approach for better Li-Ion cell model parameter identification", Batteries, 9(2), 72, 2023.

Website address of the personal page :

Supervisor's email :

Description of the research work proposed for a PhD **Topic # (see list) :**

Title :

Subject :

This PhD project focuses on the optimized design of EV with the objective of extending their lifetime while considering system integration via technical, economic, environmental and societal criteria.

The work will study how EV system performance and ageing is influenced by several key design choices, including battery choice involving cell chemistry, module and pack configuration, battery management systems (BMS), and battery thermal management systems (BTMS). But also the integration of the BTMS in the overall EV architecture including the cooling of other key components like the electric motor and the heating, ventilation and air conditioning (HVAC) system. Different solutions such as air cooling, liquid cooling, immersion cooling or phase-change materials may be considered.

The main objective is to develop a multi-criteria model able to compare EV system configurations over their different life phases, from first use to potential second-life applications and recycling. This model will integrate ageing prediction, lifetime assessment, environmental impact and possibly economic indicators. It will build on existing literature, available experimental data (from lab partners and open source) and previous multi-criteria optimization methods developed at FEMTO-ST.

The expected outcome is a methodology to identify EV system configurations that offer the best compromise between performance, durability, cost, environmental footprint and societal impact. The project will be carried out in close collaboration between the SHARPAC and THERMIE teams at FEMTO-ST as well as School of Automobile, Chang'an University.

Keywords :

Li-ion batteries; BMS; BTMS; battery ageing; lifetime; multi-criteria optimisation; LCA; second life; sustainability

Expected collaborations :

Close collaboration between FEMTO-ST/Energy SHARPAC and THERMIE teams as well as School of Automobile, Chang'an University, Xi'an China.

This thesis will be co-supervision by Dr. Daniela Chrenko, Dr. Alexandre Ravey (UTBM) who works on EV system integration including battery systems, real live driving cycles as well as lifetime assessment including economic, environmental and social indicators. He visited Chang'an University in 2025. Dr. Raynal Glises who works on the modeling and analysis of integrated thermal systems and Dr. Jing Ma who works on thermal systems in EVs including battery and drive train cooling as well as HVAC design and testing. She was visiting professor at FEMTO-ST from September 2025 to March 2026.

Background required from the applicant :

Master's degree or engineering diploma in electrical engineering, thermal engineering, renewable energy, electric vehicles or related fields. Basic knowledge of electromobility and Li-ion batteries; interest in energy storage, modelling and sustainability. Skills in Matlab and/or Comsol and Python are appreciated. Good written and spoken English is required; French is an asset.

Existence of a PDF file detailing the proposal ("yes" or "no") :

(see guidelines on the website www-csc.utt.fr)