Developing a User Interface for Acoustic Analysis of Li-Ion Batteries

Project Description

Diagnostic systems for Li-ion batteries have become increasingly important due to the larger size, and cost of the batteries being deployed in increasingly demanding applications, including electric vehicles. These systems can range in complexity and accuracy but to be effective they must be able to track the degradation of cells and identify critical events which may result in catastrophic cell failure. One such diagnostic which has received increasing attention is the application of acoustic time-of-flight spectroscopy to batteries. Using this technique an ultrasonic pulse is sent through the battery with the response signal analysed to understand the condition of the internal structures and component material. Ultrasound techniques have the advantage of being extremely fast (with measurements taking milliseconds) and having the potential to be cheap when applied on board. This project will focus on methods to better understand the acoustic signals produced during the experiments. The FUSE intern, supported by researchers at UCL, will build upon an existing user interface to enable quicker and more reproducible analysis of the state of charge and health of Li-ion batteries. The project aims to develop this user interface to enable the tracking of peaks as the battery cycles, in achieving this, the intern will be contributing to a better understanding of the 'Science of Safety' and improving the fundamental understanding which is required to avoid battery failure.

Due to the ongoing COVID-19 situation, the entire project will be running remotely, unless the existing restrictions are removed. Remote experiments will be conducted to validate the developments of the FUSE intern.

Project Goals

Join the Faraday Undergraduate Summer Experience (FUSE) internship programme and learn more about the development of the 'Science of Safety' and battery diagnostics which will help in the development of a career in the field of battery technology and energy storage. In conducting the project, you will develop skills in the use of LabView and the Python programming language supported by leading academics in the field. You will also have the opportunity to learn how diagnostic tools are applied to Li-ion cells. You will develop an existing user interface to better diagnose the state-of-charge and health of lithium ion batteries using ultrasonic techniques and develop a method to track peaks as they change while batteries are cycling. This work will require remote experiments to be conducted to fully validate the developments you have made throughout the programme.

Eligibility

In order to partake in the project you must be:

- A full-time registered undergraduate student at a UK university
- Undertake the internship within the years of undergraduate study (i.e. not be currently in your final year)

Funding

A salary of £9.50/hour across the UK or £10.85/hour in London will be provided. This will be determined by the working address of the appointee not the universities location. The internship is a full-time role for 8 weeks beginning in early July. The funding is provided by The Faraday Institution.

Deadline

Please send you CV and a brief cover letter to j.b.robinson@ucl.ac.uk or rhodri.owen@ucl.ac.uk by May 7th 2021