Fully funded Undergraduate Summer Experience (FUSE) Internship Program: Machine learning for Li-ion battery manufacturing processes

Title: Battery Data Analyst

Project Description and Goals:

Lithium-ion battery manufacturing is a complicated process with strongly coupled feature interdependencies, a feasible solution that can analyse feature variables within manufacturing supply chain and achieve reliable classification is thus urgently needed. Nextrode Work package 5 is focused on electrode manufacturing challenges. The aim of this work package is to develop new methods of quantifying and optimising electrode manufacture using data science, model creation and predictive tools.

The Battery Data Analyst intern will be embedded into the WMG team supporting WP5 of the Nextrode project focussing on "smart" battery production. The intern will gain a comprehensive introduction to WMG's battery manufacturing process. The intern will have the opportunity to undertake research on the Nextrode project to improve their data management skills, as well as the design, implementation, and validation of novel machine learning models for optimised battery manufacture.

Duties and Responsibilities:

The role involves critical investigation of the experimental/manufacturing data to improve battery electrode manufacturing processes. The responsibilities for the role are in line with the following objectives:

- Pre-processing the instrumentation data that are available from the WMG pilot line, industrial and academic partners.
- Creation of data storage structures, data visualisation and presentation methods, data cleaning, and the statistical assessment of "raw" data.
- Investigating the predictability of battery characteristics, such as energy capacity, given the manufacturing data via machine learning techniques.
- Preparing the data to underpin model training, test, and design of the machine-learning models such as neural networks, regression models and classification methods.

Skills and experience

- Experience with Machine Learning algorithms
- Experience in MATLAB (scripts), Python/R programming
- Interest in batteries and energy storage systems
- Familiar with documentation and reporting
- Confident communicator
- Willingness to learn and explore new areas
- STEM degree programme

Eligibility:

- Be registered full-time undergraduate student from a UK university.

- Undertake the internship within the years of their undergraduate study (i.e., not in final year or during a subsequent Masters' programme).
- Not have been a FUSE intern in a previous year

Duration:

8 weeks

This internship has a proposed start date of 1st June, but there is some flexibility, and the exact dates can be agreed with the supervision team.

Supervisory Team

James Marco (Professor, Nextrode Work Package 5)

Mona Faraji Niri (Assistant Professor, Nextrode Work Package 5)

Warwick Manufacturing Group, University of Warwick (Link)

Opportunities

During the term of the project, will be able to attend Faraday Masterclasses, and FUSE cohort events focusing on a variety of topics to further develop your understanding of career opportunities in battery research. At the end of the programme, you'll be invited to participate in a Faraday Institution event to share a poster on your work with UK battery researchers and industry partners. Prizes will be awarded.

Additional activities:

During the FUSE internship you will be able to attend Faraday Masterclasses and cohort events which will focus on a variety of topics to further develop your understanding of career opportunities in battery sector. At the end of the programme, you will be invited to share a poster about your work and prizes will be awarded.

Application:

In order to apply you need to email you CV and one page cover letter to:

James Marco at James.marco@warwick.ac.uk

Mona Faraji-Niri at Mona.Faraji-Niri@warwick.ac.uk

For project information please go to Nextrode Website