



Fully funded Undergraduate Summer Experience (FUSE) Internship Program: Manufacturing process (Mixing) digital twins (CFD + AI)

Title: Manufacturing process (Mixing) digital twins (CFD + AI)

Project Description and Goals:

Lithium-ion batteries power everything from smartphones to electric vehicles, but how they are manufactured strongly affects how they perform. One of the most critical and complex steps is electrode slurry mixing, where active materials, binders, and solvents are combined to create the foundation of a battery cell. However, the slurry mixing process is characterised by strong nonlinearity, multi-physics couplings, and scale-dependent behaviour, particularly when scaling-up the manufacturing process from lab to industrial production.

Throughout the Nextrode and HVM Catapult project, our team has developed CFD models to simulate the behaviour of shear-thinning battery slurries across different mixing conditions, including geometry, speed, and scale. During this internship, you will improve and use these models to generate synthetic datasets that capture key mixing characteristics such as flow behaviour, shear distribution, and energy consumption. You will then explore machine learning approaches to build data-driven digital twins of the mixing process and gain hands-on experience with suitable ML techniques.

Duties and Responsibilities:

As an intern, you'll join the WMG research team and contribute to interesting work in developing a digital twin for battery manufacturing. The responsibilities for the role are in line with the following objectives:

- Work with advanced simulation models of battery slurry mixing
- Generate synthetic datasets from high-fidelity simulations (e.g., flow patterns, shear rates, mixing efficiency)
- Explore how mixing behaviour changes with scale, geometry, and operating conditions
- Train, test, and design of machine-learning models such as neural networks, regression models and classification methods.

Skills and experience

- Fundamental understanding of computational fluid dynamics
- Familiarity/Experience with one of the following commercial CFD models (COMSOL, STARCCM+, Ansys Fluent)
- Having exposure to Python and machine learning is an advantage
- Interest in batteries and energy storage systems
- Strong documentation and reporting skills
- Confident communicator
- Willingness to learn and explore new areas
- STEM degree programme background

Eligibility:

- Be registered as a 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 upon with the supervision team.

Supervisory Team

Mohammad Tavakol Sadrabadi (Research Fellow)

Mona Faraji Niri (Associate Professor)

James Marco (Professor)

Warwick Manufacturing Group, University of Warwick ([Link](#))

Opportunities

During the term of the project, you 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 the 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 your CV and one page cover letter to:

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

For project information please go to [Nextrode Website](#)

Deadline for applications:

30th April 2026