

We seek an Undergraduate (UG) student to conduct in-depth research.

Evaluating Battery modules for reuse in Electric Vehicles

Following the successful virtual Faraday Undergraduate Summer Experience (FUSE) 2020, the Recycling and reuse of Lithium-Ion Batteries (ReLiB) project (<http://relib.org.uk/>) seeks to fund a student to conduct 8 weeks virtual summer internship based on results obtained in Work Stream 1 (WS1) by the research group at Newcastle university. The WS1 within the ReLiB project is dedicated to developing a robust technique in the state of health (SoH) assessment of retired electric vehicles (EVs) battery modules. In this project, a retired 24kWh Nissan leaf battery pack was disassembled to the module level, and many different methods for SOH estimation have been explored, including, discharge capacity, electrochemical impedance spectroscopy, and incremental capacity analysis. The assessment results obtained showed that 31% of the batteries have been found to have >80% of original capacity. In theory, these batteries still have energy allowing them to serve in EV if refurbished and reassembled with similar modules from other retired battery packs. However, this must be validated via testing these battery modules using driving cycles and monitoring the variation in power and energy. Therefore, this project will allow the student to develop the basic knowledge of testing Li-ion batteries to imitate real scenarios using the state of art facilities and presenting testing results in a professional way. Importantly, this work will contribute towards showing the potential of refurbishing/reassembling retired EV batteries to boost the circular economy and reduce ecological damage. An undergraduate summer studentship totalling eight weeks is proposed with the potential working steps:

- 1- Introduction to Li-ion batteries in EVs- 1 week
- 2- Introduction to the testing facilities and software involved. 1 week
- 3- Practising testing methods and results analysis. 1 week
- 4- Understanding the driving cycle and how to use it in battery testing. 1 week
- 5- Analysing collected data from driving cycle implementation on retired battery module. 3 weeks
- 6- Short written report summarising the capacity fade and impedance evolution of refurbished battery module in EV. 1 week.

Learning objectives: at the end of this virtual internship project, the student will have

- gained knowledge of Li-ion Batteries and their use in EVs

- gained training and experience in the use of battery testing software .

- gained training and experience in different battery testing techniques.

The proposed start date is the 1st June. UG students from Electrical and Electronic Engineering, Chemical Engineering or Chemistry or any other related discipline are welcome to apply.

Eligibility criteria:

Applicants must:

- 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).

Faraday Undergraduate Summer Experiences (FUSE) 2021

Supervisory Team: Dr. Mohamed Ahmeid and Dr. Simon Lambert

School/University: School of Engineering, Electrical and Electronic Engineering Group, Newcastle University

Should you have queries contact: Mohamed.Ahmeid1@ncl.ac.uk

Do you want to apply please upload your CV by 30 April

<https://www.linkedin.com/jobs/view/2461132212/?refId=YWIAHiLTsk2sQvwj5K9b8A%3D%3D>