

## THE BRIEF

Faraday Battery is a startup founded in the UK and formed in 2019. Faraday Battery's aim is to showcase the significant advantage Faraday battery packs have over today's conventionally used battery packs and both the operational and bill of materials (BOM) cost advantage they derive.

The Science and Technology Facilities Council (STFC) Hartree® Centre worked with local SME, Faraday Battery as part of the ERDF-funded CW4.0 programme using data science and AI techniques for remote predictive maintenance of batteries in electric vehicles.

Faraday Battery is a start-up company looking to manufacture rechargeable battery packs for large electric vehicles like trains and buses. At the moment, battery packs are designed to last for ten years after installation however, this relies on their ongoing ability to perform reliably. Optimising when to replace battery cells is a crucial problem for industry as doing this too late results in an unreliable service for customers and replacing cells too early means that healthy cells are not used to their full potential. The company were looking for a way to measure and quantify the health of a cell in real time and display warnings of cell health through a user dashboard.

## THE APPROACH

The Hartree Centre's data science team worked with operational data from individual battery cells to develop tools to measure their regular operation. They used machine learning to predict and quantify cell health variables, highlighting cells needing maintenance in real time. To visualise the data and warning alerts, the team developed a dashboard to display key cell health statistics that could be accessed anywhere within a company from a cloud-based server. This was packaged into reusable, well-documented software enabling Faraday Battery to offer cell monitoring tools to their customers on demand.

## THE BENEFITS

Centralised remote monitoring of the health of rechargeable batteries will enable future net zero transport providers to keep track of their resources more efficiently. This helps providers understand how well their batteries are performing overall, enabling them to detect failures sooner and prevent catastrophic issues. It allows for fleet-level monitoring that can be controlled at a company headquarters and will help with overall maintenance scheduling and cost-saving by being able to replace individual cells when needed rather than full battery packs. The accessible dashboard is designed to present operational data easily to engineers and planners who can act quickly on the information they see.

*"We needed to develop Machine Learning models to predict the state of operations of the battery and didn't have the internal expertise to develop such complex models. This project provided funding and the opportunity to work with one of the best teams in the UK. The Hartree Centre has deep expertise in machine learning and helped us train the models based on the data we had already collected. I would recommend any startup that needs help in this area contact the Hartree Centre's team of experts."*

- Sanjay Gupta, Faraday Battery

