Consortium

BATMAX consortium comprises of 14 partners from nine European countries, including 7 industrial and 7 research partners.

Connect:

@batmaxprojecteu

BATMAX Project

batmaxproject.eu

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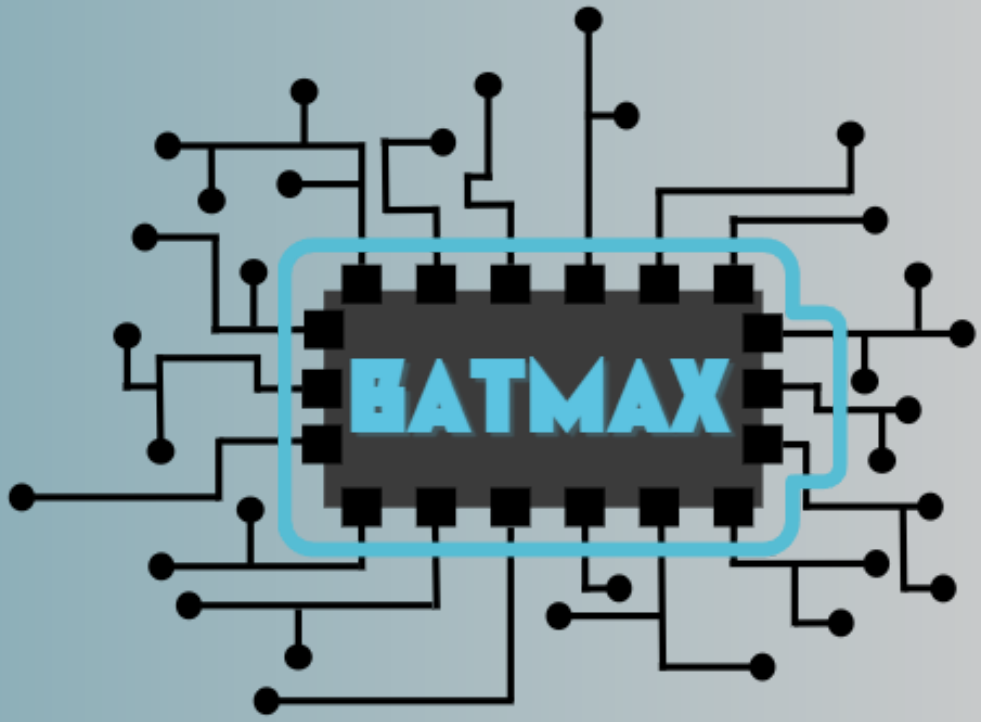

Battery management by multi-domain digital twins

Challenge

Electrification of the automotive, marine and stationary storage industries relies on battery technologies which combine low cost with high performance in terms of energy, power, safety and lifetime. To enable this transition Generation 3b chemistries, with enhanced energy density and lowered costs, need to be perfected, accelerated to market, and validated into these applications. Essential to this is a Battery Management System Architecture which understands the complex underlying chemistry and can maintain such battery systems to a long lifetime with high safety and high performance.

Solution

The BATMAX project will adopt a holistic data-based and adaptable BMS supported by emerging technologies such as Digital Twins and AI to meet the needs and demands of different mobile and stationary applications and use cases. Battery systems are fundamental for the green shift in transport, mobility, and energy. BATMAX project brings together dedicated researchers, industry partners, and stakeholders for a multidisciplinary approach to set the foundations of the new era of battery systems.

The BATMAX project has chosen to focus on four use case application areas for batteries:

- Waterborne
- Non-road mobile machinery
- Heavy-duty vehicles
- Stationary storage

The battery management system should be flexible and adaptable to all types of battery uses, and a methodical approach will be followed by the consortium. The primary focus of the BATMAX project is to enhance battery management by prioritizing safety, lifetime, reliability, and performance.

Methodology

BATMAX aims to create a framework for effectively parameterizing physics-based models, utilizing advanced numerical methods to accelerate the extraction of key parameters from experimental and numerical simulation data.

BATMAX focuses on developing hardware and sensorisation at both the cell and system levels to collect and communicate efficiently battery measurement data. An open-source BMS platform will be integrated into a laboratory-scale prototype system.

The BATMAX BMS framework (hardware and software) will empower the utilization of advanced battery models integrated with a digital twin framework. This framework will effectively handle large volumes of measured data in a cloud platform, enabling in-depth monitoring of battery aging and key system functions.

A hybrid model will be developed that combines physics-based models and data driven approaches to estimate the battery's state. The hybrid model will be integrated with AI-driven prognostic models in the digital twins. For a successful optimization of hybrid and AI-driven models, computation at the edge or cloud level will utilise data from sensors and from physical models.