

Battery Management System meets Embedded Digital Twin Technology

Newtwen and STMicroelectronics (ST) work together to improve the state-of-art in BMS technology using a physics-based electrochemical digital twin on-chip solution

THE CHALLENGE

The state of the art in battery management systems is based on heuristic algorithms or equivalent circuit models. While adequate, they cannot predict actual power limitations due to electrochemical constraints such as plating and aging phenomena. The actual causes of aging are the electrochemical and mechanical processes occurring within the cell: the cell's terminal voltage is a poor but measurable indicator of the state of these processes. As a result, the state of health of a battery pack is inaccurately known.

THE SOLUTION

Newtwen's goal is to tackle the challenge by proposing a BMS based on digital twin technology. They provide a physics-based twin solution for battery cells that computes in real-time electrochemical variables that reflect the true state of the cells: with such models it is easier to assess degradation phenomena and other parameters that would not be possible to measure, enabling the BMS to optimally control the whole battery pack. ST supported Newtwen in validating the software solution by providing the hardware equipment, electronic components, and software architecture they used to test the twin.

IMPACT

The result of the collaboration was the successful validation of the real-time feasibility of the digital twin solution applied to a demo battery pack developed together. This could lead to a further implementation plan in which ST will integrate the offering of their BMS with Newtwen's advanced control logic based on digital twins.

NEWTWEN

Newtven's technology provides augmented real-time information about system features that are otherwise unmeasurable, by creating an embedded digital twin to model the physics accurately.

Newtven targets customers in the automotive, industrial automation, and energy industries. Their focus is on applications in business areas such as engineering, production, and after-sale data analytics.



HEADQUARTERS

Italy, Padova

FOUNDED

2020

NO. OF EMPLOYEES

11 – 50

WEBSITE

newtven.com

ACKNOWLEDGEMENTS

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ABOUT STARTUP AUTOBAHN

STARTUP AUTOBAHN powered by Plug and Play is an open innovation platform that provides an interface between innovative tech companies and industry-leading corporations. The basis of the program is the partnership that develops between startups and the corporate business units. The two entities hold an equal footing from the get-go: together they evaluate the potential for a joint venture, move forward to pilot the technology, and work to achieve the ultimate goal – a successful production-ready implementation. Designed with the intention to exceed startup acceleration, STARTUP AUTOBAHN powered by Plug and Play moderates a community for collaboration with a focus on implementable results. Over the years, the platform has successfully cultivated over 400 projects with more than 300 startups since its founding in 2016.