

Design of a Lithium-ion Battery Pack for a Small Urban Electric Vehicle: Challenges and Lessons Learned by a Transdisciplinary Team

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Abstract. Electric vehicles (EVs) are emerging as a feasible solution to combat emissions, reduce reliance on fossil fuels, and gradually replace internal combustion engine (ICE) vehicles. The primary purpose of the traction battery in EVs is to provide energy to power the electric motor. However, the design of these batteries is complex, which presents one of the significant challenges in reducing the cost of vehicle electrification. This article discusses the obstacles a transdisciplinary team faces in developing a lithium-ion battery with a battery management system (BMS) for a small urban vehicle under the "Rota 2030 Program". The case study focuses on the collaboration between researchers from Brazilian technology institutions and two subsidiaries of multinational automotive companies based in Brazil. The team encountered difficulties locating information regarding commercial electric vehicle systems, such as battery sizing details, cell configurations, the chemical composition used, and developing BMS hardware and software, which are constantly evolving. The initial results reveal the complexity and challenges involved in designing a battery that meets the requirements of an EV.

Keywords. Transdisciplinary Engineering, New Product Development, Electric Vehicles, Lithium-ion Batteries.

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