

**HORIZON EUROPE PROGRAMME**  
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**Situationally Aware Innovative Battery Management  
System for Next Generation Vehicles**



**InnoBMS - Deliverable report**

**D4.1 - Concept of scalable cell monitoring, control  
unit and sensorics layout**



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### Project summary

The core objective of InnoBMS is to develop and demonstrate (TRL6) a future-ready best-in-class BMS hard- and software solution that maximizes battery utilization and performance for the user without negatively affecting battery life, even in extreme conditions, whilst continuously maintaining safety. Concretely, the InnoBMS proposal will deliver a 12% higher effective battery pack volumetric density, a 33% longer battery lifetime and a demonstrated lifetime of 15 years. The results will be demonstrated using novel testing methods that give a 36% reduction in the testing time of a BMS. The results will be demonstrated in two use cases, one light commercial vehicle (Fiat Doblo Electric) and Battery Test Chamber (FMF). The key outcomes will enable a cost reduction of 12% and 9.7% for passenger cars and Battery Test Chamber, respectively. The core objective will be achieved through five technical objectives. 1) advanced hybrid physical and data-driven models and algorithms to enable a flexible and modular BMS suitable for a wide range of batteries. 2) Software for a fully connected and fully wireless BMS that acts as a communication server inside the vehicle E/E-architecture, the center of connection, on-board diagnostics and decision-taking for all battery-related information. 3) A scalable, fully wireless and self-tested BMS hardware that enables using different battery sizes at different operating voltage levels, and smart sensor integration. 4) Better battery utilization and exploitation using cloud-informed strategies and procedure. 5) A heterogeneous simulation toolchain and automated test methods.

## Publishable summary

The core objective of InnoBMS project is to develop and demonstrate (TRL6) a future-ready, best-in-class BMS hardware and software solution that maximizes battery utilization and performance for the user without negatively affecting battery life, even in extreme conditions, while continuously maintaining safety.

InnoBMS leverages on seven work packages, with WP4 focusing on the hardware element of the overall project based on the requirements and specifications from WP1 (T1.1 Use-case Definition, interfaces and computational requirements of the advanced functionalities covering both BMS (edge-cloud) and VCU for the use-cases).

WP4 designed BMS hardware to meet the highest safety and reliability requirements for automotive applications, and the assembly of advanced sensors to enable the BMS to provide more accurate and reliable information about the state of the battery.

WP4 focuses on four tasks. Firstly the conceptualization of a modular BMS E/E layout including cell-to-pack focusing on ISO26262 and ISO21434, covering both 400V and 800V system which this report will focus on.

Following on from this definition of hardware, the design for automated assembly of CMB and implementation of wireless interface will be confirmed in the second deliverable of this WP4, D4.2 (Rapid hardware prototype of the wireless battery module system).

Subsequently Functional safety (i.e., ISO26262) and boundary condition-related testing of the battery pack with Battery test bench will take place during subsequent months to contribute to the report for D4.3 Advanced pack-level assembling for ultimate battery pack performance.

Finally, a fully wireless, connected and tested BMS hardware available for integration in the demo vehicle will be delivered aligning to the overall WP4 deliverable and reported on D4.4 Functional and safety-related testing of the battery pack.

This deliverable report, D4.1 is based on Task 4.1 Conceptualization of a modular BMS E/E layout including cell-to-pack focusing on ISO26262 and ISO21434, covering both 400V and 800V system.

# 1 Acknowledgement

## 1.1 The consortium

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### Project partners:

#	Partner short name	Partner Full Name
1	VUB	Vrije Universiteit Brussel
2	TOFAS	TOFAS Turk Otomobil Fabrikasi Anonim Sirketi
3	BOSCH	Robert Bosch SRL
4	AVL	AVL List GmbH
5	AVL-SFR	AVL Software and Functions GmbH
6	IDIADA	Idiada Automotive Technology SA
7	CID	Fundacion Cidetec
8	UL	Univerza v Ljubljani
9	THIL	Tajfun Hil Društvo sa Ograničenom Odgovornošću za Istraživanje, Proizvodnju, Rgovinu i Usluge Novi Sad
10	UNR	Uniresearch BV
11	FMF	FPT Motorenforschung AG
12	PTE	Potenza Technology Limited

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