# Continental Launches New Sensors to Protect the Battery of Electrified Vehicles

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Typically, the lithium-ion battery of an electric car is integrated in an underfloor position where its weight contributes to a low center of gravity and where it is well protected by the vehicle structure – with two potential exceptions: At high speeds objects, such as lashing straps, can be swirled up and damage the underfloor. At low speeds ground contact during a parking maneuver can also cause damage. Therefore, electric vehicles are fitted with a large and often heavy cover to protect the battery compartment from the underside. However, if an impact occurs, it will be up to the driver to judge whether the car needs to be checked at a garage. “This is not a satisfying situation as there is poor visibility underneath a car, plus it takes a trained eye to assess the true damage”, says Johannes Clemm, Managing Director Continental Safety Engineering International in Alzenau. To help the situation and make a lightweight underfloor protection feasible, Continental has developed the pressure-sensor based Battery Impact Detection solution.

This system detects and classifies underfloor impact events to alert the driver if the battery integrity may have been breached. This way the car owner can take precaution before a punctured battery could ignite at a later point. “In addition, the BID identifies the area of the damage, so the battery management can empty the cells in that area to prevent any risk of fire,” Clemm adds.

The BID covers two typical impact risks: One is low-speed ground contact, e.g., during parking maneuvers when the vehicle slowly rolls over a curb and hits the ground. During this type of event, the BID signal could also be used to trigger a fast-acting active suspension system to temporarily increase the underfloor clearance in order to mitigate the damage. The other use case is high-speed intrusion which can be caused by swirled up heavy objects such as rocks or lashing straps on the road. Given the speed and impact, these types

of objects can damage the underfloor and potentially even penetrate the battery structure.

In comparison to current solutions the sensor-based underfloor protection can save up to 50 percent of the weight of current battery shielding solution per vehicle. The pressure sensor satellites used in the BID derived from the proven Pedestrian Protection System (PPS pSAT) which has been in serial production and applied in millions of vehicles for more than ten years. Any impact is detected via a resulting pressure signal in an air-filled silicone tube that is integrated in serpentines at the bottom of the battery compartment. The time difference between the signal's arrival at the two pressure satellites at both ends of the tube makes it possible to calculate the area of the impact. The severity of the impact can be classified via signal thresholds that serve to trigger cascaded alarms to the driver.

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