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# POWER & PARITY

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## A Tight Spot



**“What made this project a pioneer in the automotive area was that we had to certify not only a vehicle but a whole system.”**

—Bernhard Weidemann, Mercedes-Benz AG, Stuttgart, Germany

**Automakers** have long been focused on perfecting the technology to move a car autonomously from Point A to Point B. Now, with fully autonomous vehicles inching toward mainstream reality, car companies are launching projects to tackle one of the most formidable environments for self-driving cars: the parking lot.

Daimler and Bosch partnered on a pilot project to transform the parking garage at the Mercedes-Benz Museum in Stuttgart, Germany into one capable of driverless parking. The project was not without challenges, namely unpredictable pedestrians, tight spaces, high volume and imprecise GPS. The team installed intelligent infrastructure, including sensors, along the driving corridor and its surroundings. Those sensors relay data to a vehicle’s existing smart technology, which converts the information into driving maneuvers. Project metrics revealed that driverless parking can result in more efficient use of space, with up to 20 percent more cars able to fit in a parking area.

First launched in 2015, the project received approval from the local government to open to the general public late last year. Rigorous risk assess-

ment was key to obtaining that approval, says Bernhard Weidemann, spokesperson for autonomous driving and artificial intelligence, Mercedes-Benz AG, Stuttgart, Germany.

To that end, the project team hired an independent company, TÜV Rheinland, to take a deep dive into the technology’s infrastructure safety, vehicle safety, safety of the vehicle control unit and IT security. Using these reports, the team was able to proactively mitigate major technical concerns regarding the operation of the automated valet parking system.

“What made this project a pioneer in the automotive area was that we had to certify not only a vehicle but a whole system,” says Mr. Weidemann. “There is no standard or regulation in place that covers both vehicle and infrastructure aspects.”

The lack of standards is a major obstacle to scaling and replicating similar projects. At the Mercedes-Benz Museum, for instance, the parking garage is only compatible with one brand of vehicle. But a larger environment would require technology that can accommodate cars of many makes and models—some autonomous, some not—and with many differing variables.

The industry has conflicting views on how to solve the parking problem, says Francesco Borrelli, PhD, a professor who studies control systems for self-driving cars at the University of California, Berkeley, California, USA. Some favor a vehicle-centric approach that focuses on giving the car as much data as possible so that it can safely navigate any environment, including parking lots. Others argue that some level of coordination between the vehicle and environmental infrastructure is necessary.

“The biggest challenge is definitely the coordination-type maneuvers at a large scale,” Mr. Borrelli says. “Imagine a sporting event or theater show, where you have hundreds of cars navigating a parking lot at once, and maybe half of them are autonomous.”

Finding a scalable solution is a speed bump, for sure. But it’s also imperative for the future of self-driving cars to be fully realized, he says. —Ambreen Ali



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