

# AI-driven solution predicts road conditions

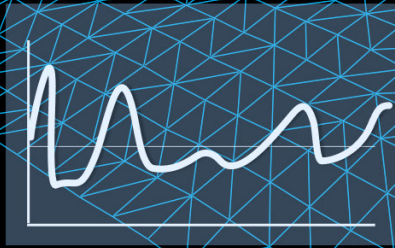


Figure 1: The AI Road Sense system can detect road conditions and driving behavior in real time, enabling predictive and adaptive chassis control (Source: ZF)

*At CES 2026 in Las Vegas, ZF (Germany) presented its AI Road Sense, a CAN-based solution. It predicts road conditions and driver behavior to enhance safety and comfort.*

**W**ith our Chassis 2.0 strategy, we are driving the transformation of the chassis into the digital age. By combining hardware expertise, advanced software, and artificial intelligence, we are creating solutions that not only take safety and comfort to a new level but also pave the way for the software-defined vehicle. In this way, we are shaping the mobility of tomorrow – intelligent, connected, and individually adaptable, said Dr. Peter Holdmann, Member of the Board of Management and Head of Division Chassis Solutions.

The scalable AI Road Sense system is available in three versions: standard, advanced, and premium. Even in the standard configuration, AI Road Sense uses CAN data frames to identify the current road type. The advanced version adds camera data, enabling predictive surface detection and analysis. The premium configuration expands the system with Lidar sensors, which scan the road profile up to 25 m ahead with an accuracy of 2 cm, creating a detailed 3D terrain profile for precise chassis adjustments.

## Navigating the road ahead

With AI Road Sense, ZF presents an AI-based solution that enhances safety and comfort in software-defined vehicles. The system uses state-of-the-art sensors to adapt the chassis in real time to changing road and surface conditions – whether on wintry roads, off-road terrain, or when switching between different pavement types. This raw data is then processed and utilized by ZF’s Cubix chassis software to coordinate the control of smart actuators such as the CDC (continuous damping control) semi-active damping system or the Smotion active damping system. The latter reacts within 1 ms to adjust the dampers. Future

smart actuator integration will include steer- and brake-by wire for even more advanced control and capability.

The Cubix platform makes it possible to implement certain driving functions. In doing so, it is possible to address those systems that are actually available in the respective vehicle. This is a paradigm shift in chassis development. Whereas engineers used to use the properties of certain devices and systems to define the characteristics of a chassis. In the age of the software-defined vehicle (SDV), it is the other way around: Functions determine the basic character of the chassis – then you look at how these functions can be implemented by controlling existing devices. The benefit is not tied to the use of specific hardware, not even from ZF. Cubix is scalable and can control third-party devices, too.

“AI Road Sense can help reduce drivers’ uncertainty when facing challenging road conditions. The system detects specific situations in fractions of a second and reacts faster than human reflexes allow. This means the vehicle’s behavior always meets expectations, strengthening both confidence and the sense of safety at the wheel,” said Holdmann.

While a camera alone would recognize snow only as a uniform surface, ZF combines camera signals with chassis signals such as tire slip and torque increase. This allows AI Road Sense to distinguish between deep and shallow snow and adjust the vehicle to the situation. In this example, if the system detects slippery roads, the “Snow Start” is automatically activated: the vehicle starts with reduced torque to prevent wheel spin and tire slippage. This ensures more comfort, fewer worries, and a relaxed driving experience, even under challenging conditions. In off-road situations, AI Road Sense also relieves the driver of difficult decisions. The AI detects the depth and ▶

## Harman acquires ZF's ADAS business

Harman (U.S.A.), a subsidiary of Samsung (South Korea) is going to take over the ADAS (advanced driver assistance system) products by ZF (Germany). This comprises smart cameras, radars, and related software functions. The transaction is valued at 1,5 billion Euro. As part of the agreement, approximately 3 500 ZF employees across the world are expected to transition to Harman. The transaction is expected to close in the second half of 2026, subject to receiving regulatory approvals.

"Samsung has a successful record of strategic acquisitions that accelerate innovation and expand what's possible for our customers," said Young Sohn, Chairman of the Harman Board of Directors and Senior Advisor at Samsung Electronics. "Since acquiring Harman in 2017, the company has scaled its automotive and audio business from seven billion US-dollar to more than 11 billion today." Alongside the automotive sector (passenger cars and commercial vehicles) ZF serves market segments such as construction and agricultural machinery, wind power, marine propulsion, rail drives, and test systems. With some 161 600 employees worldwide, ZF reported sales of 41,4 billion Euro in fiscal 2024. The company operates 161 production locations in 30 countries. hz

firmness of the ground – whether mud, sand, rocks, or snow – and automatically selects the optimal drive strategy. All-wheel drive and differentials are intelligently pre-locked to optimally distribute power, even in deep ruts. Another advantage: AI Road Sense works in the background, without the user needing to know or select driving modes. For example, when switching from a gravel road to the highway, the system switches to a quiet, energy-saving mode.

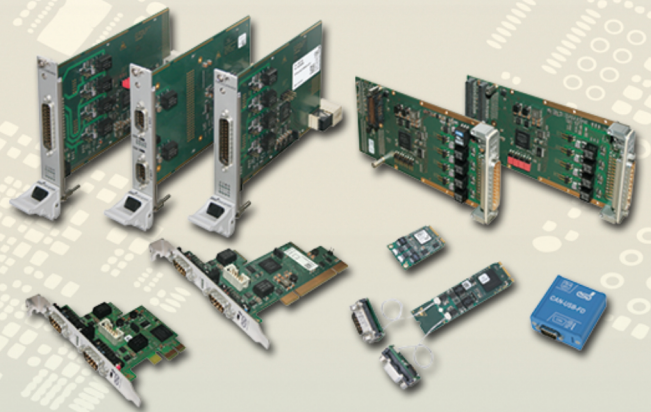
AI Road Sense represents a major step toward intelligent, software-defined mobility. By combining advanced sensing with predictive control, we are delivering a driving experience that is safer, more comfortable, and highly personalized for enhanced performance.



Dr. Peter Holdmann (ZF)

AI Road Sense can also enable driver behavior recognition, analyzing throttle, brake, and steering inputs along with in-vehicle and external conditions to predict driving style and preferences for enhanced comfort. This capability enables a personalized and adaptive driving experience across chassis and powertrain systems.

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March 10 - 12, 2026  
in Nuremberg  
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