VW ID.3 EV
First model in multi-billion dollar MEB range nears

PLUS
The race for artificial intelligence domination
Regulators brace for new autonomous era
Traditional OEMs rethink digital strategies
Sensors for ADAS and autonomy
functions cannot be blocked by other activities, such as a data stream from the infotainment domain.

In the example of a rearview camera, a signal detecting an object blocking further travel is sent to the gateway over a 100-Mbit Ethernet cable. The gateway aggregates all incoming data into a large data stream and sends it in real time to the ADAS/AD server over a 1-Gbit Ethernet link. There the software makes a decision about the signal from the rearview camera. A brake command is then sent to the brake control unit, which in turn actuates the brakes to stop the vehicle. Forwarding the signal from the rearview camera is prioritized so that critical functions cannot be interrupted by non-critical network traffic.

The required high safety is achieved by the multi-zone gateway control concept which uses redundancy to create a fail-safe functional network.

Plug-and-socket connectors and cables, which are able to provide signal integrity for the entire life of the vehicle, are one of the decisive factors for the reliability of high-speed network connections. Reliability must not be impaired by EMI or by thermal processes.

New technologies fulfill this demanding task by combining sensor, control, and infotainment data with integrated multi-zone redundancy and TSN capabilities to maximize reliability. A multi-layer safety approach with device certification ensures compliance with the strict safety requirements of vehicle manufacturers.

Growing need for speed

While automotive Ethernet is expected to “rise and become the backbone of the car,” according to McKinsey, there is growing demand for even higher speeds, and future network systems will be oriented to these increasing speeds. Groups such as the Networking for Autonomous Vehicles Alliance and OPEN Alliance are bringing together industry leaders to foster the development and adoption of next-generation multi-gig Ethernet automotive networking, as this technology likely represents the future of in-vehicle and V2X connectivity.

// ALEX BORMUTH and JOE STENGER of Molex wrote this article for Autonomous Vehicle Technology.

Autonomy’s opportunities and challengers

Autonomous vehicles promise to transform the transportation industry, creating a range of opportunities for OEMs and their suppliers. But before these benefits are seen, several technical challenges have to be overcome.

Representatives from a Tier 1, a tool provider, and a market researcher explored this exciting period in an Autonomous Vehicle Technology webinar entitled “The Autonomous Vehicle Future: Opportunities and Challenges.” Gary Silberg, KPMG’s Automotive Sector Lead, said he expects a major downturn in the number of personally owned cars, but that other vehicle types like automated/connected vehicles and people movers will rise.

Silberg also predicted that “vehicle miles traveled will soar” as aging baby boomers use automated vehicles to take trips that they wouldn’t be able to make on their own. He also expects a surge as parents use autonomous vehicles to transport children who aren’t old enough to drive.

The impact of autonomy will change life in cities and alter commutes for workers. Several cities around the globe are trying out smart city strategies. Panelists noted that city planners who are successful can create environments that will attract businesses and workers.

“For cities that want to attract talent and get people to move to their city, mobility will be a factor,” said Aaron Jefferson, Vice President of Business Development at ZF’s Electronics and Advanced Driver Assist Systems Division. “Innovative cities will experiment and move forward. For those who get it right, it will be a great job creator.”

Many industry specialists now predict that autonomous vehicle usage will begin in limited areas such as campuses and airports, and in commercial off-road vehicles that travel in specified areas like mining sites. Limited downtown areas may also be an early market.

Silberg predicted that the startup period will create what he calls islands of autonomy, in which some states and many confined areas like retirement communities have autonomous services, while several other areas don’t gain the benefits of autonomy. Jefferson questioned whether individuals or families will buy autonomous cars.

“For robotaxis, people movers, and commercial vehicles, the cost models are very clear,” he opined. “Companies still need to make a case for the automated passenger car market.”

Market growth may be slow during the early years of adoption because many buyers will want to buy a few vehicles and wait to see how they work out. Although
market growth may be slow, development costs are already high. Developing sensor and processing systems will be expensive, and validation costs will also be high. That makes it hard for companies to maintain solid revenue streams. Many are reducing costs by affiliating with a number of specialists to create a large ecosystem.

“The big question is how to get a return on investment,” Jefferson said. “It’s difficult to do; there aren’t enough resources. I expect to see more companies come together. It makes sense to partner and share experiences.”

Partnerships are important at all levels, including development tools. Barath Kumar, Business Development Manager at dSpace, noted that his company teamed up with RTMaps (Real Time Multisensor Applications), a French company that supplied tools used to develop Navya’s Level 5 robo-cab. The partnership makes it easier to fuse and process real or simulated sensor data, either incoming imagery used to test sensors or testing controllers by sending them virtual sensor data.

Virtual testing is important since it’s impossible to drive enough miles to fully test autonomous vehicles in all conditions. Simulation and validation will be used to augment actual driving tests. These virtual tests can simulate varied road and weather conditions, and they make it easier to test unusual scenarios.

“Simulation and modeling are absolutely the secret sauce,” Silberg said. “All miles aren’t created equally; complex driving issues will help improve autonomous performance more than miles driven down a straight highway.”

These tests will help OEMs determine how many sensors they need, and what combination of cameras, radar, and LiDAR are needed. Sensors must overlap areas, and different modalities are needed to assure accuracy.

“Redundancy is important; if one sensor fails, you need to know another will compensate and handle the situation,” Kumar said. “Several customers also see the need for predictive sensing, for example with electronic horizon, GNSS, V2X, and so on. The first thing we hear is that sensing is a crucial element.”

Validation will be an important factor in the drive to complete safe, reliable vehicles that are affordable. Though it can save companies a lot of money, performing virtual tests for billions of driving miles will not be inexpensive. That’s another challenge for ecosystems that are working on autonomous vehicles.

“Moving forward, it will be important to validate; the question is how to do it in a timely and cost-effective manner,” Kumar said.

To view the archived webinar, visit https://onlinexperiences.com/Launch/QReg/ShowUUID=3E-BE5374-CB90-43A5-B1A0-61F4C-64C2063&LangLoca-leId=1033&AffiliateData=speakers

ZF’s Jefferson put some definition around the current ADAS and AD market.

dSpace’s Kumar lays out a sensor vision for autonomous driving.