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Weekly Newsletter

DVN Interior

NEWSLETTER #217

Editorial

Spotlight On Driver, Occupant Monitoring

SUBARU IMAGE

Automotive in-cabin sensing technology and driver + occupant monitoring systems (DMS-OMS) can enhance safety, comfort, and convenience while providing valuable insights for automakers, suppliers, and service providers.

The systems have traditionally relied on standard 2D image sensors that provide limited information such as driver eye gaze or occupant head and body position. But that's changing; the systems are becoming mandatory in Europe next year, and regulation, as usual, fosters innovation—including 3D data, which we look at in this week's in-depth piece. We also go into the truck market for these systems, and the data privacy concerns and implications which come with getting more driver information within the vehicle.

Interior news of the week includes SDV influence on user experience, HMI, recycling, and much more.

Don't forget to go **see** the videos from the April Köln DVN Interior Workshop!

Sincerely yours,

Philippe Aumont
DVN-Interior General Editor

In Depth Interior Technology

DMS-OMS Revolution is At Hand

Driver distraction is a serious problem. In the US, some 3,308 people were killed and 289,310 were injured by distracted drivers in 2022 (the latest year for which data can be had). Other countries see similar results. A driver monitoring system (DMS) is meant to prevent accidents caused by driver drowsiness, distraction, or inattention...

Today's systems either monitor attention indirectly—typically based on steering input—or directly with a camera and sensors tracking eye gaze and/or head posture. Automakers including Volvo, Subaru, GM, Ford, Tesla, Mercedes and more have them, at least on some models, and the locations of the camera vary from the steering column to the A-pillar to above the windshield. Some systems, without using a camera, can detect when the driver's hands come off or exhibit weird behavior with the steering wheel.

A camera-based DMS uses two or more cameras to track and monitor the driver's eyes, and raises an alarm if the driver's attention is compromised. Usually there's a driver-facing camera with infrared-emitting diodes (IREDs or IR-LEDs), to detect the driver's face and eyes—even at night or if the driver is wearing dark sunglasses. The system also keeps track of driver vigilance by measuring engagement in spurious activities such as eating, drinking, using a cellphone, and others.

DMS is scheduled to become mandatory this July for new vehicle types, and for all new vehicles in 2026. It is generally expected that in the next few years, DMS will be included in the EuroNCAP safety ratings.

So with those regulatory and non-governmental mandates coming soon, there's been a great deal of active research and development in the field. There have been many announcements and presentations; here we take a look at some of the highlights:

3D Emotion

DVN IMAGE AT CES 2024

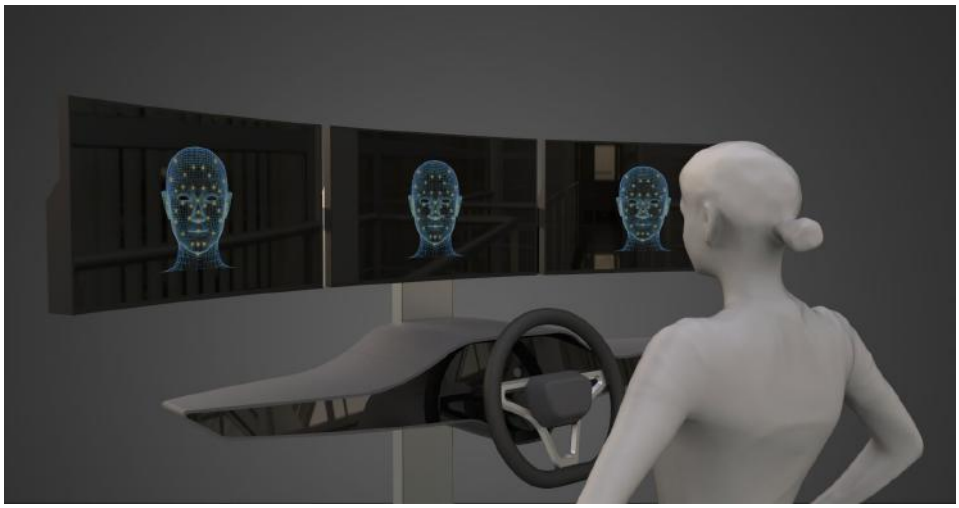
At InCabin Detroit just shortly ago, 3D Emotion showcased their 1-megapixel high-FoV driver and occupant monitoring system (DOMS), and received feedback especially regarding the smoothness and accuracy of the 3D pose estimation based on the 2D images. The eye gaze tracking and related features were also noted for their performance. 3D Emotion partnered with Melexis on this, and the two companies featured a joint demo. It highlighted the DOMS algorithms with their time-of-flight (ToF) camera. The demo included features like drowsiness detection, distraction monitoring, gesture recognition, and body classifications and out-of-position detection, all using the ToF camera's accurate depth sensing. By combining the 3D output of ToF cameras with their 3D estimation algorithms, they achieved excellent results, even at VGA resolution.

Lead Deep Learning Engineer Fabian Windbacher gave a speech at the event about the current state of in-cabin monitoring. He emphasized the growing need for single-camera solutions that capture multiple features at once—driven by regulations, cost, and innovation. Their DOMS solution addresses this need by combining active and passive safety and user experience features in one product.

The single-camera solution achieves high feature coverage in an affordable, efficient manner. Along with cost, efficient use of resources and low processing load are automaker priorities.

Luxoft exhibited jointly with 3D Emotion at the Automotive Testing Expo and ADAS & Autonomous Vehicle Technology Expo in Stuttgart The innovative setup includes a feature of advanced distraction prevention where the co-driver display fades to black when the driver's view is directed at it.

AMS Osram



AMS OSRAM IMAGE

AMS Osram showcased their diverse lightning and sensor projects , and gave more detail on their Icarus 3D Driver Monitoring System, highlights of which include:

- Monitoring the driver for drowsiness, distraction, and gaze, plus monitoring the cabin for children and pets.
- 3D sensing to determine microsleeps, eye gaze directions, and blink duration.
- Ability to support emerging features, including augmented reality heads-ups displays and face authentication.

The AMS Osram speaker at the event said the system "measures the position of the driver's head in 3D to detect micro-sleeps and other advanced signs of drowsiness which can pose a serious risk to road safety".

The Icarus evaluation kit features a Vertical-Cavity, Surface-Emitting Laser (VCSEL) or an IRED for flood illumination for 2D near-infrared (NIR) sensing. It can be upgraded to include an NIR dot-pattern projector for accurate and cost-effective 3D sensing. AMS Osram also showcased their AS8579 capacitive sensor designed to determine whether the driver's hands are on the steering wheel or not—crucial to ensure safer operation of L^2-up vehicles.

Eyeris

EYERIS CEO MODAR ALAOUI (R) SPOKE AT THE 1ST DVN INTERIOR WORKSHOP. (EYERIS IMAGE)

AI continue to be a hot topic in depth-sensing capabilities, and Eyeris' monocular 3D sensing generative AI software is on that list. It uses advanced neural networks to regress 3D depth information from 2D image

sensors for auto manufacturers.

Sensors powered by monocular 3D-sensing AI software provide advantages including
• Simpler hardware setup and calibration, compared with ToF
• More compact and lighter
• Wider field of view

Most tier-1 suppliers and automakers rely on multiple sources to build their own camera modules, processors, and other vehicle systems. This helps them create a custom solution.
Eyeris, Omnivision, and Leopard Imaging have co-created an automotive series-production reference design kit. It offers automakers and suppliers customization, shorter development cycles, lower overhead costs, reduced dependency on external suppliers and better-quality control. These advantages translate into faster time-to-market, cost savings, and reduced risk for customers.

Deep-In-Sight

(DEEP-IN-SIGHT IMAGE)

Korean startup Deep-In-Sight presented their new In-Cabin Monitoring System (ICMS), which aside from monitoring for safety hazards also offers facial recognition and gesture control.

The Camosys system monitors for drowsiness, distraction, phone usage, seatbelt usage, and other events. It also allows drivers and passengers to unlock a vehicle in just three seconds while detecting fake facial images, according to its maker.
The Pangyo Techno Valley-based company has also developed other products based on 3D ToF cameras and AI, including volume management systems and DMS.

Trucks

(VOLVO IMAGE)

For trucks and commercial vehicles, particularly large trucks, the benefits of DMS are even more obvious, as driver are exposed to long and boring driving hours. As we already presented in an Optalert interview, DMS as a drowsiness countermeasure started more than 20 years ago within the mining and transport industries in countries like Australia.

Truck drivers, due to their extended hours on the road, are more prone to fatigue. NHTSA reported 633 U.S. deaths from drowsy-driving-related crashes in 2020.

First offered by Volvo Trucks long before it was legally required, this feature monitors and analyzes the truck's movements in the lane, to detect driver tiredness and drowsiness. The system alerts and then informs the driver to take a break when needed.

Seeing Machines

The latest, 3rd-generation version of Seeing Machines' aftermarket Guardian has started production. This product integrates the IR optical path, vision processor, and 4G modem all into a 1-box solution. That step, which balances the conflicts of small size (to not impede driver's view) with enough space to dissipate the heat of the active components.

Initial deliveries will be to meet after-manufacture supply for European truck makers. This is where the truck is made as it rolls down the assembly line, with specialist hardware added at the end of production but before leaving the factory. Firstly, this will be to comply with GSR guidelines for drowsy driving, but later comes detection for distraction. More, there are new TruckSafe protocols about to be introduced by Euro NCAP, which European trucks will need to comply with.

Seeing Machines has offered Guardian for almost a decade, typically to detect distracted and drowsy driving and provide real-time alerts. What looks new in the third-generation product is OTA upgradability via the inbuilt 4G modem. This way the product can be upgraded with through-life updates, as new features are developed or as new requirements come into force (for GSR or Euro NCAP). This business model of continuous updates would serve to future-proof the initial outlay of the cost of the hardware by the fleet operator, and appears more flexible than embedding the DMS into the truck, such as in the instrument cluster or on the steering column as seen in the automotive sector.

Privacy

(CYBERARC IMAGE)

Driver-monitoring technologies do raise serious privacy concerns, especially at a time when carmakers are coming under increased scrutiny for sharing and monetizing driver data which, in some cases, has had real-world implications like hiking insurance rates.

Such systems can be worrisome to consumers and consumer-interest watchdogs, particularly if they record video or if any data collected by the device flows to places outside of the vehicle, including to the automaker.

It will be up to any automaker who uses this kind of technology to decide how many features they want the system to provide and what sorts of privacy limitations it will have.

Experts say there is sure to be some backlash from consumers, some of whom will feel uncomfortable with a camera watching them drive. It seems likely likely that some regulators will limit it, at least in Europe.

Interior News

Antolin's Sustainable Mono-Material Solutions

INTERIOR NEWS

(ANTOLIN IMAGE)

Antolin has developed ECover and ECover Tech for vehicle interiors. These have been designed and developed with the aim of offering customers more sustainable components without compromising on design, perceived quality, or the integration of new features.

ECover uses only polypropylene, both in the plastic carrier of the vehicle's interior part and in the fabric that covers it. As a result, at the end of its useful life the entire solution is recyclable, including production waste. The trim cover does not need to be separated, and the complete part can be transformed into recycled material batch for manufacturing new plastic parts for automotive or other sectors.

By adding significant value to the product, the ECover Tech version allows for the integration of lighting and interactive functions into the final component. From a user experience perspective, this version offers customization possibilities for messages, on-demand interactivity, and sophisticated interior lighting elements.

Facilitating the final recycling of products is part of Antolin's commitment to developing a circular business that prioritizes responsible resource usage and integrates materials with a lower environmental impact.

This alliance between innovation and sustainability underscores Antolin's capacity to lead the new mobility paradigm from a positive impact perspective, supporting both the industry and clients in their decarbonization strategies.

video

Stradvision SVnet Immersive MI Technology

INTERIOR NEWS

(STRADVISION IMAGE)

South Korea-based Stradvision, who created award-winning AI-powered image recognition software 'SVNet' now have received a production award for their cutting-edge augmented-reality product, called Immersive.

It's the product of strategic collaboration with a Japanese automaker, and is designed to enhance the navigation system of the car company's cockpit domain control for infotainment. With SVNet's Immersive technology, the perception capabilities of the navigation system will be sharply imprved with accurate lane detection, providing detailed semantic segmentation to understand various elements on the road, and precisely identifying road edges to enhance navigation accuracy and safety. Stradvision SVNet has already been deployed in over 2 million units globally, underscoring the robust and reliable nature of their technology.

"We are thrilled to embark on this groundbreaking project with our esteemed Japanese OEM partner," said Philip Vidal, CBO of Stradvision. "The continued success of Immersive marks a significant step forward in our mission to revolutionize automotive navigation and safety. By combining our advanced vision processing technology with the OEM's industry expertise, we are set to deliver a product that will enhance the driving experience and set new standards in the industry."

The collaboration with the Japanese automaker underscores Stradvision's commitment to delivering cutting-edge solutions and expanding their global footprint. The production of Immersive, set to commence in Q3 2026, aims to revolutionize the driving experience with advanced AR features that promise enhanced safety and convenience.

Vinfast VF3 Takes Interior Minimalism Seriously

INTERIOR NEWS

VinFast revealed this affordable VF 3 EV at CES 2024. It is already a social-media phenomenon in the brand's home market of Vietnam.

We're talking here about small and cheap cars, suitable for short-range urban or suburban travel, easy to park, with a short-range allowing a cost-saving small battery.

The VF3 is a very small car: 3.19 m long (the Dacia Spring is 3.73m); 1.68 m wide, and 1.62 m tall. Like other cars of its type, it has only 4 seats, unlike most, its wheelbase is 2.07 m—the rear seat is little more than a padded shelf, not a seating area. For comparison, the Leapmotor, with its very limited rear space, has a 240 cm wheelbase.

The electric SUV is equipped with a 10″ infotainment with Android Auto and Apple CarPlay compatibility. With the second-row seats fully folded, the VF 3 offers up to 550 liters of cargo space.

The passenger compartment looks clean, but with physical buttons for the air conditioning system, sound intensity, and a 10" screen compatible with Android and Apple. The car is devoid of a dashboard and apparently will utilize touch surfaces on the steering wheel, as there is no mention of buttons in the photos. No center console or armrest.

Will the VF3 end up being cheap and cheerful? Or just cheap?

More on their website

Hyundai Founds SDV Operation

INTERIOR NEWS

(HYUNDAI IMAGE)

Hyundai Motor Europe has announced Hyundai Connected Mobility, a business unit established in April this year to support Hyundai in transitioning to software-defined vehicles.

HCM is designed to address customers' growing demand for more connected, accessible and personalized services. According to Hyundai, the aim of HCM is to offer a range of digital in-car and in-app services as well as new mobility services throughout the vehicle lifecycle, to enable a seamless customer experience.

The business unit will be centered around mobility services, connected-car services, and data-driven digital services.

HCM is addressing the increasing customer demand for flexible usage models through their mobility service brand, Mocean. Hyundai has tailored Mocean subscriptions to provide customers with fast and flexible access to cars with a seamless digital user experience, eliminating paperwork entirely. Hyundai regards subscription models as pivotal in enticing new customers beyond conventional ownership.

Additionally, digital services will play an important role on how customers experience software-defined vehicles. On top of providing regular OTA updates to infotainment software, this activity of HCM will launch new customer-centric services, including FORd (features on demand), in-car payments, vehicle-to-everything (V2X) communications (including vehicle to grid and vehicle to load) and offer solutions for parking and smart charging.

Cadillac's 2025 Optiq Luxury EV

INTERIOR NEWS

CADILLAC IMAGES

Cadillac's new 2025 Optiq is aimed at providing a luxury entry point for EV buyers.

The model has Super Cruise driver assistance technology with a three-year connected service. The Optiq also has a large cargo capacity and a spacious second row. It will be available in more than 10 regions worldwide, including Europe.

The Optiq's cabin is designed to be high-tech, welcoming and connected, featuring illuminated décor and advanced in-vehicle technology.

Materials include patterned accent fabric woven from 100-per-cent recycled yarn and PaperWood veneer made from tulip wood and recycled newspaper.

There is a 33" diagonal advanced LED display with 9k resolution, capable of projecting more than one billion colors.

Standard driver assistance technology has been integrated with high-definition GPS mapping, driver attention system, lane changing capabilities and a steering wheel light bar. There are also integrated radar, camera and ultrasonic sensors to enhance driving safety and monitoring.

As to infotainment, there's inbuilt Google compatibility, featuring Google Maps and Google Assistant, as well as a standard 19-speaker AKG Audio System with Dolby Atmos.

On the exterior, there is a fixed-glass roof which provides a "seamless transition from glass to sheet metal", says maker GM. This is mirrored by the windows arranged in a precision pattern in acoustic laminated glass.

Tactotek, Polestar Work on IMSE Tech

INTERIOR NEWS

POLESTAR IMAGE

Polestar and Tactotek have agreed to explore the integration of Tactotek's IMSE (In-Mold Structural Electronics) technology into Polestar's vehicle programs. Polestar will license Tactotek's technology and products for lighting and HMI.

An IMSE part usually performs the functions of a conventional multi-part assembly. By seamlessly integrating electronics such as lights and controls into thin plastic structures, IMSE technology is intended to enable advanced lighting functions and human-machine interfaces. They should be more sustainable and aesthetically pleasing.

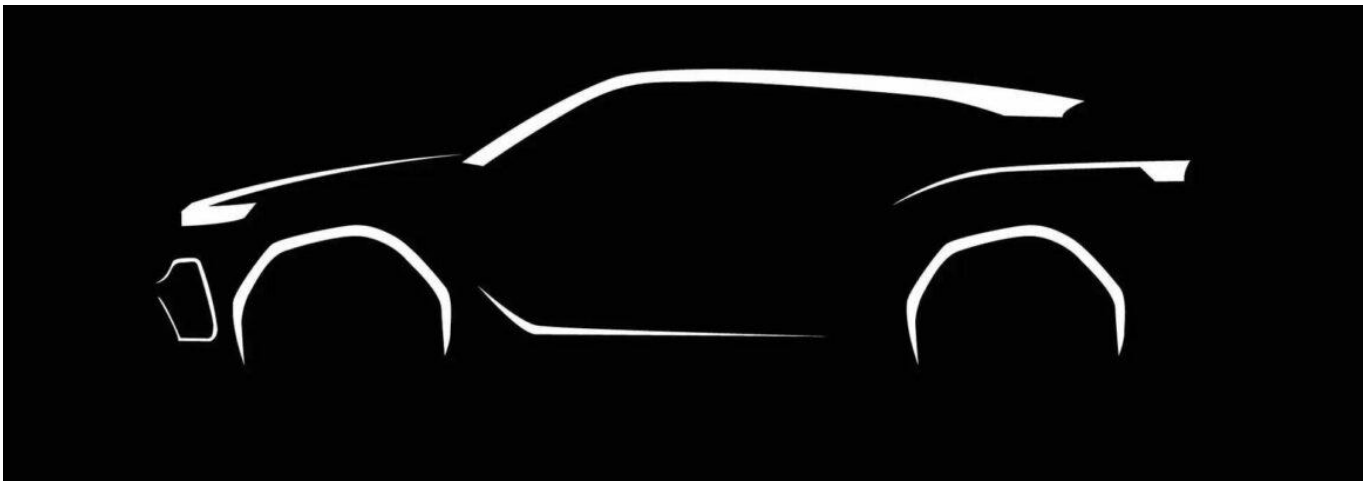
Tactotek recently opened a branch in Munich, close to the company's customers and primarily intended to serve the Central European customer base.

In Munich there is a showroom for IMSE applications and current technology demonstrators. Thematic workshops could also be held there. Specially trained engineers provide support with project ideas and design studies as well as with quotations.

The Design Lounge

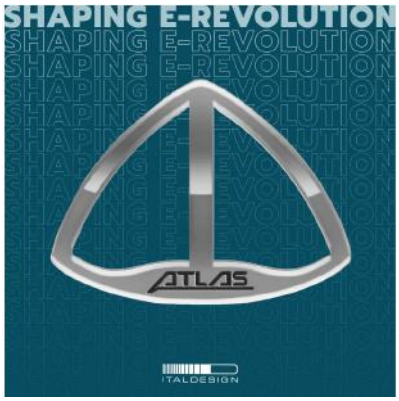
Atlas-Italdesign Electric SUV For Africa

THE DESIGN LOUNGE



ATLAS AS PRESENTED IN 2023 (ATLAS IMAGE)

British-Moroccan EV startup Atlas and subsidiary Atlas E-Mobility will manufacture an electric SUV in Morocco, kickstarting a new era of eco-friendly transportation in the African continent and beyond. The agreement signed with Italdesign is a collaborative work encompassing the development of the project from styling, engineering, modelling, and prototype building activities to be put in place by Italdesign, the Moncalieri, Turin-based design house. Atlas EV Company will commence production in Morocco from 2027.



"We make absolutely no secret of our deep admiration for the boundless, creative talents of the Italdesign team. Clearly, this collaborative project is already history in the making. Working towards putting into place the first EV manufacturing infrastructure in Africa is a milestone commitment that underpins a long-term strategy for know-how transfer and future regional economic development" – A collective statement from Atlas Group General Counsel Younes Bakkali and Board Director Mark R J Palmer.

And Italdesign CEO Antonio Casu said, "We are eager to get to the heart of this collaboration and aware of its potential impact. We believe this project from Atlas will play a crucial role in shaping the automotive landscape in Africa continent and beyond, and at Italdesign we are truly committed to make it possible and to support them in every step of the journey towards the development and launch of their new car project. In our almost 60 years of business, we have been pioneers in many new markets and worked with a great number of newcomers. This is the first time ever we approach the African market, which is ready to be the new hub for automotive manufacturing. With our experience, we can offer know-how, strategy, consultancy,

dedication, passion, and technical support to new players. Nonetheless, we know that it is always a mutual cultural exchange, we are therefore eager to learn, as well as poised to drive innovation together with Atlas".

Italdesign's Head of Design Joaquin Garcia added, "As designers, partnering with Atlas is highly professionally stimulating, and personally profoundly inspiring and enriching, due to the amazing cultural and artistic heritage Africa embodies. We are sure that bringing our individualities together into this new project will be very interesting. Our all-electric SUV will feature a vision for a greener future and will embrace innovation to provide users with a seamless and enjoyable journey. We are looking forward to bridging continents together with Atlas and aiming to capture a wide market".

The new product is planned to enter production as 2026 gives way to 2027, initially targeting consumers in the European, Middle Eastern and African markets before going global.

News Mobility

Navigation in SDVs: How?

NEWS MOBILITY

PININFARINA IMAGE

Today's navigation applications work with real-time traffic data, use weather information and receive continuous updates. They access sensor data to obtain a comprehensive picture of the vehicle's surroundings and warn if a speed limit has been exceeded. With modern navigation systems for the SDV (software-defined vehicle), automakers offer their customers differentiated solutions for a better driving

The navigation applications of a SDV are supplied with data from the cloud, which is displayed on the map. This includes speed limits, temporary traffic signs, traffic jams and information about closed roads. Data that flows dynamically into the system in addition to the map also comes from the cloud. They contribute to comfort and safety.
The trend in the SDV is towards a central platform via which all systems and services run. These use the same data, including location-based data. This creates an interplay between infotainment, assistance systems and even drive control. Seamlessly available and networked data, including map data, is required here. The drive control system uses it to obtain information on route attributes. Assistance systems use it to compare the information from the sensors. This creates a holistic, personalized driving experience that automakers can use to strengthen and expand their brand.

In a modern navigation ecosystem, it is possible to map the route guidance on the smartphone in the infotainment system. Other proprietary apps also use location-based data, which is then used in the vehicle. This seamless user experience can be described as mobile-to-mobile convergence.

For vehicle manufacturers, navigation solutions in the SDV that are scalable and easy to implement are worthwhile. They are provided as a software-as-a-service solution and the automaker need not worry about map updates themselves.

Modular systems are important for car companies, whose range of functions they can adapt are depending on the vehicle model, region or customer. Drivers benefit from up-to-date maps, high-quality data and modern routing algorithms. The navigation solution helps to overcome reservations, particularly in the field of electromobility, where there is a fear of range and a lack of trust in the charging infrastructure. Predictions supplement the real-time data to ensure a better driving experience. With regard to autonomous driving, the interaction of standardized location-based data with sensor information is essential.

Such a navigation system offers automakers great added value as it is easy to implement. They can offer it in their own look and feel, scale functionalities, add data themselves and combine it with other services. This allows them to tap into new sources of income through new services and subscription models. They increase customer satisfaction, retain customers and create value. They also increase the value of their vehicles and position themselves technologically for further evolutionary stages of the software-defined vehicle.

Baidu's Advanced Mapping Eases Intersection Understanding

NEWS MOBILITY

BAIDU IMAGES

The huge central screen in a Tesla is put forward as a selling point. Its navigation is very pretty and quite fluid, with a readable map. But Tesla's GPS can sometimes mislead the driver in complex junctions, which become difficult to read on the screen. Some manufacturers, such as Mercedes or BMW, offer specific features on their maps to better consider complex intersections.

Baidu, the Chinese counterpart of Google, has just unveiled Baidu Maps for Tesla, Huawei, and Jiyue electric cars, as an application that replaces the default car mapping. And the video demonstration made by Baidu on Weibo is quite convincing.

We see a much more advanced mapping system than the basic one offered for example by Tesla. The car displays red lights and the time remaining before they change color. We obviously see radars appearing, but above all, complex intersections seem much simpler to read.

The 3D view allows you to have an overview of all traffic lanes. They are all displayed on the screen, which prevents you from taking the wrong lane in very dense areas.

At intersections, an AR view appears on the instrument cluster screen (behind the steering wheel) of Model S and Model X. We already know this type of function from other manufacturers. In practice, the screen displays a real-time view of the intersection, filmed by the Tesla's camera. There is a 3D arrow superimposed, indicating the direction to follow and the path to take.

The Baidu Maps application should be available on Teslas sold in China now, and it seems most unlikely that Tesla will also offer this application in the rest of the world. But the American company could join forces with other local players to improve their mapping system. Some French cities (like Bordeaux) already have connected lights allowing information on the remaining time to be sent to cars.

General News

Valeo Ex-Manager is Audi's New Chief Software Officer

GENERAL NEWS

GEOFFREY BOUQUOT (AUDI IMAGE)

Audi has announced that Geoffrey Bouquot, formerly Head of Technology at Valeo, has been appointed to a newly-created position. Officially, the function is called Innovation and Software-Defined Vehicles (SDV). The Supervisory Board of the Volkswagen Group subsidiary confirmed the appointment.

Bouquot is tasked to accelerate the pace of software development. This is accompanied by a paradigm shift towards the integral development of vehicles with software as the leading element. He is to drive forward this transformation to a software-centric organization as the responsible board member.

"We need more speed in development and a clear focus on software," says CEO Gernot Döllner, explaining the new management structure. Bouquot brings with him the necessary experience in managing and transforming large development and software teams.

The new Board of Management department strengthens Audi's long-term technology and innovation strategy, Manfred Döss, Chairman of the Supervisory Board of Audi AG, was quoted as saying in a company press release. The focus is now on the development of SDVs.

Mutares Takes Over Fischer Automotive

GENERAL NEWS

FISCHER AUTOMOTIVE IMAGE

Mutares has bought Fischer Automotive Systems from Fischer. The company is to be integrated into the Automotive & Mobility division. The acquisition is expected to be completed by the end of July 2024, subject to approval by the antitrust authorities.

Fischer Automotive develops, produces and sells components for vehicle interiors and exteriors, such as air vents, storage compartments, cup holders and electrically operated tailgates. The products come from the headquarters in Horb am Neckar, Germany. They also come from other plants in Czechia (Ivanovice na Hané and Holubice), Jagodina in Serbia, Taicang in China, and Auburn Hills in the USA.

Mutares is a German-based holding company that acquires medium-sized companies in turnaround situations.

Around 1,200 people work for Fischer Automotive. The company generates an annual turnover of over €160m. The company's customer base includes Audi, BMW and Tesla, as well as tier-1 suppliers such as Faurecia and Magna.

Fischer Automotive significantly expanded the production facility at their Serbian site in Jagodina at the beginning of February 2024. The company supplies air vents and cup holders from there. Fischer Automotive used the new space primarily for production, logistics, external logistics warehouse and social rooms.

The automotive division building in Horb am Neckar will remain the property of Fischer. The company intends to use it for their fastening systems division. The local employees from production and logistics in the automotive division are to be transferred to the fastening systems division.

According to Fischer, the employees from the acquisition and project area and in the national companies in Czechia, Serbia, the States, and China will continue to be employed by Mutares. Mutares intends to strengthen their presence in Europe, the USA and China with the takeover.