Editorial

Regulation, Marketing Pushing Costs Up

ROLLS-ROYCE SERENITY (TOPSTEN IMAGE)

Car content keeps increasing as a result of regulations; technology, and marketing. Recent new-vehicle introductions have been presenting with large increases in interior content; two examples we present this week are the Mercedes EQS and the Toyota LQ. This week's in-depth article looks at in-cabin sensing, and there's news about new mandatory driver-assistant systems. Fine and well, but alongside the obvious safety improvement, vehicles are increasingly exceeding something of a price acceptance threshold, above which most potential buyers will feel excluded.

Market competition and increasingly stringent regulations are pushing for innovation and technology (realized as in-car content). We all talk about improving user experience with amazing comfort, personal cocoon, ultrapremium lighting and sound and HVAC and infotainment systems; ever-fancier materials and controls and displays. But whose safety is really improved if nobody can afford to buy these amazingly-equipped cars? The sky might be limit technically, but *cost* is the limit practically!

The interior community has to play its role, and to foster the industry to set up maximum acceptable cost per function, especially in the domains of HMI/UX and sustainability where regulations and marketing are raising the bar.

That's part of what we'll address at the DVN-I Seminar, planned for 29 November in Köln, Germany. Please continue to **send us your thoughts** to support event preparation.

Sincerely yours,

DVN

PHILIPPE AUMONT
General Editor, DVN-Interior

In Depth Interior Technology

In-Cabin Sensing for Safety…and More!

DMS-OMS (driver and occupant monitoring systems) and in-cabin sensing in general have been a focus of DVN Interior from the beginning. In my previous career, I was in charge of an innovation project portfolio where these technologies were included since 2006!

Autosens is a UK-based organizer of events; training, and information in the domain of vehicle perception technologies. They recently put on a roundtable on in-cabin sensing—a fine opportunity to get an up-to-date overview with four panelists from companies already known to readers of DVN Interior: Seeing Machines; SmartEye; Cipia, and Xperi. The discussion was centered around whether a single sensor is enough for present and future in-cabin use cases. The panel looked specifically at sensor technology to determine how many and what kinds of sensors are optimal for DMS and OMS applications, seeking to answer these questions:

- Which sensors are most effective for in-cabin applications?
- What are the positioning and mounting challenges for one vs many sensors?
- How can we leverage powerful sensors and image processing to get maximum cost-efficacy?
- What's the optimum approach for energy and latency efficiency?
- What factors influence customer choice of system adoption?

ADAS (advanced driver-assistance systems) use sensing technology to understand the external environment including other cars; pedestrians; cyclists, and buildings. Inside the vehicle, the same technologies—cameras, radars, and perhaps eventually lidars—can now achieve high accuracy and reliability for the likes of child- and pet-presence alerts; seat belt reminders, and airbag deployment.

Panelists

Xperi in-cabin monitoring SVP Adrian Capata. Xperi develops in-cabin monitoring technologies on neuromorphic vision systems, developed with the support of Prophesee, a Paris-based startup which developed what they call an event-based approach to machine vision;

Seeing Machines automotive SVP and general manager Nick DiFiore. Seeing Machines is an Australian company, powering General Motors' Super Cruise already presented in several DVN Interior articles, like **this one**;

SmartEye automotive chief Detlef Wilke. Smart Eye is a Swedish company, also **presented** in DVN Interior columns, and

Cipia R&D VP Erez Steinberg. Israel-based Cipia has likewise been **covered** in DVN Interior headlines.
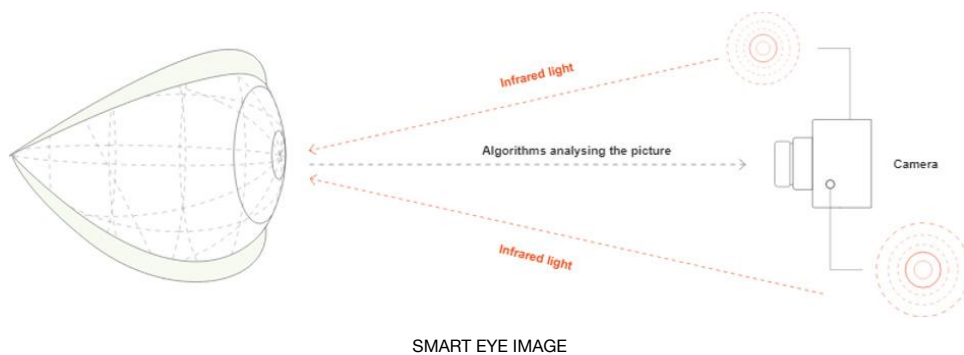
SMART EYE IMAGE

Panel Discussion

The first point is what is the issue that the industry wants to solve. An easy answer would be just to comply with the upcoming regulations, but the paramount issues the industry is trying to address are to improve safety; minimize the consequences of driver inattention, and in a next step to make sure no more children or pets are left behind in hot (or cold) cars.

What equipment is needed? The minimum, of course, consistent with cost control and maximum reliability. That is: the minimum set of sensors, for the maximum performance output. The biggest bang-for-buck. The system is addressing safety, which will be mandatory. As safety is implicit for users, it doesn't create value, consumers consider it as a given.

Fortunately, with the system in place, added-value features can be added to create conveniences; improve user experience; allow personalization, and otherwise entice the car buyer to pay.

The market for these functions is as new as the functions themselves. A lot can still happen; use cases can shift and drift, and technologies, too. As vehicles are increasingly shared (remember what we said about acceptable-cost thresholds? That's going to push more people towards car-sharing!), cleanliness and security could become more important.
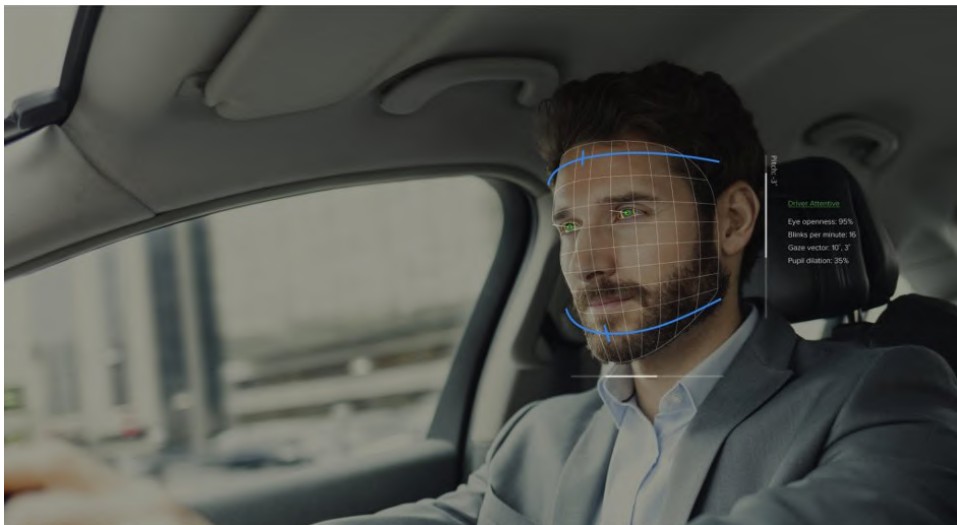
CIPIA IMAGE

Regulatory factors

The regulatory context is obviously fostering the rapid introduction of in-cabin sensing, as Euro NCAP has raised the international standard for safety. Starting in 2023, Euro NCAP will require new vehicles to have DMS to detect distracted and drowsy drivers. Points are awarded for vehicles that alert the driver to distraction and fatigue, with more points for cars that can actually stop the car.

The U.S., on a regulatory island of its own making, has a similar opportunity to require DMS in vehicles with an updated NCAP program. NHTSA's request for comment was focused on the potential inclusion of ADAS technologies including blind spot detection and intervention; lane keeping assistance, and pedestrian-sensitive automatic emergency braking in the US NCAP. These systems are a good start, but DMS must be a part of any ADAS system in order to maximize safety and ensure public acceptance.

As part of last year's infrastructure law, the U.S. Congress required NHTSA to use DMS as a possible solution to increasing traffic deaths. The law includes two crucial provisions calling for rulemakings on distracted driving, impaired driving, and updates to NCAP—and DMS could serve as a solution to all these problems. Nevertheless, it must be kept in mind that the same infrastructure law required NHTSA to permit adaptive driving beam headlamps in accord with a particular SAE standard developed for that purpose, yet in response NHTSA disobeyed Congress and instead issued a technically problematic ADB rule, far out of alignment with the SAE standard, which can only result in a more expensive, less performant system.

In addition to Congressional and European recognition, the Insurance Institute for Highway Safety and Consumer Reports both recommend DMS as part of any driver assist system. As part of their safety rating system for consumers, IIHS and CR award vehicles that use DMS when automating steering, braking, and acceleration work together. This is further recognition that DMS works and is a key component of any ADAS technology group.

SMART EYE IMAGE

Sensors

The best sensor for DMS-OMS right now is probably a camera. It addresses the driver inattentiveness issue, and it is in real mass production, which means cost has been optimized—mass production cost efficiency is a must for automotive products. Will a single camera be enough to watch the complete cabin? Or will it have to be one camera per seat row? The discussion carries on. But in the long term, cameras alone are probably not enough. If we compare a camera to a human, the human has a much broader perception, like audio for instance. It means that additional sensors should be added. And most of time, these already exist in the vehicle; any car has a microphone today. So fusion of sensing information is the next solution.

Thermal sensing would be an interesting technology, especially to detect vital signs. But it will happen only if it is affordable!

Computing capability

For safety, the computing power has to be where it is happening—onboard the vehicle, not off somewhere in the cloud. Safety is a real-time application. For mission-critical performance, it can't come through the cloud. That's what is edge processing all about: processing; analyzing, and storing data closer to where it is generated to enable low latency: rapid, near-real-time analysis and response.

Detecting the blink of an eye is typically an application where latency is critical. Or side airbag deployment according to the weight and size of the passenger, for another example.

SEEING MACHINES IMAGE

DMS and Sensor Fusion

The panelists considered it takes several years until a single camera is obsolete. If any new application would need a new sensor, obviously, several sensors will be costly. The legal DMS will use that single sensor. To cover more, in the long term, it could address wellbeing or anything else. Information from the single camera could be already fuse with other existing information. Drivers could respond to alerts via the microphone, or through switches.

Incapacitation

Incapacitation is the next challenge, according to the panellists. Driver incapacitation is the term used to describe the inability of a driver to carry out their normal duties. The issue is how to measure it. Understanding the cognitive load—getting in the head of the driver—is a challenge. Systems don't understand where the mind of the driver is going; cameras measure only what our body manifests: our behavior.

Sensor Placement

Panelists discussed sensor integration in the mirror, as recently introduced (and presented in DVN Interior) by Magna and Gentex. It is a real integration as it uses an already existing features, it doesn't use any additional real estate in the cabin. The only issue could be that it's above eye-line of the driver, so it could be an issue to detect whatever is requested.

XPERI IMAGE

Next Steps

According to the panellists, DMS introduction is generating enormous development efforts, which means that new other application, such as OMS and wellbeing tracking will come later. Seeing right with a machine, versus personal (driver) perception performance, is the next challenge. It's a very nonlinear process. It's a really a research area for the future.

On their own, ADAS operation can be abrupt. For example, an automatic emergency braking system may suddenly apply brakes in a jarring way that is not naturalistic to the human driver. However, by combining AEB and DMS, the overall system can be set to different sensitivities. Scaling ADAS sensitivity to the driver's state is important for achieving both the desired safety benefit and driver experience.

ADAS features will work more effectively when DMS is included in the safety suite. Warning-only systems for external objects (cars, pedestrians…), like blind spot monitoring are effective only if the driver sees or hears the warning. When DMS is integrated with other safety systems, like lane keeping assist; forward collision warning, and automatic emergency braking, the systems can work collaboratively to improve safety and enhance the driving experience.

The NHTSA request for comment also had specific focus on approaches to reduce injury arising from distraction and alcohol-related crashes. DMS will detect how driving under influence manifests.

Interior News

Basemark's Development Tools for AR Cockpits

BASEMARK IMAGE

Finnish automotive software developer Basemark has launched their Rocksolid AR SDK, a full suite of software development tools and runtime systems for the development of automotive in-cockpit AR (Augmented Reality) applications. The company says the tools will enable customers to develop and deploy AR solutions easier, faster and more efficiently.

New safety standards and increasing customer demand for driving comfort are propelling automotive makers to develop and deploy new safety and comfort features. Augmented reality holds immense possibilities to improve comfort, safety and the driving experience. For example, AR applications can increase the accuracy and safety of navigation and enhance vehicle safety and ADAS features, such as lane departure warnings. In addition, augmented reality-powered applications can help the driver with vehicle interaction and be more aware of their surroundings as drivers get instant information on the surrounding environment and road conditions.

The Rocksolid AR SDK can be used as a standalone component integrated into existing automotive software and electronics architecture or as an integral part of the Rocksolid Core automotive OS and architecture.

The solution supports both OpenGL ES and Vulkan APIs, providing options for the customer to deploy the AR applications on a wide variety of different processors. This is important for car manufacturers as, due to chip shortages, they need to be flexible on which chips they choose to build different car models. The company states that efficiency of processing is customarily more than two times better than with OpenGL ES, resulting in smaller power consumption and hence longer range for EVs. One application example already **covered in DVN**: the BMW iX.

Renault's VR Interior Development
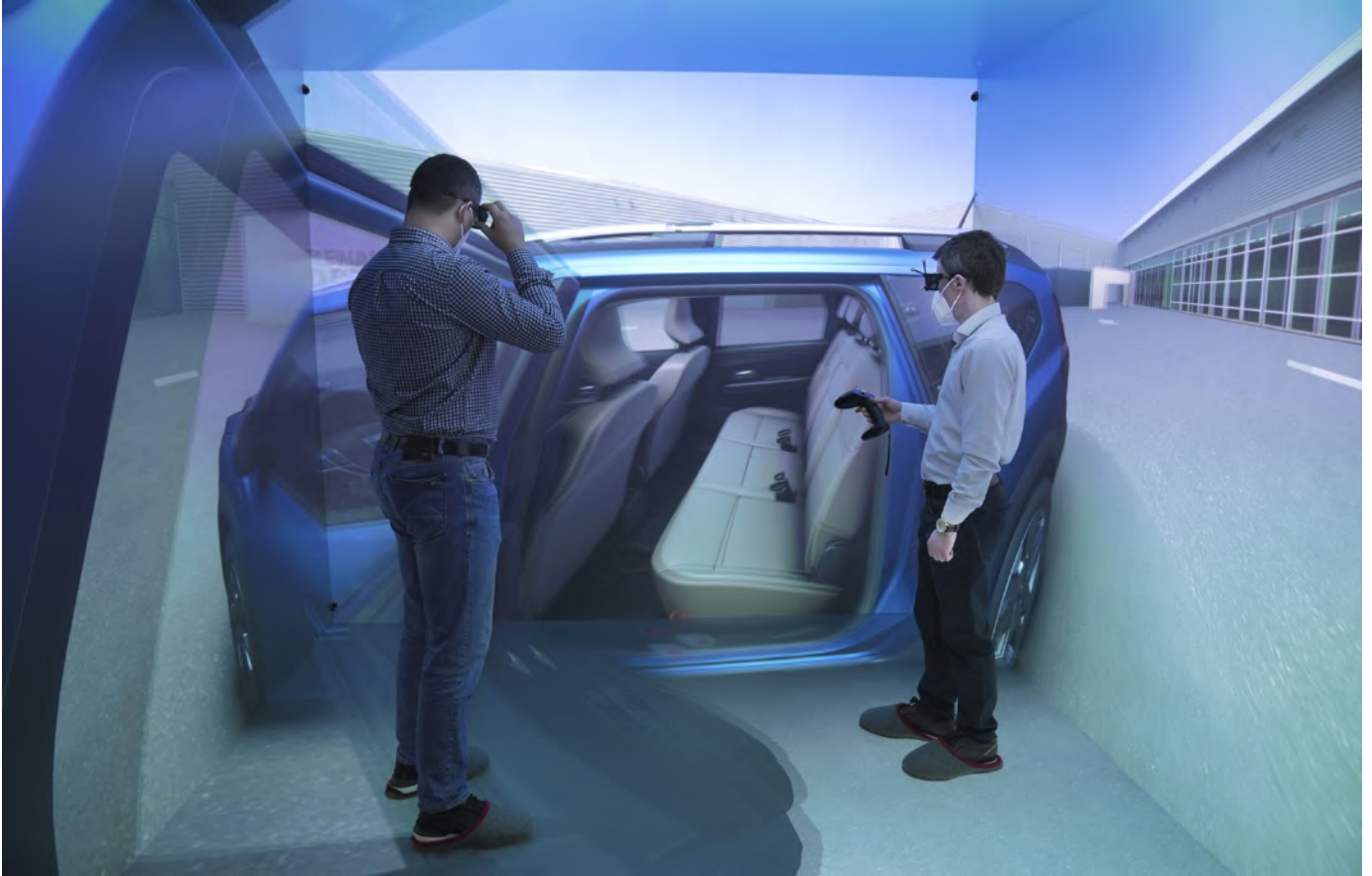
DACIA JOGGER INTERIOR IN VR (RENAULT IMAGE)

Virtual reality was one of the prime tools applied in the development of the new Dacia Jogger, enabling engineers to see and gain a feel for the model before physical prototyping had begun. The company's Cave Automatic Virtual Environment (CAVE), based at Renault Group's Titu Technical Center in Romania, provides an environment for specialists to move around the vehicle as they assess elements of its design. In the case of the Jogger, it was used to refine interior practicality and spaciousness.

A group of 13 consumers from different backgrounds tested the third row of seats in the new 7-seater on a journey inside CAVE. The virtual environment was configured to test all sensations, including passive driving (outdoor scenery scrolls past the tester, as if they were physically driving even though the pedals are not active); static confirmation (visibility, ergonomics and design); and physical perception (comfort and safety).

Following feedback based on this immersive experience, engineers changed the Jogger's second row of seats by bringing them forward 2 cm, and interior modularity was improved. All this could be done in real time without pushing back the project's schedule.

According to Renault, CAVE saves more than €2m per year. With stereoscopic videos projected along five walls, the user is surrounded and can even climb on board as if it were a real scale model. After a thorough inspection using 3D glasses and multiple interactions between testers, a few clicks are all that is needed to alter the vehicle's design. The images have a six-megapixel resolution, facilitating analysis of elements such as the ergonomics of the dashboard controls, visibility around the vehicle, accessibility, comfort and the overall design.

VW Cariad + Blackbeery = New Real-Time OS
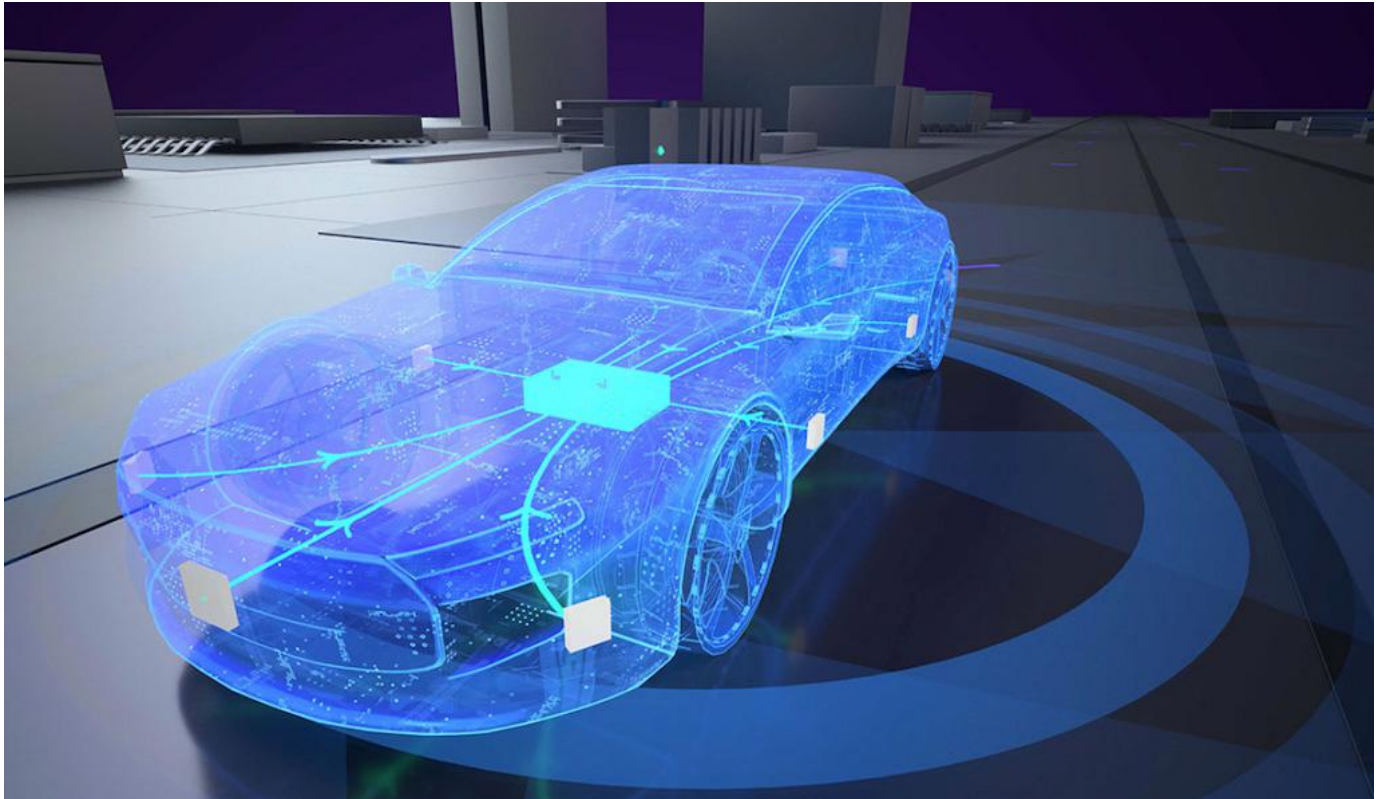
CARIAD IMAGE

Volkswagen subsidiary Cariad will use software from Blackberry in parts of the VW.OS software platform. The real-time operating system QNX is to be integrated primarily in the stack for driver assistance functions and automated driving functions. Within the stack, QNX OS for Safety 2.2 is to form a reliable, safe functional basis.

Volkswagen is developing a uniform software platform in their Cariad subsidiary. It consists of VW OS, the Volkswagen Cloud VW.AC, and a scalable, uniform electronic end-to-end architecture. The platform is to be available for the Volkswagen Group brands from the middle of this decade. As part of the agreement, Blackberry QNX will also provide professional engineering and consulting services for system-level integration, performance optimization, and solution validation.

Based on Blackberry's QNX Neutrino real-time operating system (RTOS), QNX OS for Safety is a fully POSIX-compliant, open-standards-based operating system which embedded developers can use to build safety-critical systems and has been certified to ISO 26262 ASIL D, the automotive industry's highest functional safety standard. With a pre-certified, scalable microkernel RTOS, the solution enables automakers and embedded software developers in a wide variety of industries to accelerate their development timelines and reduce the cost in moving projects from research to production.

Toyota LQ Concept Interior Has It All!

TOYOTA IMAGES

Toyota has unveiled their LQ concept, an L^4 autonomous vehicle equipped with an AI-powered personal assistant called Yui. A preview was given at the last Tokyo Motor Show in late October 2019, as **shown in DVN Interior**.

Toyota says the automated driving technology will combine with the AI assistant to create a unique mobility experience, creating new relationship between vehicle and driver by learning from and responding to individual preferences and needs.

Yui provides a personalized mobility experience based on the driver's emotional state and alertness. In order to ensure safety and comfort, the AI can engage with the driver using interactive voice communications, in-seat functions designed to increase alertness or reduce stress, in-vehicle illumination, air-conditioning, fragrances and other HMI interactions. Yui can also select and play music based on the driving environment and provide real-time information on topics of interest to the driver.

The LQ is equipped with L^4-equivalent automated driving functionality. The automated valet parking system, jointly developed with Panasonic, eliminates the need to search for parking spaces by automatically driving between a drop-off spot and an assigned parking space. The system also maximizes space in the parking lot by reducing clearance between adjacent vehicles to 20 cm.

The LQ's AR-HUD (augmented-reality head-up display), also co-developed with panasonic, supports safe driving by reducing driver eye movement. Driving information such as lane warnings, road signs, and route guidance can be displayed in 3D scenery seen through the windshield. The system helps keep the driver's eyes on the road with a large screen display—equivalent to 230"—which has a depth of 7 to 41 meters ahead of the vehicle.

The advanced seating system has multiple inflatable air bladders embedded into the seat with an in-seat air-conditioning system. It staves off driver drowsiness; if the system recognizes that the driver is tired, it inflates the air bladder in the seat back to support an upright sitting posture and directs cool air from the ventilation system located in the seat. When conditions allow

the driver to relax, such as in automated driving mode, the air bladder in the seatback gradually inflates and contracts to encourage abdominal breathing.

The car uses the roof and floor mat areas as an intuitive communications platform to share information between the vehicle and passengers. Embedded lighting displays different colors to indicate automated or manual driving mode and lights up different footwells to indicate which passenger Yui is addressing.

There's a newly developed catalyst coating that decomposes ozone into oxygen on the radiator fan, allowing ground-level ozone—a cause of photochemical smog—to be decomposed as the vehicle moves. This was developed with Aisin Chemical and Cataler. Toyota has measured the effect of the coating as purifying about 60 per cent of the ozone contained in 1,000 liters of air over the course of a one-hour drive. It sounds like a reprise of "PremAir" technology developed and patented by Volvo in cooperation with U.S. catalyst experts Engelhard and introduced in 1999, though the Volvo solution placed the catlytic material on the radiator, rather than on the fan.

The minimalist interior is smooth and sleek, with key elements like HVAC outlets hidden behind invisible registers. The 3D-printed center console is reinforced using the design technique of topology optimization, which provides optimal strength and supports an advanced vehicle interior with fewer support structures visible to the driver.

More Futuristic Details of Mercedes-Benz EQS
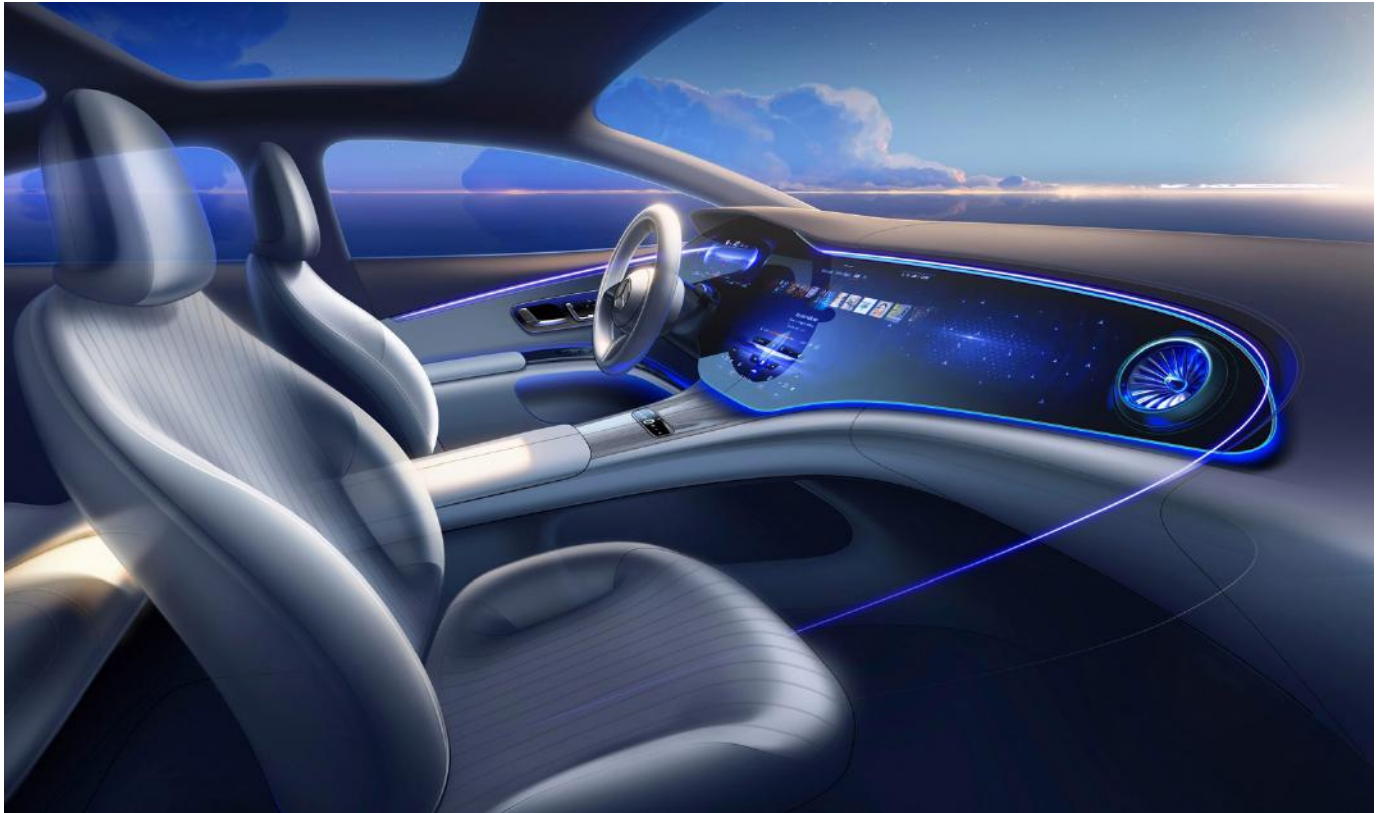
MERCEDES-BENZ IMAGE

The EQS targets to become Mercedes' flagship luxury EV. The interior features a wide range of electric and autonomous technology to provide drivers and passengers alike with a unique experience. Following on from our **first report** this past March, we now have more details to share.

At the front in the vehicle sits the centerpiece of the user experience: Mercedes' own MBUX Hyperscreen, measuring 55". The system is context-sensitive and will constantly optimize itself by adapting to changes in the vehicle surroundings or user behavior. Dynamic and individual content will be customized to each user's needs. The MBUX Interior Assistant also can operate based on movements within the cabin, at both the front and rear of the vehicle.

Mercedes says the EQS as a vehicle and as an experience will appeal to the majority of the human senses, including sight, hearing, smell and touch. Up to 350 sensors are used as sensory organs to aid the vehicle in measuring distance, lighting conditions, seat occupancy, the driver's eyelid movements and even passengers' language. This information is then processed by a range of control units to tailor the EQS experience to a user. With AI, over time the EQS can improve its capabilities by learning from a range of experiences and situations it has previously faced.

Alongside these features, an optional driving sound can also be added that reacts to the accelerator position and speed to provide the driver with audio feedback through a Burmester surround sound system in real time. Furthermore, the car can also provide users with "Energizing Nature" programs, such as "Forest Glade", "Sounds of the Sea", and "Summer Rain". It also has the "Energizing Coach" feature, with programs like "Freshness"; "Warmth"; "Vitality", and "Joy", depending on vehicle situation and occupant temperaments. Furthermore, a smartwatch can be used to measure human stress or sleep values to optimize the cabin area.

To keep the cabin free from exterior pollutants, a HEPA filter can be fitted as an optional extra. it works with Energizing Air Control to aid in cleaning incoming air before it reaches the cabin area. The system features a high filtration level and is capable of eliminating 99.65 per cent of harmful particles.

Driver Assistance Systems Are Now Mandatory

DAIMLER IMAGE

From 6 July—last week—assistance systems and technical equipment features will be mandatory for new types of motor vehicles in the EU (meaning any new model). Initially, the regulation concerns the type approval of vehicles. From 2024, the technologies will become mandatory equipment for all newly registered motor vehicles, including those models that were in production before the requirement took effect.

According to the German Road Safety Council, the regulation primarily provides for safety-related systems that prevent accidents or mitigate their severity: intelligent speed assistant; emergency brake light; reversing assistant; advanced emergency brake assist; emergency lane keeping assist; drowsiness warning system (mostly named DMS in the industry); driver monitoring for automated driving functions; alcohol interlock; accident data recorders; cyberattack protection; tire pressure monitoring, and turning assistant for buses and trucks.

The assistance systems only provide support, the responsibility always remains with the driver himself. According to the Eeuropean Commission, intelligent assistants can prevent around 25,000 road deaths and 140,000 serious injuries by 2038, because around 90 per cent of all road accidents are caused by human error.

The main issue is that it continues to increase vehicle costs and therefore prices, which are already too expensive for many in the European market. Here again: who is safer when nobody can afford the cars?

The Design Lounge

A Badly Misunderstood Notion of Wellbeing

1962 CHEVROLET CORVAIR MONZA CONVERTIBLE (BARRETT-JACKSON IMAGE)

The rapid progression of sensors in car interiors often evokes comparisons to previous technologies and pre-digital-era experiences. In-cabin sensing applications aiming to increase driver and passenger safety as well as the overall quality of the journey, are today's common practice. Looking back prior to their fast evolution there are a lot of technical stages that had to be conquered with equally many in-cabin sensations.

It is hard to pick one specific overall example but when I think about car interiors and unforgettable sensations, spontaneously one car comes to mind: the 1960-1969 Chevrolet Corvair—a "compact" car with a rear-mounted, air-cooled, horizontally-opposed six-cylinder engine, rear-wheel drive, and a 108-inch (2,743-mm) wheelbase. It was the only American mainstream car that opted for such an unusual layout, and it became one of the most misunderstood cars of modern history. Related anecdotes are as popular and as many as the Corvairs produced (well over a million), and some of them are even flattering.

One of its uncommon features was a gasoline-powered heater, since in an air-cooled motor there is no hot water to run a heater. Therefore, General Motors added an extra spark plug to burn gasoline and create heat (and furnace odours, and reduced fuel economy). Moreover, there was an air-conditioning option with a **condenser crammed over the engine** providing cool air for the cabin, while the engine compartment would overheat even more than they already did without the A/C. These rickety HVAC provisions spurred a series of anecdotes related to smoking, cooking, or barbecuing over Corvair's rear compartment.

The car was extremely light over the front wheels, as all the weight was in the back, so no power steering was needed. Obviously, the price to pay in the case of side winds was driving with both hands on the steering, focused straight ahead. The car was dangerous even by the standards of its time, prone to severe, sudden, tricky handling even with the unusually mismatched front/rear tire pressures—more so with the all-four-same pressures people generally used out of habit or laziness.

Altogether, Chevrolet's Corvair offered a very unique pre-digital traveling experience counting on some of the most sophisticated sensors, in-cabin thermostats and pressure sensing devices: the buyers and drivers!

News Mobility

Webasto's Roof-Mount Sensor Technologies

WEBASTO IMAGE

Cameras, radar and lidar sensors are integrated into a panoramic roof of a prototype in the Roof Sensor Module solution from Webasto, based in Stockdorf, Germany. It Includes four radar sensors; four lidar sensors, and 16 different kinds of Bosch camera. The integrated solution gives automotive designers more freedom and allows them to maintain an individual vehicle architecture. "With our prototype, we are demonstrating our expertise as a system integrator. Compared to current robotaxi prototypes on the market, we can significantly reduce height and weight in an elegant roof module while integrating a transparent sunroof that brings comfort, air and light into the vehicle for passengers," explains Freddy Geeraerds, Webasto SE Executive Board member and responsible for the global roof business.

The solution is designed for automated driving and can also be combined with openable roof systems, solar technology, ambient lighting or switchable glazing. The supplier has collaborated with development partners on the Roof Sensor Module. In the field of lidar, for example, with the suppliers Bosch, Hesai, Innoviz Technologies, Luminar and Robosense. Bosch also contributed expertise in camera and radar technology for environmental detection. To ensure functionality even when dirty, cleaning systems using water and air were integrated. These come from dlhBowles and Röchling. The intelligent thermal management system comes from Delta Electronics, while National Instruments contributes a measurement system. The vehicle was presented for the first time at EXPO2022 of Plug and Play's "Startup Autobahn" innovation platform on 7 July in Stuttgart.

Project @City for Automated Driving in Urban Traffic

ZF IMAGE

15 partners have cooperated in the @City initiative to enable automated mobility in urban areas. Based on near-series technology, ZF has, for example, developed a demonstration vehicle that can autonomously stop at intersections, turn, and interact with other road users. "@CITY is another important opportunity for us to test and further develop the practical suitability of our systems based on concrete scenarios," says Dr. Andreas Teuner, Head of Development Driver Assistance Systems at ZF.

The basis is the ZF coAssist system on L^{2+}, which is already available in China. It combines camera and radar sensors with a central control unit and modern positioning technology. For @CITY, the system was supplemented by a 360-degree lidar system. This enables the vehicle to reliably detect its immediate surroundings in urban traffic. It offers functions such as adaptive cruise control, traffic sign recognition, and lane change, lane keep, highway and traffic jam assist. Continuous fusion and interpretation of sensor data enables the test vehicle to drive autonomously on a busy road, stop at intersections and turn left or right when the way is clear. In doing so, the project vehicle responds to the actions of other road users.

In the @City project, the project partners conducted research on topics including environment detection and situation understanding, localization and communication with other road users. The results generated in the subprojects were continuously incorporated into the development of automated driving functions. At the final event at the Aldenhoven Testing Center on 22 June, the initiative presented further research and development results on automated driving in the city, including interaction situations with pedestrians and cyclists, in addition to the ZF demo vehicle. The systems developed in @City are able to predict the behavior of these road users, for example, taking into account their head and body posture as well as their direction of movement.

@City partners are Aptiv Services Deutschland; Audi; Continental Automotive; Continental Safety Engineering International; Continental Teves; Deutsches Zentrum für Luft- und Raumfahrt; MAN Truck & Bus; Mercedes-Benz; Robert Bosch; Technische Universität Chemnitz; Technische Universität Darmstadt; Technische Universität München; Valeo Schalter und Sensoren; ZF Friedrichshafen; 3D Mapping Solutions, all supported by the German Federal Ministry for Economic Affairs and Energy.

General News

SWR, Xperi Partner for Radio Listening Experience

GENERAL NEWS
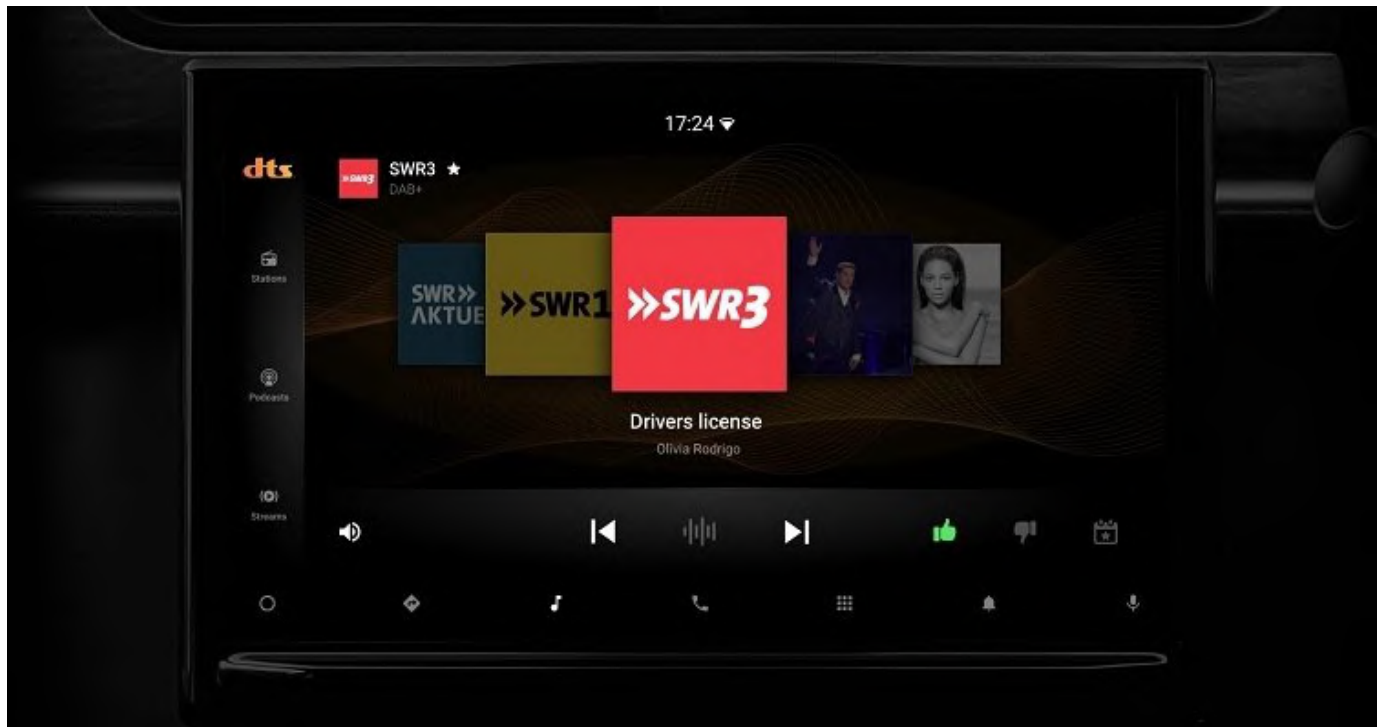
SWR, XPERI PARTNER FOR RADIO LISTENING EXPERIENCE SWR INTEGRATION WITH DTS AUTOSTAGE (BUSINESS WIRE IMAGE)

Xperi and SWR have announced the integration of the ARD broadcasters into DTS AutoStage, the first global, in-vehicle hybrid radio platform to be commercialized around the world. SWR is one of the largest media groups in Germany and the second largest broadcasting corporation in the ARD, that is the Association of Public Broadcasting Corporations in the Federal Republic of Germany.

SWR's public broadcasting stations, will be integrated, free of charge, in the DTS AutoStage ecosystem. DTS AutoStage increases consumer content engagement with bold and immersive imagery, station logos, songs, comprehensive artist and album information and more, all while making the broadcasters' content more personalized and easier to find. DTS AutoStage also enables continued station listening from local broadcast stations when the vehicle drives out of broadcast range.

The SWR/DTS AutoStage integration offers seamless, accurate and consistent delivery of all SWR broadcaster metadata in the vehicle dashboard, with the key benefit that the stations can manage their services, station information and streams all in one place. SWR and DTS AutoStage systems support broadcaster services to provide security, reliability and data compatibility with car companies.

DTS AutoStage is ISO 9001 certified and its content is sourced from more than 80,000 radio stations, 100,000 plus broadcasts, more than 40 million tracks, four million albums, one million artist bios and more – all aggregated, curated and personalized to create the richest and most relevant in-vehicle radio listening experience.

Adayo, Huawei in AR-HUD Pact

ADAYO IMAGE

On 30 June, Adayo's wholly-owned subsidiary Huayang Multimedia and Huawei held a signing ceremony around a letter of intent for Huawei's Optical Product Line Smart Vehicle Optical Business.

According to the letter of intent for cooperation, the two parties will establish a long-term, stable and rapid cooperation and exchange mechanism, give full play to their respective advantages, carry out in-depth cooperation in the field of smart cars, especially AR-HUD, and jointly develop new businesses, expand new markets, and create independent and controllable industries. Chain, together with more industry partners to build a healthy and prosperous industrial ecology, and will also achieve mutual benefit and win-win development in more application fields in the future.

AR-HUDs are aimed at creating a better driving experience. Based on real-time sensor data, key information such as ADAS alerts and navigational cues are projected into the driver field of view, interacting with and marking real world objects.