

Editorial

EE Architecture: A Crucial Discussion For The Lighting Community

Vehicle electrical architecture is evolving fast. CAN networks were first implemented on the 1986 BMW 850, if I recall correctly—almost 40 years ago. This was needed at that time with the introduction of new systems like ABS and advanced air conditioning and stereos.

With the introduction of new features—especially ADAS—much more data has to be collected, analysed, and computed. The general automotive trend is toward SDV (software-defined vehicles). Software, usually in local ECUs, is moving to central and domain ECUs. We bring you news on that front from Marelli news in this week's DVNewsletter. Surely, we'll see more and more of this kind of thing.

So: what will be the impact for our lighting components? Everybody is working on solutions; there are lots of options today. Perhaps too many.

When I joined DVN, I decided to dedicate a session to EE architecture at each DVN Workshop. In Munich, we had more than 10 lectures from major outfits like TTTech Auto, Marelli, Continental, Infineon, On Semi, Elmos, ST Microelectronics, Microchip, and Inova. This was a great success to be able to start the discussion. I received a lot of positive feedback. In Detroit, the session is already fully booked with 10 lectures.

We have the chance at DVN to have on board Thomas Froelich, former head of electronics at Marelli Automotive Lighting and Sensing, who helps us organise and chair these sessions. Two weeks ago, he participated in the automotive ethernet conference in Munich. Ethernet is one of the possible (key?) solutions for SDV, and more than 1,200 people were gathered to talk about ethernet for new EE architecture and especially lighting. You will find more information on that, from a lighting perspective, in this newsletter.

Sincerely yours,

Paul-Henri Matha
DVN Chief Operating Officer and Lighting General Editor



In Depth Lighting Technology

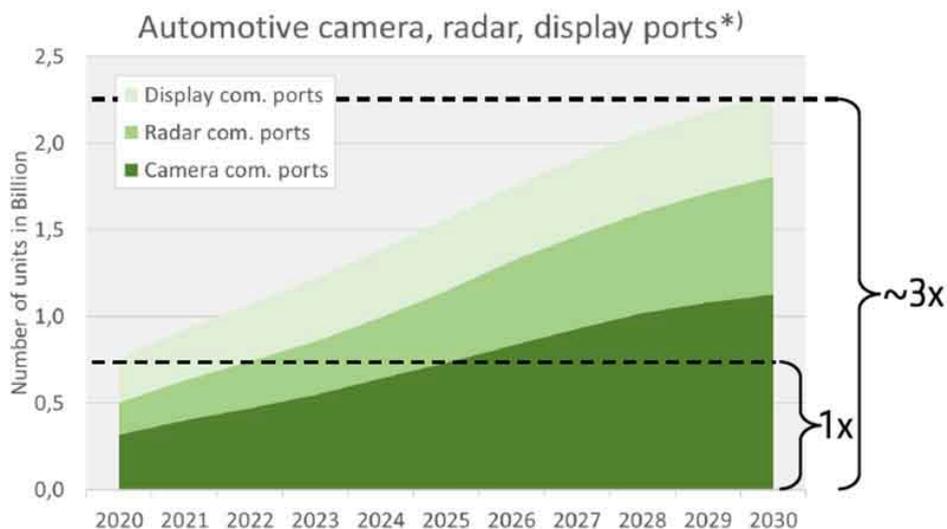
10th Automotive Ethernet Conference 2024



By Thomas Froelich

Attendance was very high: About 1,200 participants, speakers and exhibitors over the three days of the event attended at least part of the two workshops on the first day, the 2-day conference and the parallel plugfest activity.

The conference was moderated by Volvo. All participating automakers—BMW, Volvo, Audi, Renault, Stellantis—agreed the future of the software defined vehicle will need high speed ethernet as a central communication platform. This is mainly due to the fast-increasing numbers of displays, radars, and cameras used in new passenger cars. The result is a much greater amount of sensor raw data and video transmission to be handled.



*) Sources: mobility foresights, multiple semiconductor vendors, R&S, TechInsights, TSR, OLED association

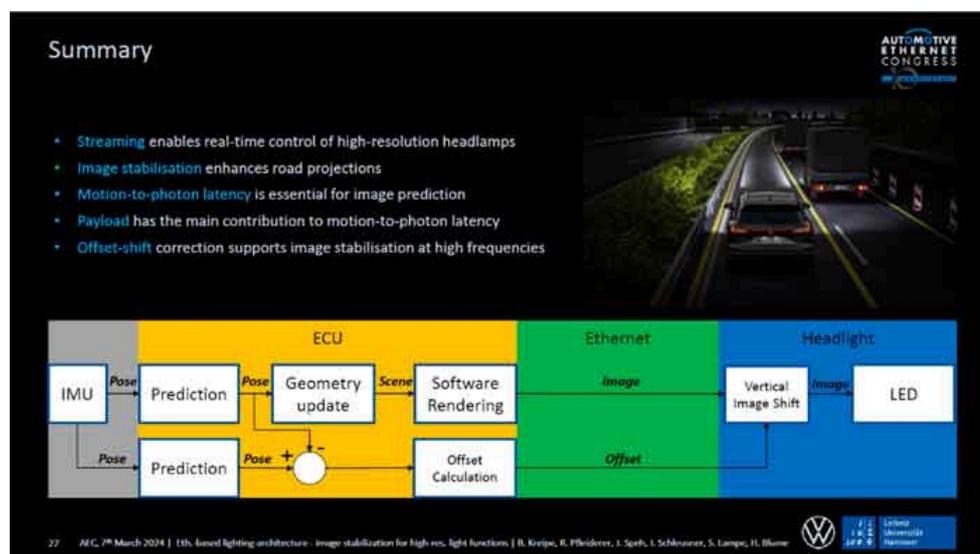
Patrice Ancel from BMW went into more detail when presenting his company's Ethernet strategy. The first use of 10BASE-T1S in production vehicles is scheduled for 2025, and the introduction of ASA-ML is planned for 2027. With the BMW 'Neue Klasse' to be introduced in 2025, they will have their first zone architecture in production, replacing today's FlexRay by 10BASE-T1S. First applications for this will be interior lighting, projectors, and rear lighting.

Nevertheless, there are a lot of things to be improved or solved to arrive at a system able to fulfil all needs. For example, Dr. Martin Hiller from Volvo presented a wish list for the future, including faster wake-up times, an improved low-power mode, and significantly higher bandwidth.

Growing the amount of software and data to be handled is also increasing the vulnerability of the system and with this the need of more cybersecurity measures. Frédéric Ameye from Renault presented—to keep costs low—the chance to remove proxies and gateways by using memory-safe protocols with Rust as the programming language.

Several presentations highlighted the new 10 Mbit/s version of automotive Ethernet (10BASE-T1S) as an enabler for the zone architecture and connecting the different domains with the central computer. 10BASE-T1S is a promising standard for the future. However, the costs are currently still too high for a real breakthrough.

Expectation of the audience (collected via Slido, just like at DVN Workshops) is that 10BASE-T1S has the first use cases for connecting interior and front lighting and sensors. Another use case is replacing CAN. The presentation of Audi's Bernhard Kreipe and Leibniz University Hannover's Richard Pfleiderer, "Ethernet-based lighting-architecture - image stabilization for high-resolution light functions" demonstrated the advantages of 10BASE-T1S:



They showed a method for stabilising high-resolution light projections in driving operation. The stabilisation of the light image is based on an inertial measurement unit that records vehicle movements in real-time. An algorithm in a central control unit continuously calculates correction values for the position and distortion compensation of the light distribution and sends this data to the lamp via Ethernet, preferably 10BASE-T1S.

The demonstrator was also displayed at the Microchip booth demonstrating the close collaboration between the companies on this research activity.



Another presentation by Volvo and NXP was demonstrating the usage of 10BASE-T1S for the next generation of radar sensors in a zone architecture.

The wide range of topics covered at AEC 2024 included focal points such as middleware & software-oriented architecture, use cases, security, PHY & cable harness, TSN and validation & testing.

One other important topic for robust usage of the ethernet communication in automotive is the harness and the related connectors for 10BASE-T1S.

Leoni presented the impact on the wiring harness by moving to a zonal-oriented architecture and how to design a robust solution enabling reliable data transmission.

Standardization of Automotive Ethernet

Shift from domain-oriented to zonal architectures

Comparison of distributed and zonal architecture - from a cable maker's perspective

	Distributed architecture	Zonal architecture
Advantages	<ul style="list-style-type: none"> Flexible to changes Clear function responsibility Function adjusted harness 	<ul style="list-style-type: none"> Less harness complexity & ECUs Potential for automated harness production
Disadvantages	<ul style="list-style-type: none"> Validation efforts Very complex cable harness Big harness variants 	<ul style="list-style-type: none"> Size of Controllers „Size“ of Software Technology overhead in entry vehicles

Source: LEONI Worldwide

Zonal-oriented architecture will require cabling technology for different speeds – right-sizing as key task

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LEONI

Rosenberger demonstrated practical wiring harness implementation and the related connectors of 10BASE-T1S applications.

Finally, the message and request by several presenters was to collaborate much more closely to enable the future in vehicle communication via Ethernet in a stable way. The communication network and related protocols will not be the differentiator for future vehicles, but could be the base of a lot of problems.

Lighting News

DVN Close-Up View: 2025 Kia K4, US-Spec

LIGHTING NEWS



The K4 is a new model for Kia in North America, expected to replace the Forte compact car when it goes on sale for the 2025 model year. An electric model called EV4 may also join the lineup at the same time. 2 versions were presented: a sedan and a 5-door hatchback.

The price of the 2025 K4 is expected to be around USD \$22,000 to \$30,000, depending on the trim and options.

Main exterior lighting features include:

- Slim low beams with 6 square rectangle 15 × 15 mm high beam elements—named 'small cube projection module'
- Amber DRL (steady-lit operation of the turn signals except when one of them is flashing)
- A chromed line in upper area of the grill that may be replaced by a lit line (European version...?)
- Side marker lights & reflex integral to front and rear main lamps
- Vertical rear reflex
- 3D shape rear lamps
- No word yet on whether the US model has separate red or amber rear turn signals or flashes the brake light.



Plastic Omnium Renames; Adds Software, Lighting

LIGHTING NEWS



Plastic Omnium, the French supplier of body cladding, front-end modules, lighting, and hydrogen components, are changing their name to OPMobility to better reflect their expanding reach. The name change reflects a shift from mainly plastic products to new business areas including lighting and software, OPM say.

Company Chair Laurent Burelle says, "The group has undergone a deep transformation, expanding its activities worldwide and diversifying its customer base, including newcomers in electric mobility. With this new name, we are addressing all the players in sustainable mobility".

OPM are the 20th-largest automotive supplier in Europe. In 2023 they had revenue of €11.4bn and a global network of 40,300 employees; 152 plants, and 40 R&D centres.

Marelli's New Light Domain Controller for SDV Architectures

LIGHTING NEWS



Marelli have developed, in China, a lighting domain control unit platform to control vehicles' front and rear lights, and all new 360° lighting features. In the future, even more lighting algorithms could be integrated into the controller. This technology will be showcased at the upcoming Beijing International Automotive Exhibition, from 25 April 25 to 4 May, along with other Marelli advanced technologies.

The mass production of Marelli's light domain controller has been introduced and proved in China's EV market. On the end node side, Marelli have introduced the 'MCU-less' intelligent driver concept, enabling the opportunity to centralise all lighting software into domain ECUs, supporting the automotive industry's trend toward SDV (software-defined vehicles).

As lighting functions become increasingly independent from dedicated ECUs, the software-as-a-product concept has reinforced the core role of software in the entire lighting system. Marelli's technological approach supports OTA updates and continuous deployment of new features for automotive lighting software, after the vehicle has left the factory.

In China, Marelli have a complete localised R&D, design, and production system. On the production side, they've devoted production facilities for electronic control units for lighting in Guangzhou and Wuhu. For R&D, there are centres in Shanghai and Wuhu to support the development of lighting control units for Chinese and global markets, while also closely collaborating and sharing design resources with design centres in Europe. This enables the company to quickly respond to market demands and provide customers with innovative, efficient and affordable lighting controller system solutions.

ZKW Premium Lights on BMW XM

LIGHTING NEWS



The BMW XM has narrow new front and rear lights developed by ZKW in Wieselburg, and they're most unusual. The dark, high-resolution LED headlamps blend harmoniously into the front of the car. And the taillights are narrow full-LED items. ZKW CEO Dr. Wilhelm Steger says, "Alongside the BMW X7, the BMW XM is the first rear lamp project with the BMW Group. We are proud to be able to incorporate our innovative lighting solutions into these premium models".

This unique project precluded off-the-shelf component usage. Due to the low height of the headlamp, a special light guide concept had to be developed. ZKW Project Manager Wolfgang Zeidlhofer says, "The development of the headlamp presented the BMW design team and ZKW with a particular challenge. It had to be as narrow as possible in order to emphasize the unique design of the vehicle". ZKW developed a split front light with two high-resolution LED modules that integrate headlamps with low beam and high beam as well as daytime running lamps with LED light guides for position lights, direction indicators and side markers (for the US version).



Technical perfection was required in very small installation spaces, and maximum dimensional accuracy and small gaps. The adjustment system for the components in the rear lamps is unique, allowing a particularly small gap to be achieved between the different light functions. However, the small installation space in the bumper for the headlamps also presented the ZKW development team in Wieselburg with a major challenge, which was successfully overcome with a space-saving design. The headlamps of the BMW XM are produced in various international ZKW plants.

MOBI Seminar

LIGHTING NEWS



Wolfgang Huhn, DVN, and Prof. Dr. Valery Ann Jacobs, Prof. in lighting at MERLIN – MOBI

Every year the VUB, the Vrije Universiteit Brussel, organizes a seminar on electric and autonomous vehicles. The 2024 event took place last Wednesday, March 27, in their prestigious Z building.

After an introduction by Prof. Lieslot Vanhaverbeke, head of the Electric and Autonomous Vehicles research group, Wolfgang Huhn from DVN gave a keynote speech, followed by the second keynote, which was given by a representative of the Ministry of Mobility in Belgium. Two parallel sessions followed. Session A was about monitoring e-mobility, autonomous mobility multi-modal systems and energy sharing ecosystems, Session B was about research results in battery technology like self-healing battery systems.

Wolfgang introduced the latest lighting technologies in his keynote, as well as the potential of interactive social displays and projection systems for communication and the important ability of branding through lighting. Lighting can make EVs cool, and they definitely need it to be more attractive to consumers.

The second lighting presentation was given by Dr. Li Ru, a postdoctoral fellow who gained industry experience at XingYu years ago, titled "Design, Optimization and Risk Assessment of Healthy Lighting for Future Automated Vehicles for Vulnerable Road Users (VRU)". Ru showed the road safety potential of lighting specifically for VRUs using the latest international research results, some of which were initiated by the GTB.



The MOBI event was a well-organized high level seminar with about 60 participants and a nice networking reception at the end. The organizers brought together lighting technology with EV and AV research results. They see lighting and light signalling as the best opportunity for a holistic approach to communication within the whole transportation system. DVN could not agree more.

Driver Assistance News

Driving Automation Systems Fail IIHS Safeguard Tests

DRIVER ASSISTANCE NEWS



The U.S. Insurance Institute for Highway Safety recently started testing ADAS in a new way, intended to press automakers to put better safeguards into their partial-automation systems.

In the initial batch of tests, systems in a wide array of auto brands made a terrible showing: None of them ranked 'Good', just one of the 14 tested systems worked well enough to be called 'Acceptable'; two were 'Marginal', and 11 got ranked as 'Poor'. IIHS President David Harkey says, "We evaluated partial automation systems from BMW, Ford, General Motors, Genesis, Lexus, Mercedes-Benz, Nissan, Tesla and Volvo. Most of them don't include adequate measures to prevent misuse and keep drivers from losing focus on what's happening on the road".

The Lexus LS' optional Teammate system was the only one to earn an 'Acceptable' grade. Optional systems available on the GMC Sierra and Nissan Ariya put up 'Marginal' showings. And those three were as good as it got; The standard-equipment systems on the Lexus and Nissan both came up as 'Poor', as did the systems in the Ford Mustang Mach-E, Genesis G90, Mercedes-Benz C-Class sedan, Tesla Model 3, and Volvo S90. Some of these models offer more than one partial-automation system—and received more than one 'Poor' grade.

"Some drivers may feel that partial automation makes long drives easier, but there is little evidence it makes driving safer," Harkey said. "As many high-profile crashes have illustrated, it can introduce new risks when systems lack the appropriate safeguards." That's a serious and growing problem, as we [described in detail](#) in our DVN Report on Tesla's so-called 'Autopilot' and 'Full Self Driving'.

The new IIHS ratings aim to encourage safeguards that can help reduce intentional misuse and prolonged attention lapses as well as to discourage certain design characteristics that increase risk in other ways, like systems that can be operated when automatic emergency braking (AEB) is turned off or seat belts are unbuckled.

"The shortcomings vary from system to system", said IIHS Senior Research Scientist Alexandra Mueller, who led the development of the new testing and rating protocol. "Many vehicles don't adequately monitor whether the driver is looking at the road or prepared to take control. Many lack attention reminders that come soon enough and are forceful enough to rouse a driver whose mind is wandering. Many can be used despite occupants being unbelted or when other vital safety features are switched off".

"These results are worrying, considering how quickly vehicles with these partial automation systems are hitting our roadways," Harkey said. "But there's a silver lining if you look at the performance of the group as a whole. No single system did well across the board, but in each category at least one system performed well. That means the fixes are readily available and, in some cases, may be accomplished with nothing more than a simple software update."

Here's how the tests work (and the systems mostly didn't):

Effective driver monitoring is essential to making partial automation safe. Systems should be able to detect if the driver's head or eyes are not directed at the road and whether the driver's hands are on the steering wheel or ready to grab it if necessary.

To evaluate the systems, IIHS testers record what happens when the DMS lens is blocked, the driver's face is obscured, the driver is looking down, and the driver's hands are not on the steering wheel. For systems that allow hands-free driving, the testers also record what happens when the driver's hands are holding a foam block the size of a mobile phone. Systems should not activate under these conditions, and, if they're already switched on, they should issue an alert.

None of the 14 systems tested met all these requirements, though the Ford systems came close. Ford's BlueCruise and Adaptive Cruise Control with Stop & Go and Lane Centering Assist immediately issued alerts when the driver's face or the DMS lens was covered, but didn't detect when the driver's hands were occupied with another task. The BMW system didn't react when the DMS lens or driver's face was covered, and the Mercedes system lacks a driver-monitoring camera altogether, though both vehicles were able to detect when the driver's hands were not on the steering wheel.

Prompt and persistent attention reminders are also key. When a partial automation system detects that the driver's eyes aren't directed at the road or their hands aren't ready to take over the steering, it should begin a dual-mode alert, such as an audible and visual warning, within 10 seconds. Before another 10 seconds pass, it should add a third mode of alert or begin an emergency procedure to slow the vehicle.

Lexus Teammate, both Ford systems, and GM Super Cruise met all these requirements. When the test driver deliberately looked away from the road and held the foam block in both hands, Teammate began audible and visual alerts after four seconds and began an emergency slowdown procedure after 16 seconds.

Both the hands-on Nissan ProPilot Assist with Navi-link and hands-free ProPilot Assist 2.0 and Tesla Full Self-Driving performed almost as well. The hands-on Nissan system, for example, provided audible and visual alerts about six seconds after driver disengagement, but it didn't provide a third type of alert until around 21 seconds had passed, when it pulsed the brakes. Seven other systems didn't provide even dual-mode alerts within the first 15 seconds.

Partial automation systems need appropriate emergency escalation procedures to minimize the danger to occupants and other road users if the driver doesn't respond to

those attention reminders. Regardless of how many different modes of alerts they issue, systems should start slowing the car within 35 seconds of driver disengagement. Drivers who ignore alerts for this long are either in distress or misusing the system. The system should send an SOS message to emergency responders or a 24-hour help centre, and the driver should be prevented restarting the automation for the remainder of the drive.

Of the 14 systems tested, only GM's met all these requirements. Five systems included two of the three emergency procedures, and another five included one. Lexus' combination of Dynamic Radar Cruise Control with Lane Tracing Assist system and the two Genesis systems all failed to take any emergency action if the driver disengaged from driving and didn't respond to repeated warnings.

Another group of requirements is aimed at ensuring drivers stay involved in decision-making. All lane changes should be initiated or confirmed by the driver. When traffic causes the ACC to bring the vehicle to a complete stop, it should not automatically resume unless the system can confirm the driver is looking at the road and no more than two minutes have passed. The lane-centring feature should not switch off automatically when the driver makes manual steering adjustments within the lane, as that can discourage drivers from being physically involved in the driving, and physical involvement can help prevent mental disengagement.

GM Super Cruise and Tesla 'Full Self-Driving' are the only ones that can make a lane change without any driver input, but Super Cruise and both Tesla systems switched off lane centring when the driver did any manual steering.

Many systems allow ACC to resume automatically after a stop of more than two minutes or when the driver isn't looking at the road. Both Tesla systems and BMW Active Driving Assist Pro would resume ACC in both scenarios, for example, while several others would restart in one of the two situations. Volvo Pilot Assist was one of seven systems that wouldn't automatically resume in either scenario.

There is little evidence that partial automation has any safety benefits, so it's essential that these systems can only be used when proven safety features are engaged, like seat belts, AEB, and lane departure prevention. For a 'Good' rating in this category, a partial automation system should not switch on if the driver is unbelted or AEB or lane departure prevention is not active. If already in operation and the driver unfastens their seat belt, the system should immediately begin its multi-mode, driver-disengagement attention reminders. Finally, it must be impossible to switch off AEB or lane departure prevention if the automation is engaged.

The hands-free Nissan ProPilot Assist 2.0, Lexus Teammate, and GM Super Cruise were the only ones to meet all these requirements. The hands-on ProPilot Assist with Navi-link and the BMW system came close, but each deactivated without issuing an alert when a real safety feature was disengaged. This is dangerous because the driver may not be aware that they need to resume full control of the vehicle.

In contrast, most of the systems fail multiple safety feature requirements. Volvo Pilot Assist, for example, deactivated without an alert when the driver would unbuckle, could be activated with lane departure prevention turned off, and remained active if the feature were switched off mid-drive. The two Genesis systems failed all safety feature requirements.

Find more information in IIHS' [video](#) about the new rating system.

Valeo opens new plant in Daegu (Korea) for ADAS

DRIVER ASSISTANCE NEWS



Valeo celebrated a major milestone with the official grand opening of its new manufacturing facility in Daegu (Korea) for the production of sensors for vehicle automation.

The opening was held in the presence of Daegu Metropolitan Mayor Hong Joon Pyo, Marc Vrecko, President of Valeo Comfort and Driving Assistance Systems Business Group, Kim Min-kyu, CEO of Valeo Mobility Korea and French Ambassador of Korea, Philippe Bertoux.

Valeo signed in July 2022 an investment agreement worth \$56 million with the Daegu Metropolitan Government to mass-produce ADAS (Advanced Driver Assistance Systems) parts, key devices for vehicles that will be more and more autonomous. The construction of the greenfield Valeo plant in Daegu began in March 2023 and the plan will start operating in early 2025.

The Valeo Daegu plant will start producing parking assistant sensors before becoming a core production facility in Asia for autonomous driving sensors, with the mass-production of key components such as ultrasound sensors, radars, cameras and LiDARs.

The production is destined for local sales as well as export to meet the growing demand of ADAS and security systems.

Marc Vrecko, President, Valeo Comfort and Driving Assistance Systems Business Group, said, "Valeo is a leader in the production of ADAS with one car out of three worldwide equipped with Valeo ADAS technology. We are honored to start the production of a whole range of key components for autonomous cars such as ultrasound, radars, cameras and LiDAR sensors in the Daegu plant (Korea) which offers a highly experienced workforce and an excellent automobile industry base. "

Valeo has been present in South Korea since 1999 and has since then established 3 R&D centres and 14 production sites. The Comfort & Driving Assistance Business Group created a South Korea Regional Operation in 2015, after experiencing steady growth since entering Korea in 2008. They have been working closely with the Korean carmakers for 10 years, and Valeo is now recognized in South Korea as a key partner for the development of ADAS.

General News

2024 World Cars of the Year

GENERAL NEWS



By Paul-Henri MATHA

I thought that Renault Scenic was the 'Car of the Year 2024'. So, what a surprise when I read last week that the Kia EV9 was the 'World Car of the Year 2024'. Then I took time to try to understand and Google is a really good friend for that purpose.

Car of the Year (COTY) is a widely-used award name. There's at least one of them in the US, and numerous around the world. The big one we're talking about here is a European award, selected by 61 journalists from 23 countries. Results were given during the Geneva International Motorshow. To be eligible for nomination, the car must be in production and commercially available in at least five European markets before 31 December of the current year.



The Renault scenic won 329 points, competing with BMW 5-series (308), Peugeot 3008 (197), Kia EV9 (190), Volvo EX30 (168), BYD Seal (131) and Toyota C-HR (127). Four of the seven finalists were BEVs, including the winner, and all finalists were full EV or PHEV versions. 2023's winner was the Jeep Avenger, and in 2022 it was the Kia EV6.

World Car of the Year (WCOTY) is worldwide award, selected by 100+ global jurors from 32 countries in Europe, America, Asia, and Africa.

Vehicles eligible for World Car of the Year must be produced in volumes of at least 10,000 units/year, must be priced below the luxury-car level in their primary markets, and must be actually on-sale in at least two major markets (China, Europe, India, Japan, Korea, Latin America, USA) on at least two separate continents within the period 1 January 2023 to 30 March, 2024.

The Kia EV9 beat the BYD Seal and Volvo EX30. 2023's winner was the Hyundai Ioniq6.



Subcategories were also awarded:

- World Luxury Car: BMW 5 Series / i5
- World Performance Car: Hyundai Ioniq 5 N
- World Car Design: Toyota Prius
- World Urban Car: Volvo EX30

All in all, key takeaways:

- BEV cars got the award.
- SUVs got the COTY and WCOTY award—no sedans, hatchbacks, or wagons.
- Lighting elements looks nice, with premium execution. These vehicles represent the general trends in exterior lighting:

Slim headlamps (maximum 20 mm high):



Homogeneous signature



Pixelization and sequential welcome



3D shapes

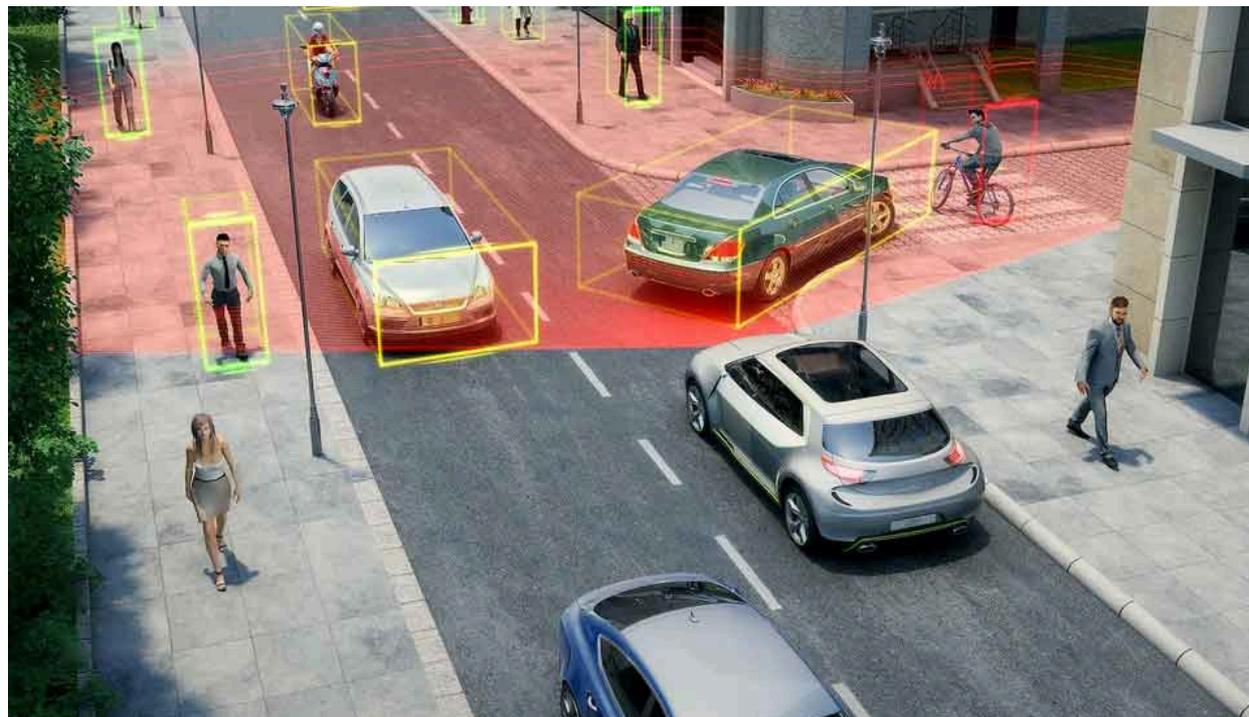


Lit grilles



Valeo + Google Cloud = Generative AI for Cars

GENERAL NEWS



Valeo announced an expansion of their partnership with Google Cloud to develop new generative AI tools and solutions. Together, the two companies are working on cloud-based best practices and innovations, aiming to address the customer's specific challenges with greater efficiency and nuance.

The use of Google Cloud's AI solutions will help Valeo to speed up and simplify their digital innovation processes, with the potential for more responsive product development and end-to-end efficiency gains. For example, Valeo plan to add Google Cloud's AI to the toolbox their software developer teams use to create, fix, optimize, and test code, so these tasks can be done faster and more productively. Valeo will also expand their use of Google Cloud's AI capabilities to increase efficiency and insight across the entire software engineering lifecycle, from requirements analysis to architecture design, to test case generation.

Other areas of collaboration between the two companies will include deploying AI tools to support higher productivity in vehicle design, production, and equipment integration, as well as quality assurance and customer service. As part of the agreement, Valeo will also use new AI tools developed by Google Cloud with their automaker customers.

Under the expanded agreement, Valeo will gain early access to Google Cloud's latest generative AI technologies, so they can embed generative AI faster and more seamlessly into their software engineering processes.

Already a partner of Google Cloud for infrastructure, data, and collaboration, Valeo conducted a hackathon in 2023 on gen AI use cases among employees with the support of Google Cloud. The hackathon uncovered numerous new use cases for Google Cloud's gen AI technology across engineering, project management, knowledge management, and industrial maintenance.

Valeo's CTO and EVP of Strategy Geoffrey Bouquot says, "Generative AI has the potential to refine and upgrade every aspect of the automotive digital value chain, but

only if it can absorb the standards, regulations, technical language, and other contextual factors that each company faces. At Valeo, we are looking forward to bringing together our deep understanding of the challenges of the automotive industry and Google Cloud's generative AI tools and expertise. Together, we will play an essential role in how we make generative AI as relevant, secure, and productive as possible to support Valeo's growth".

And Google Cloud's Managing Director for France Isabelle Fraine says, "Generative AI solutions tailored to specific companies' context offer immense potential to transform them at speed. Valeo is an innovation leader in the automotive industry and has clearly determined new models and sources of productivity with generative AI. We look forward to seeing the added value and relevance for the company that our joint technological and industrial forces will bring".