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Weekly Newsletter

DVN-I
Automotive Interior

NEWSLETTER #121

Editorial

Faurecia CEO Patrick Koller Talks With DVN

L-R: PHILIPPE AUMONT; FAURECIA CEO PATRICK KOLLER, HECTOR FRATTY

This week we've got a special treat for DVN-I readers: an interview with Forvia CEO Patrick Koller. Koller, who was CEO of Faurecia and led the merger efforts through to fruition, shares his thoughts on automotive interior and lighting trends; Forvia's commitment to climate-compatibility and zero emissions; why Faurecia merged with Hella. He describes the product synergies and the significance of Forvia being a reference interior supplier —and much, much more in this wide-ranging interview. We hope you will find it as enjoyable and informative to read as we did to build it!

Sincerely yours,

DVN

PHILIPPE AUMONT
General Editor, DVN-Interior

In Depth Interior Technology

DVN-I Interview: Faurecia CEO on Hella Synergies to build Forvia

Patrick Koller is CEO of newly-formed Forvia, having been at the helm of Faurecia since July 2016 and steered that company's merger with Hella to form Forvia, the world's seventh-largest automotive supplier. Forvia specialize in seating; interiors; electronics; lighting; clean mobility, and lifecycle solutions. This is an auspicious time to talk and listen with him, and he graciously granted an interview with DVN CEO and lighting general editor Hector Fratty and interior general editor Philippe Aumont.

DVN: We're in a time of great change, with climate change driving a push for sustainability; Covid outbreaks and lockdowns in China; Russia's war on Ukraine; semiconductor shortages; inflation, and social tension. In that context, do you confirm your target of €33bn in 2025?

Patrick Koller: Regarding climate change, I am proud that Forvia are the first company in the automotive industry to have its net-zero emissions target approved by the Science Based Target initiatives' (SBTi) on June 6th. It means that together Faurecia and Hella will reach net zero emissions by 2045, confirming Forvia's leadership in our sector. Forvia are the world's seventh largest automotive technology company. Based on the 2025 forecast of 91 million vehicles per year, we confirm our target. As we announced the divestment of €1bn worth of assets (representing €2bn of sales) before end of 2023, the forecast is at €31bn.

DVN: How long did your acquisition target list include Hella? How did it wind up being the pick?

Patrick Koller: Regarding Faurecia, Hella have an interesting technology portfolio for battery-powered vehicles and electronics; lighting is a cherry on the cake. Our strategic plan for mergers and acquisitions was designed to extend our electronic capabilities quickly. Hella were one of those M&A targets; their electronics expertise and capacity are helping Faurecia to reach critical mass in automotive electronics. Combining Faurecia and Hella are positioning Forvia strongly on battery and fuel cell electric vehicles. Together, we have a market-leading expertise in solutions for hybrid powertrains to support customers moving from ultra-low to zero-emissions mobility.

INTERIOR LIGHTING FROM HELLA

DVN: Can you tell us about the product synergies you see in lighting and interior?

Patrick Koller: One obvious synergy opportunity is in interior lighting. And beyond pure lighting, it includes any surface within the interior, where the combination of materials, lighting, and sensors will create functional, active surfaces, allowing new opportunities for HMI. Hella are also deeply involved in seating electronics. They are involved in radomes, where composite capabilities are important, they are very much involved in egress systems including door entry systems. Overall, Hella are expanding their electronics offer. The additional software expertise brought by Hella enables us to grow the electronic business from €1bn to €7bn by 2025.

DVN: After the competition between Faurecia and Plastic Omnium to acquire Hella, how do you see the future of HBPO (Hella Behr Plastic Omnium)?

Patrick Koller: For HBPO, Plastic Omnium have a change-of-control clause whereby they can take over Hella Behr shares.

DVN: Forvia is now a big lighting supplier. What does that mean to you?

Patrick Koller: Unlike many other kinds of automotive components, lighting is a sophisticated product with high technology content and particular tooling needs. Hella are one of the leaders and have the technology and the tooling to prove it. Many innovations are arriving in the market and after LED light sources, we have now the precise matrix light.

MATRIX LED HEADLAMPS WITH GLARE-FREE HIGH BEAM IN AN AUDI A8 (HELLA IMAGE)

There is a lot of innovation now to develop communication with light projections, which will improve safety not just for the driver but also for pedestrians and other road users.

DVN: Some are thinking that tier-1s will increasingly have to deliver the entire front end including headlamps and illuminated grilles. What do you think of that, and what will be Forvia's approach?

Patrick Koller: Now, front ends should be called front (lighting) panels, as they no longer have the structural role front ends had in the past. As electrification is extended, the area in between headlamps can be used differently than cooling air intake in traditional ICE cars. This module includes a radome (structure protecting radar equipment and made from material transparent to radio waves). A front panel, as a module, could exist with or without headlamps. This wide module the width of a car—is using mostly polycarbonate and coating technologies. It unlocks a new commercial approach for headlamps. Hella already have contracts with premium German automakers. Our plant in Slovenia focuses on the front panels with PC surfaces several times bigger than headlamps, and is now producing panels for Mercedes-Benz and Škoda. The plant is a standard-setter, and is regularly visited by automakers.

HELLA FRONT PANEL FOR EVS (FORVIA IMAGE)

DVN: As we know, it is not always easy between electronic and mechanical engineers. Now the software guys are the third partner with a strong and rising importance. How do you best recruit and integrate them all?

Patrick Koller: Of course, mechanical and electronic engineers are different. But at the end of the day, engineers are interested in technology. What is important is the content of what they have to develop. They are looking for innovative, state-of-the-art technology—it doesn't matter if it's seating, interiors, or lighting. Engineers respect technology. They want to work at a technology company. These synergies between Faurecia and Hella will retain the talents, and will help Forvia to attract new ones. What is also important for attracting talent is location. It's important to be present in key technology hubs, such as Paris and Berlin.

DVN: What kinds of changes do you foresee in the automotive market?

Patrick Koller: Cars will always be a source of freedom of movement, so the passenger car is here to stay. However, the automotive market is going through a paradigm shift. It starts with the powertrain. The main challenge is in cost. The other challenges are around climate protection and CO_2 neutrality, progressive automation of vehicles, and vehicle lifecycle management. OTA will be enough to update the product along its life; it allows ongoing update of the electronics. Forvia are developing everything in less than 20 months. Major innovations will center around:

• Road projection, to help the driver and occupants focus on what is important, like a vulnerable road user next to the car.
• Front and rear panels, as discussed earlier.
• Longer lifecycles through OTA—fewer facelifts every 3.5 years to reduce R&D/investment costs.
• Interior lighting which will be more and more important
• The cost of vehicles can't keep going up. I believe in the future of hybrid vehicles, hybrid hydrogen, and battery electric powertrains with 150 km range in electric, and 300 km in hydrogen.

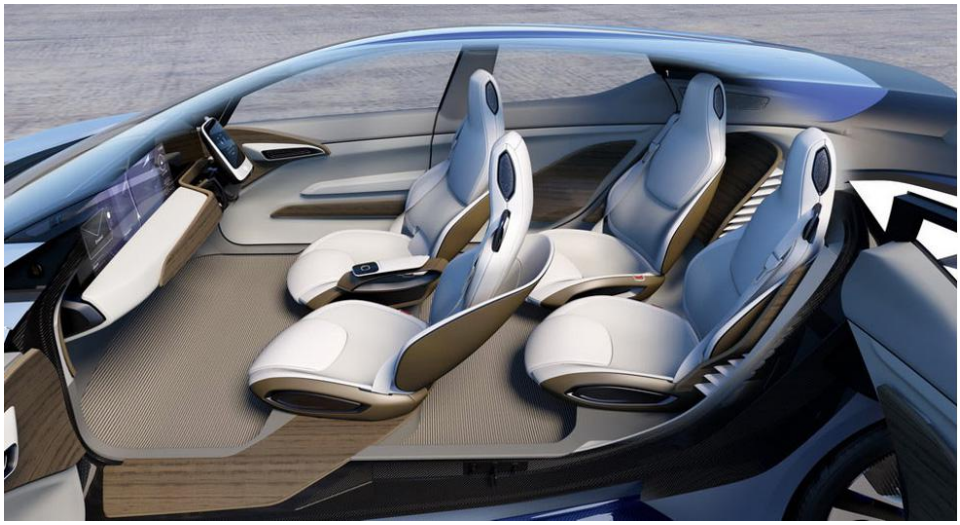
FAURECIA CONCEPT INTERIOR

DVN: How do you handle sustainability and carbon neutrality?

Patrick Koller: Faurecia created a sustainable materials division. Bio-sourced materials are a very effective way to generate carbon-negative contributions to the overall CO_2 equation. The challenge is to develop the right injection processes for these diverse materials, and the material variability most likely inherent to natural materials. It applies mostly for Interiors. CO_2 will probably force us to rethink modules design. We should aim for a product defined around sub-modules (maximum ten) to be clipped/assembled online. And it would have the benefit to be exchanged all lifecycle long. And even changed for model updates. We are aiming for an average of 30 per cent recycled plastics (polypropylene) by 2025. We must develop and finance the value chain to sustain this target. When it comes to carbon fiber, we have progressed with the "Force" project, to source carbon fibers intended for use in various structural applications, like seat frames, cross-car beams, etc. Hydrogen mobility is also key, and a cornerstone of the energy transition. We produce hydrogen storage systems, and through Symbio, our JV with Michelin, we are present in 70 per cent of the hydrogen value chain.

DVN: What can you say about competition?

Patrick Koller: Beyond the traditional well-known competitors like Yanfeng; Antolin; IAC, and SMR, I have to mention Hasco in China. Hasco produce seating, interior, lighting, and they are in electronics in a JV with Visteon. Even if costs are getting higher in China, as an example I was recently in Mexico, where total labor (direct + indirect) is lower than China.



FAURECIA CONCEPT INTERIOR – SWIVELING SEATS

DVN: What are the major shifts you see in car seats?

Patrick Koller: Seating has two different businesses; seat frames and complete seats. For structures the most important is CO_2 and weight reduction, and it will need mechanisms to support the swiveling function of the seat, longer track to support flexibility within a more automated vehicle. As far as complete seats are concerned, the JIT model is probably becoming obsolete. It becomes difficult to finance it, especially with high inflation. Sustainable, vegan materials must be visible; customers are ready to pay for it!

DVN: What is key to be the reference interior supplier?

Patrick Koller: For interior parts, we are also experiencing a change of paradigm. Interior suppliers had the impression they were developing products, where their focus was on transforming materials; even airbags or storage features are real products. Nowadays, we must be able to offer design freedom to our customers, therefore we need to have all the technologies to answer any design need. If you look to some premium vehicle interiors, you'll see huge pillar-to-pillar screens. Innovation must be driven by customer needs, not engineering dreams. HMI should go in that direction, with one single large screen, complemented with reliable touch, gesture and vocal technologies.

DVN: What about DMS-OMS (driver and occupant monitoring systems)?

Patrick Koller: DMS Is a question of sensor fusion in the cabin. We want to go beyond safety and drowsiness detection. We're expanding DMS to health, aiming to detect any crisis (faintness, epilepsy). That's what drivers can expect.

DVN: Thank you for your time and thoughts, Mr. Koller, we are watching for great things from Forvia!

Interior News

Bentley's "Airline" Seat

INTERIOR NEWS

BENTLEY IMAGE

Bentley says the new "airline" seat optional in the Bentayga EWB SUV is the most advanced car seat ever in the world. It has 22 adjustment modes, an automatic climate sensing system Bentley says has never been done before, and advanced postural adjustment technology.

When a rear-seat passenger selects a desired temperature, sensors in the seat sense passenger temperature and surface humidity with an accuracy of 0.1°C, every 25 milliseconds. The system can then determine whether to apply heat, ventilation, or both to keep the passenger optimally comfortable; Bentley calls it "thermal wellbeing". At first the seat works to bring the seat and its occupant up or down to the desired temperature as quickly as possible; the system then maintains optimal thermal comfort throughout the journey with micro adjustments to maintain the setpoint.

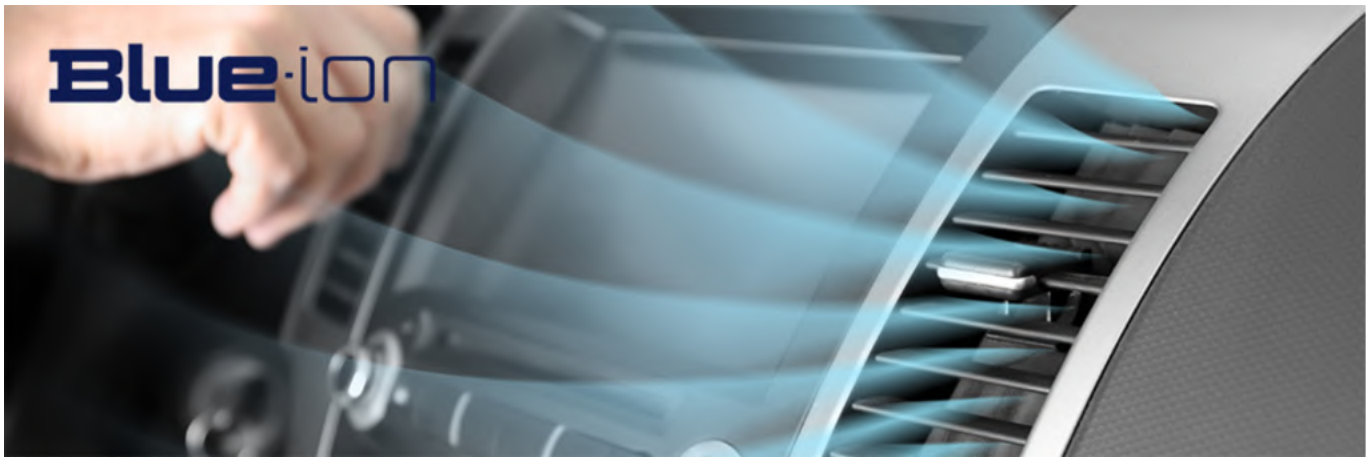
This auto climate system has seven setpoints—neutral plus six others—and the ability to prioritize just the back or cushion area. The seven setpoints are not linearly spaced, and have been derived from extensive passenger testing in combination with leading research in this field. Based on the clinical data, trials observed: 75 to 80 per cent of people will use the neutral setpoint all the time, which delivers the optimal comfort targets established by testing different passengers and different environments.

The postural adjustment system uses pneumatic activation zones to regulate the contact pressure between the seat and the body, reducing fatigue. Bentley collaborated with chiropractor and with seat supplier Comfort Motion Global (CMG) to develop the system.

There's a cushion extension and electrically-adjustable height adjustment for the head restraint, and users can lean back by 40 degrees.

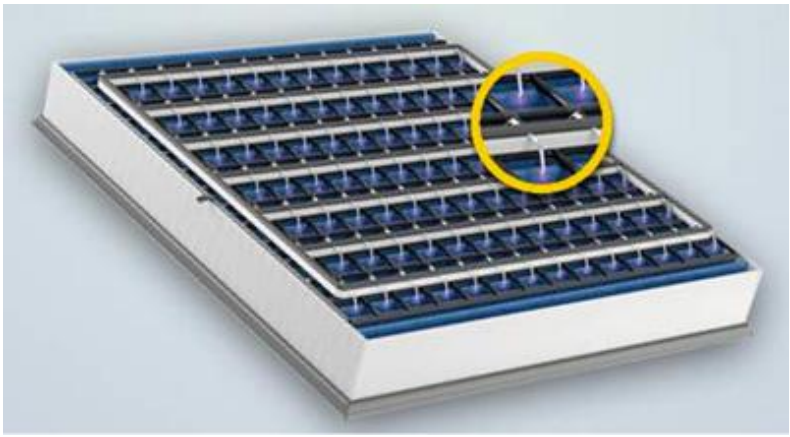
Hengst's Ionized, Polarized Cabin Air Filter

INTERIOR NEWS



HENGST IMAGES

About 300,000 liters of air per hour pass through a vehicle's HVAC system into the cabin—along with whatever-all pollutants, allergens, and odors are in the immediate environment. According to studies, this results in about five times more exposure for occupants than at the roadside, on account of the car cabin's closed space. Awareness of the importance of IAQ (interior air quality) for health and driving safety has increased quite substantially since the pandemic reminded us all of the havoc airborne pathogens can wreak.



The newly developed Blue.ion electrified cabin air filter from Münster, Germany-based Hengst, achieves particularly high separation rates at FFP-2 level thanks to an upstream ionizer. It thus reliably protects vehicle occupants from ultra-fine dust; bacteria, and viruses. In addition, the polarization of the filter ensures constant filtration performance over the entire filter service life. Thanks to its space-saving design, the system can also be retrofitted into existing installation spaces.

When designing cabin air filters, there are conflicting objectives to combine the lowest possible flow resistance with filtration of the finest particles in a given—often cramped—installation space. Particularly with HEPA filters, the desired filtration performance often comes at the expense of installation space or blower performance.

The new Blue.ion filter boasts permanently high, energy-efficient filtration performance, which is achieved by a combination of ionization of the particles in the air stream and polarization of the filter medium. In detail, this means that the ionizer is located directly in front of the cabin air filter. It achieves uniform charging of the particles in the air stream in a very small installation space. The electrically-charged particles can be better separated by a specially selected filter medium.

In addition, the charged particles partially agglomerate, clumping together so they are better sequestered in the filter. Thusly, filtration can be achieved that would otherwise require filters with significantly higher flow restriction. Polarization ensures that the improved filtration performance is maintained at a constant level over the entire service life of the filter.

Forciot's Steer Grip Detection Supplements DMS

INTERIOR NEWS

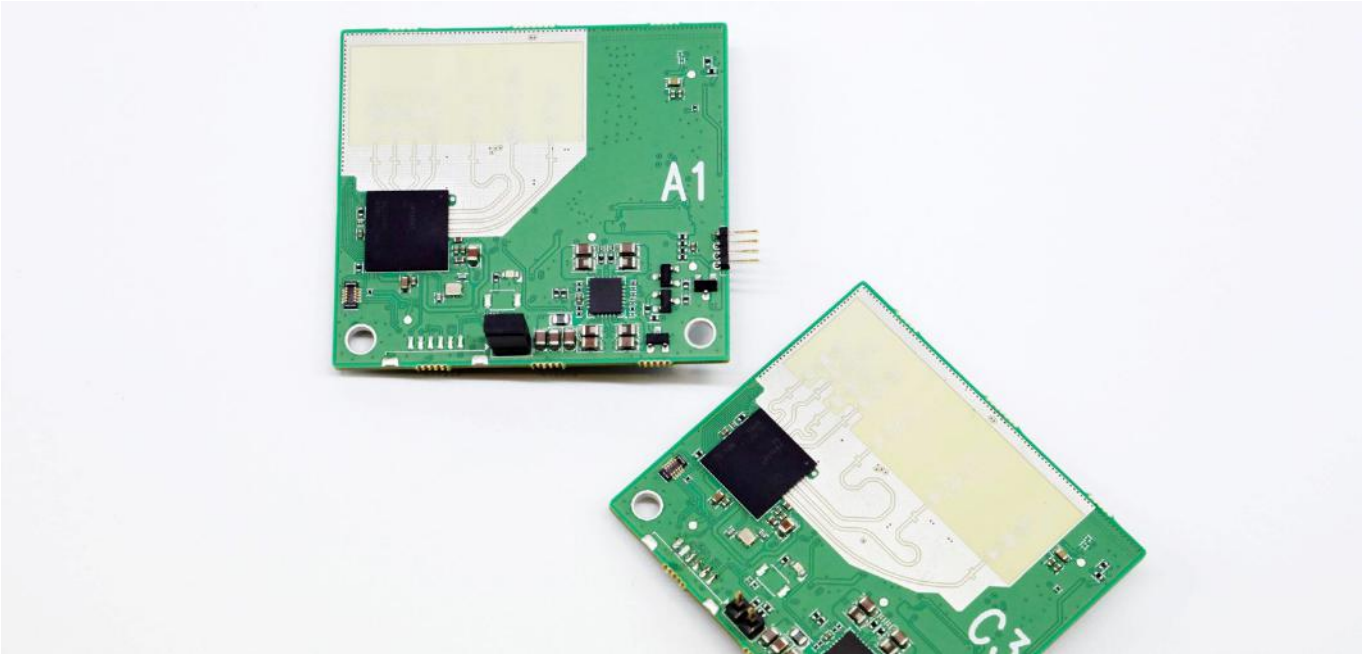
Forciot, based in Tampere, Finland, have developed a system called GRIP, which brings advanced grip pressure detection on the steering wheel—and now also a printed, stretchable heating element, as an all-in-one -solution for enhanced safety and user experience.

The maker says GRIP revolutionizes steering wheel solutions by providing accurate force data in all conditions with multiple sensing zones, allowing design freedom to easily integrate into surfaces of any size, shape, and material. It also detects gentle wheel contact reliably even with gloves on, and reduces costs by combining the printed stretchable heater element and pressure sensing for grip detection.

The EU General Safety Regulation (GSR) includes DMS requirements, which GRIP responds to; distraction and drowsiness recognition data is derived by its measuring the driver's grip and movement. It likewise supports recognizing driver availability; detecting dangerous behavior from sudden or illogical movements; warning the driver when they're distracted and not gripping the wheel appropriately, and identifying static and dynamic poses.

LG's High-Resolution In-Cabin Radar

INTERIOR NEWS



LG INNOTEK IMAGE

LG Innotek has developed a new in-cabin radar module they say outperforms existing systems. The module is used to detect the presence or movement of people or pets in vehicles, and can be used to prevent vehicle burglary or children being left behind in parked cars. LG Innotek is an affiliate of LG Electronics, specialized in electronic, camera, 3D sensing, lighting, display power solutions for many industries, including automotive.

In Korea, the installation of safety devices that can check if children remain in a vehicle has become compulsory for all minibuses transporting children. Europe also plans to add a child presence detection test to its standards for new automobile sales starting in 2023. The US is also pursuing the mandatory installation of child presence detection function from 2025 to prevent parents from leaving their children alone in the car.

LG Innotek says radar has several advantages for child presence detection, perhaps most of all its ability to penetrate obstacles such as clothes and blankets to detect a living organism. Since it uses radio waves instead of images, it is free from privacy infringement issues. Unlike pressure sensors and ultrasonic sensors, radar modules do not need multiple sensors to function with high sensitivity. In autonomous vehicles, radar can play different roles on behalf of the driver, such as checking the fastening of seatbelts and notifying passengers when they should leave the vehicle.

LG says their in-cabin radar modules have increased the resolution by approximately 40 per cent over existing products, and signal processing time has been reduced by 30 per cent. These improvements were achieved by dint of a proprietary antenna design and a weak signal detection algorithm, that filters noise and uses only valid signals. The company also used digital transformation technology to optimize the antenna layout, achieving antenna performance 1.3 times higher than before with the same number of antennas. They've also been able to minimize signal detection errors, and to develop their own software that increased the sensitivity to weak signals, further improving the product's precision.

Microchip Technology Knob-On-Display

INTERIOR NEWS

MICROCHIP TECHNOLOGY IMAGE

Somewhere there's a good balance between pure-touchscreen user interfaces and tangible, movable controls. Arizona-based Microchip Technology say they've got it, in the form of their maXTouch Knob on Display (KoD) family of touchscreen controllers, which they say are the first automotive-grade touchscreen controllers to natively support the detection and reporting of capacitive rotary encoders as well as mechanical switches on top of a touch panel.

Unlike traditional mechanical rotary encoders, the technology enables the mounting of a knob directly onto a display without an opening in the panel, or any customization of the touch pattern, increasing design flexibility and system cost savings.

The company states that KoD technology eliminates the need for custom touch sensor patterns, providing designers the ability to implement a different knob count, shape and position to accommodate a variety of end-user products. The customized configurations are adjustable without changing the embedded firmware of the maXTouch KoD touch controller. The controller allows designers to keep the comfort of a rotary encoder input device but combine it with a modern and innovative interior design using smart surfaces and multi-touch displays.

With the release of the maXTouch KoD family, Microchip offers two variants to allow customers the design freedom and flexibility to choose how they will implement the capacitive rotary encoder. The KD variant enables customers to choose their knob design partner and create their own solution using a reference design jointly developed with BNL Bearings—offering the option to fully customize the design for specific applications.

Speaking of which, DVN previously reported on the **Ford/Preh solution** presented at the DVN Interior Workshop in Köln.

New HH GT Model Has Touchscreen on Robot Arm

INTERIOR NEWS

HUMANS HORIZONS IMAGES

After the Hiphi X, the next model from Shanghai-based automaker Human Horizons is on the…well, it's on the horizon! The futuristic digital GT Hiphi Z puts its weight on interaction with the occupants as a USP, and is meant to update the traditional idea of a GT with modern techniques. The promise is what HH call a "next-generation driving experience".

Inside, car has a futuristic, spaceship-like digital setup with the Hiphi Bot, an AI "companion" which HH claims can automatically adjust every aspect of the driver and passenger experience. There are soft fabrics; flowing ambient lighting, and a 23-speaker audio system and racing bucket seats.

To interact with the occupants, the Hiphi Bot uses a combination of visual; audible; tactile, and olfactory effects. What's more, the car is equipped with a vehicle-mounted robotic arm. Mounted on this is the touchscreen, which "looks" at the driver or passenger when they speak to it. The robot arm can move in four degrees of freedom and eight directions for this purpose. HH says the accuracy is as fine as 0.001 mm, so it can perform delicate movements with little noise. There are currently no pictures of the arm in action; stay tuned.

According to HH, the driver assistance system—developed in house—has double redundancy for the six main systems: computer; perception; communication; brakes; steering, and power supply. The Hiphi Z incorporates

an Nvidia Orin X chip that powers the QNX-Neutrino real-time operating system. With 34 sensors and lidar, the system scans the environment, enabling assisted driving and parking.

On the outside, the Hiphi Z is equipped with the world's first all-around light curtain: 4,066 individual LEDs which can interact with passengers; the driver, and the environment. The doors feature an interactive system and ultra-wideband wireless communication technology which automatically detects people; keys, and other vehicles.

HH plans to announce the car's official launch dates at the Chengdu Auto Show next month.

The Design Lounge

Audi's Future Interior Design Trends

THE DESIGN LOUNGE

NEW CONCEPT AUDI A5 2022

In Audi's view, new technologies are changing people and the way they move, via the transition to e-mobility, the potential for automated driving, all-encompassing digitization, and with it, the networking of car and world. The company notes that this will not only impact the construction of vehicles, it will also revolutionize the design of the brand's future models and, consequently, the design process.

In the past, it was often the bulky combustion engine—usually positioned in the front of the vehicle—that determined the basic proportions of the vehicle body. The interior was required to be functional and high quality: a control center, often compact and subdivided by the center tunnel and control elements. This saw a symbiosis of conflicting parameters: seat comfort suitable for long-distance trips versus lateral acceleration, space for passengers versus a sufficient luggage compartment, a bright sense of hominess versus multifunctionality in every corner.

In EVs, the motors tend to sit on the axles; the battery is in the underbody area, and the dimensions of the vehicle cabin in the middle are growing. Furthermore, Audi suggests that in the future, if cars can drive fully or partly autonomously, steering wheels and pedals may disappear. User convenience and connectivity are said to be increasingly important, inspired by smartphones. So Audi feels car design is more and more becoming experience design with the objective of creating experiences for the user. The critical questions include:
• What demands are users making of us? Do they want to be able to work in the car, read, or sleep?
• What purpose are we designing the car for? Long distances? Cities? Leisure? What does the appropriate interior need to look like for that?

Audi says in the future, the interior should therefore no longer be just a functional control station for the driver, but should instead reflect individual needs and integrate countless functions as smoothly as possible. Various operating philosophies—language and gesture control as well as touch-sensitive surfaces—will replace

traditional switch panels and rotary wheels. Consequently, the interior of the future will set new standards for integration of technology, spaciousness and feel-good ambience. As a result of this philosophy, the interior will set the pace for vehicle design overall.

"With respect to both the design and the essence of the brand, a successful synthesis of architecture, design vocabulary, and materials in the interior is a distinguishing feature of every Audi – that will only be reinforced in the future," says Audi interior design head Norbert Weber.

Plastic Autopia

THE DESIGN LOUNGE

1963 STUDEBAKER AVANTI INTERIOR (THEAVANTI IMAGE)

COFFEE CORNER
DVN
Interior

Like cigarettes, plastic was yesteryear's glamour…today, quite the opposite. The inexpensive petroleum derivative, free of any preconception regarding its use, could be moulded into any shape and thus plastic became the expression of postwar consumerism.

Unlike associations to household products, its huge impact to the automotive sector—plastic cars do not rust!—varied from exotic supercars all the way to something that most of us drove, at Disneyland's car ride called Autopia.

The exploding American car market over the 1950s brought some masterpieces based on plastic and its processes. From the 1949 Glasspar G2 sports coupe, build on a Willys Jeep chassis, to the Studebaker Avanti which long before Tesla, had the grid below the bumper, all the way to (of course) the Corvette being the long survivor of this trend. Devin's most popular roadster model proposed a modular system of components that could perfectly fit different chassis to give an often-stunning aesthetic result. Curiously, by minimizing the excess capacity of this novel material/process, Devin's success story was founded on a very a strong vison of sustainability! The Muyers Manx, curvy for purely structural reasons, became its own design-identity and equally an archetype, next to a lot of fake and very unsustainable Ferrari and Lamborghini car-body kits mounted on Pontiac Fiero chassis (nothing new there; before it was the Fiero it was the VW Beetle).

With so much new digital technology arriving daily in our lives, it is hard to imagine that something as simple as a new material could spawn an entirely new industry and market, lasting for decades. Over the years, we have invented materials and properties for the corresponding applications to serve the market. Today, more than ever before, the purpose is clear and universal: sustainability. All we need to do is look back get inspired and breath enthusiasm into inventing the right cost-effective materials for the ever-aspiring excitement of enjoyable driving.

News Mobility

Hella's All-Electric Brake-By-Wire Pedal Sensor

NEWS MOBILITY

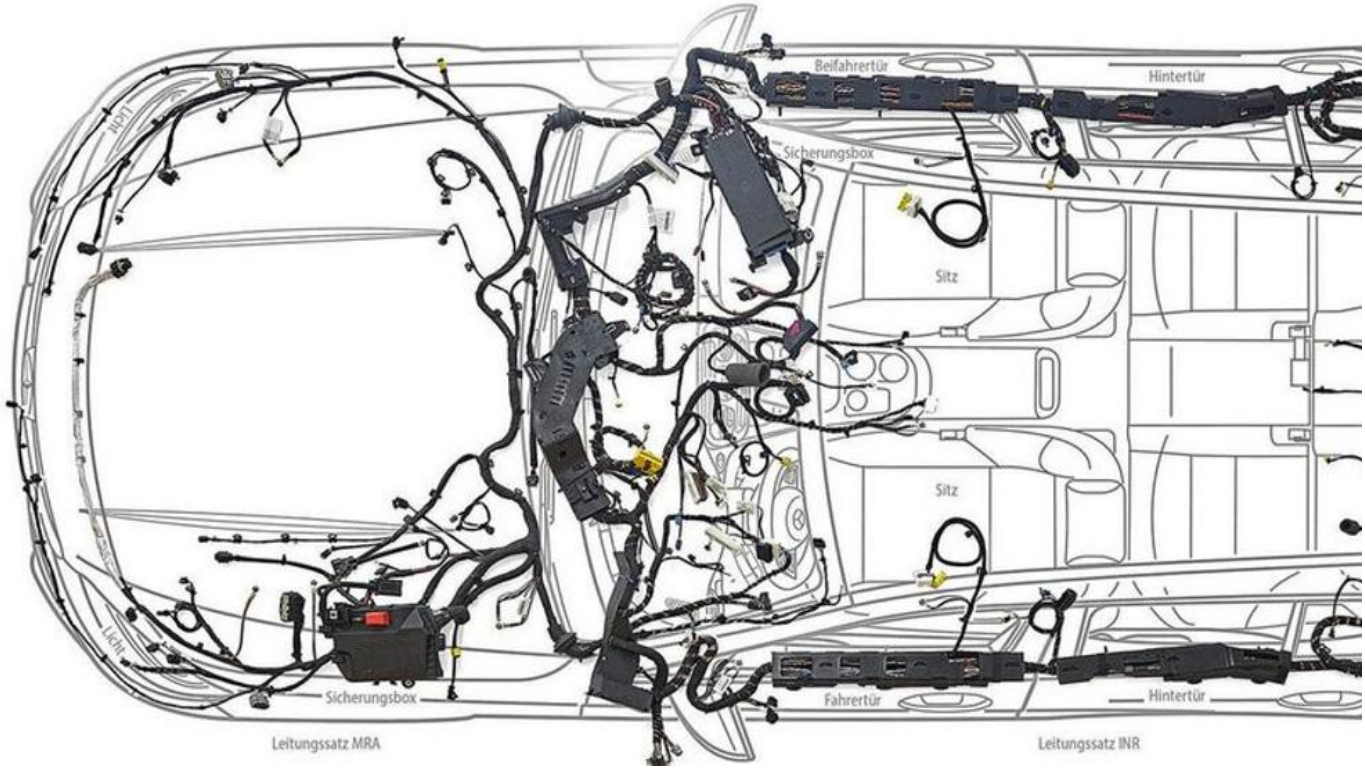
Hella has received an order from a major German car company to develop and make a fully electric brake pedal sensor for a high-volume production vehicle. Brake-by-wire technology transmits brake commands electrically rather than mechanically—and this will be the first time brake-by-wire has been used in large-volume series production.

The sensors are slated for start of production in 2025 in Hella's European production network.
The brake-by-wire pedal simulates the feel and behaviour of a conventional braking system in which the pedal is mechanically connected to the brake system. As the brake commands are controlled electronically in Hella's by-wire solution, functionalities of automated driving are supported. In addition, a customer-specific setting of the brake function is possible: the brake force can be specifically adapted depending on the driving scenario. Component weight is reduced by up to 20 per cent compared to a conventional setup. In addition, installation costs and the number of variants are reduced.

At the same time, Hella is pushing ahead with the development of their Cockpit of the Future—one of the central trend topics which Hella and Faurecia are addressing together under the Forvia umbrella, "With our by-wire technology, many bulky hardware components are eliminated. For example, the brake rod has always been a neuralgic point of vehicle design," says Björn Twiehaus, who is responsible for the global electronics business in the Hella Management Board.

New Electric Safety Requirements Due to Automation

NEWS MOBILITY



CONVENTIONAL ONBOARD POWER SYSTEM ARCHITECTURE (LEONI IMAGE)

The vehicle electrical system is currently being re-evaluated, driven by new safety requirements, attempts to save weight (lower CO_2 emissions), and add new driving and comfort functions. Some components are being dropped and new ones added (e.g. modern battery technology and DC/DC converters instead of the conventional generator).

Increasingly complex cabling and new components for energy distribution influence the structure of the onboard energy network. In addition, safety concepts must also be newly created or evaluated at this level. Functional safety and the requirements derived from it are a decisive factor in the evolution and further development of the onboard energy network.

For example, lights, airbags, DMS, wipers, brakes or steering assistance, must be classified as safety-relevant. This means that the power supply to these systems and components must be ensured. The random hardware faults of the on-board power system components must be identified, analyzed and their impact evaluated. The result is included in the required metrics of ISO 26262.

In order to develop a common understanding of the challenges ahead and the requirements to be met, the VDA 450 project group "Energy Wiring Systems for Highly Automated Driving" was set up, involving OEMs and suppliers. The aim is to develop a generic safety concept, derive the safety requirements and make them available on system elements. A recommendation from the working group is expected by September.

One of the best-known faults that can have a direct impact on other safety requirements is the short circuit of an electrical line or component to vehicle ground. This can result in a critical undervoltage for a certain time in the entire on-board power system, which could cause a functional failure of all safety-relevant components. State-of-the-art fuses are installed in many vehicles to protect the line from fire or similar. However, problems can arise if the fuse does not blow quickly enough or the onboard power system is not designed appropriately to prevent critical voltage drop.

Some vehicle manufacturers install semiconductors for these known fault cases, which can prevent the flow of energy to a short circuit within milliseconds and thus keep the vehicle electrical system stable. However, these additional mechanisms increase costs and necessitate reevaluations of existing proven-in-use arguments.

General News

Valeo, French Research Center in Mobility Tech Pact

GENERAL NEWS

CNRS PRESIDENT ANTOINE PETIT (L); VALEO CEO CHRISTOPHE PÉRILLAT (R)

Valeo and the French National Centre for Scientific Research (CNRS) have signed a five-year framework agreement outlining their cooperation on shared research programs. The partnership aims to accelerate the development of innovations that will lead to cleaner and safer mobility for people and goods.
The new framework agreement includes the launch of new research projects and theses and may also lead to the creation of joint laboratories.

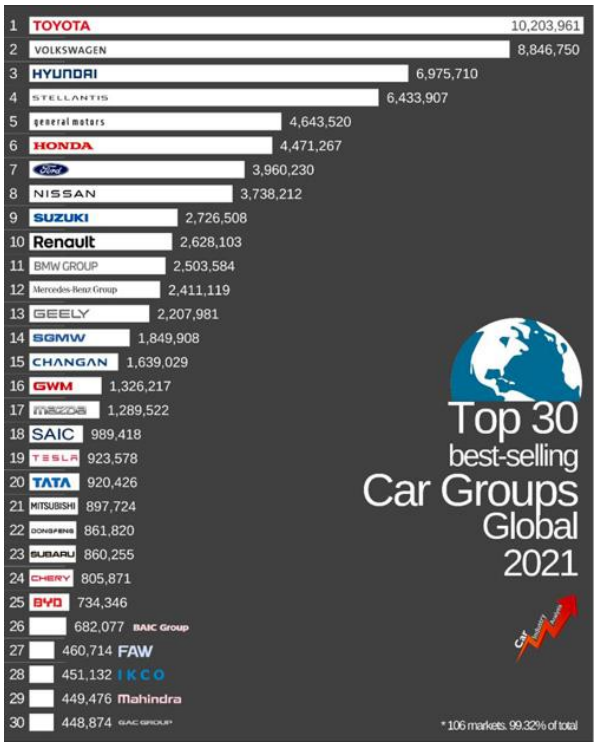
The automotive industry has been of strategic interest to the CNRS since the end of 2019; 1,000 researchers are working on related projects across 200 laboratories, and 100 start-ups have already been created in the sector, directly or indirectly by laboratories under the umbrella of the CNRS, including some 30 joint laboratories set up with corporate sponsors.

The research conducted by CNRS and Valeo will focus on sustainable design, artificial intelligence, intelligent systems, cybersecurity, data science, inclusive cities, and new energies. Valeo CEO says "In the next ten to fifteen years, the mobility space as a whole is set to undergo the biggest transformation in its history, and this transition to cleaner and safer vehicles is essential. In fifteen years, vehicles will be fundamentally different from today's vehicles. Valeo's mission is to develop these technologies, ensuring they are accessible to everyone, while achieving carbon neutrality".

Top Automakers and Suppliers for '21

GENERAL NEWS

Following publication of all automakers' 2021 figures, ranking of all these car makers in number of vehicles produced, has been made by several research institutes and car magazines.



Besides the traditional comments about the Toyota-VW battle, it is interesting to notice several facts:

- Hyundai Group is now ranked № 3;
- 12 of the top 30 automakers are Chinese, in a very fragmented Chinese market;

- Tesla is now № 19, far below its ranking by capitalization;
- Renault-Nissan as a whole would be ranked № 6;
- Two Indian groups are included in the list (Tata, Mahindra), and
- One is in Iran—IKCO, Iran Khodro.

Similar ranking for tier-1 suppliers show a stable situation, rocked only by the arrival of Forvia as № 7—adding the strengths of Faurecia and Hella. Except BASF which is mostly a chemical company, this top 10 reflects that electronics is driving the tier-1 supplier world:

TOP 10 GLOBAL SUPPLIERS

As ranked by 2021 original-equipment parts sales to automakers worldwide (sales in billions)

	Supplier	(2020 Rank)	Sales
1	**Robert Bosch**	-1	$49.14†
2	**Denso Corp.**	-2	$43.57†*
3	**ZF Friedrichshafen**	-3	$39.30
4	**Magna International**	-4	$36.20†
5	**Aisin Corp.**	-5	$33.48†
6	**Hyundai Mobis**	-7	$29.07
7	**Forvia****	ó	$25.88†
8	**Continental**	-6	$24.20†
9	**BASF**	-13	$21.35*
10	**Lear Corp.**	-9	$19.26†

†Fiscal year
*Estimate
**Forvia is the new combined entity for Faurecia and Hella.
Source: Automotive News Research & Data Center