



## Editorial

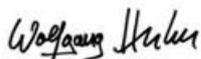
### ZKW On The Move

DVN visited ZKW in Wieselburg, in the scenic Mostviertel in lower Austria not far from Vienna. Udo Hornfeck has been ZKW's CTO since last March, having come over from wiring harness supplier Leoni. Our visit was perfectly arranged by Udo's assistant, of course under clear Covid rules, like mandatory full vaccination and mask wearing—except briefly for the photos you'll see in this week's In Depth article.

What was on display during our visit? I saw ZKW on the move, a lighting company transforming into a high-tech enterprise by using more and more synergies with their parent company LG Electronics, and by leveraging new partnerships. Israeli cybersecurity company Cybellum and US lidar company Lumotive are two of the newest ZKW partners. Lumotive showed an Audi Q8 ZKW headlamp with integrated lidar at CES. The expertise and competence brought by new partnerships like these will surely flow into innovative new solutions for ZKW's customers. Hornfeck explained to us his philosophy that vehicle lighting has to be seen not like the bolt-on discrete components of the past, but more as a vehicle-level solution, a deeply integrated function of the car. We at DVN are convinced that our industry is inexorably headed toward software-defined lighting, and ZKW share this opinion, as it seems.

Another new approach in Wieselburg is the IVF (Intelligent Vehicle Front), which comprises car design elements like lit grilles, light bands, comfort lighting systems, and future exterior display applications.

DVN had the opportunity to experience some of the innovations ZKW are working on. The company's pre-development director Gerald Böhm; innovation and product management director Hannes Scheer, and technology manager Florian Wagner showed in an engaged and excited way their results and new ideas with the chance to become future products. We left from our ZKW visit certain that such a creative and passionate team is good for some surprising and unexpected products!



Wolfgang Huhn  
DVN Senior Advisor

# In Depth Lighting Technology

## ZKW CTO Udo Hornfeck Shows DVN Around



ZKW'S UDO HORNFECK & HIS ASSISTANT STEFANIE WIDLER

DVN had the opportunity to interview—right in person!—Udo Hornfeck end of January in the ZKW Management and Innovation Center (MIC) in Wieselburg.

### **DVN: How did you get into vehicle lighting?**

**Udo Hornfeck:** My 20 years in the automotive industry are roughly divided into two parts. In the first part I was focusing on the development of infotainment systems; cockpit electronics, and navigation applications. The second part was the wire harness business with Dräxlmaier and later Leoni. In this business you learn perfectly how to handle variants, complexity, energy management and data management.

### **DVN: What's different about working at ZKW versus Leoni?**

**Hornfeck:** Nobody gives compliments for a good wiring system; you are recognised more or less only in case of problems. This is totally different in such emotional products like headlamps. With the designers there are new interesting players at the table. You see your success on the road every day and you can also gain some feedback from the end-customers.

### **DVN: Tell us about an amazing experience you've had at ZKW.**

**Hornfeck:** Clearly the first night drive. A very emotional experience with all the next-generation lighting products of ZKW and some concepts for enhanced functionality with sensor integration.

### **DVN: ...and a challenge you overcame?**

**Hornfeck:** My start was 1 March 2021, in the middle of the corona pandemic. Meeting people virtually was very unusual in the beginning, but possible. I had virtual meetings e. g. with every customer and got very positive

feedback for the ZKW's achievements in the past years.

**DVN: What are some of your goals and targets?**

**Hornfeck:** The complexity of lighting systems increases rapidly. Close contact with automakers in the early phase of a car development is an essential target. We want to openly share our ideas and get the chance to prepare as soon as possible for the future customer requirements.

**DVN: When you're not innovating and problem-solving in the world of vehicle lights, what do you like to do?**

**Hornfeck:** I keep fit with mountain biking; I love to experience the nature, tackling inclination, of course with no e-MTB—this is what I like if the time allows.

**DVN's Innovation Tour at ZKW**



FLORIAN WAGNER · WOLFGANG HUHN · GERALD BÖHM · HANNES SCHEER

Gerald Böhm, Hannes Scheer and Florian Wagner showed a lot of new products to DVN. In pre-development, ZKW are working on new technologies to meet their customers' evolving requirements. Vehicle lights are morphing into software-controlled, digital mechatronic products. To make this possible, more and more pixelated lighting solutions such as mini or  $\mu$ LED are being developed in amber for turn indicators; red for rear lamps, and white for headlamps and DRLs.



PIXELATED REAR LIGHTS MOCKUPS BASED ON STANDARD LED TECHNOLOGY



NEXT GENERATION: MINILED AND MLED FOR REAR LAMPS, WITH MINILED DISPLAY

# Lighting News

## DVN Team: Working to Make 2022's DVN Events Spectacular

### LIGHTING NEWS



W. Huhn



P. Aumont



G. Bahnmüller



J.P. Ravier



C. Befelein



G. Lebrun



Ch. Lameiras



R. Schäfer



L. Metzemaekers



D. Stern

Wolfgang Huhn; Philippe Aumont; Gerd Bahnmüller; Jean-Paul Ravier; Carine Abouaf; Carsten Befelein; Geoffrey Lebrun; Christophe Lameiras; Ralf Schaefer; Leo Metzemaekers; Daniel Stern, Hector Fratty are all working constantly to make fantastic successes of forthcoming DVN events:

- DVN-Interior Workshop in Frankfurt at the Pulman hotel in Cologne on 25-26 April
- DVN US Workshop near Detroit, Michigan on 20-21 June
- DVN China Workshop in Shanghai on 20-21 September
- DVN Lidar Conference in Frankfurt in November.

We plan these events to bring the DVN community right to where significant work is being done, to allow automakers to present their achievements and their needs; tier-1s to present their innovations, and tier-2s to show their new products and technologies. That's how mutually beneficial connections are established and strengthened in these times of ever-accelerating technological and technical evolution and product cycle compression. Save the dates, and come participate!

# DVN US Workshop '22: Save the Date; Book Your Booth!

LIGHTING NEWS

The poster features a dark blue background with white and yellow text. In the top left, a dark blue box contains the text '20-21 JUNE 2022 ROCHESTER'. In the top center is the DVN logo with 'Lighting & ADAS' below it. In the top right is a yellow circle with 'SAVE THE DATE JUNE 20-21'. The main title 'US DVN WORKSHOP Safety & Design: Challenges & Opportunities' is centered in white. Below it, the location 'ROYAL PARK HOTEL, ROCHESTER, MI' and event details 'Social Cocktail • Meet & Greet Dinner • Conference • Expo' are listed. At the bottom, a dark blue bar contains the text '- 24TH DVN WORKSHOP -'.

The 24<sup>th</sup> DVN US Workshop is coming up in four months' time, near Detroit on 20-21 June. All of us at DVN, the whole team, are doing our best to make a big success of the event. European, North American, and Asian contingents are optimistic about coming to the US by then, and we are confident the Workshop will be a grand success. The rubric, **Safety & Design: Challenges & Opportunities**, is timely and crucial, and the information and ideas shared at the event will make real contributions to decrease traffic fatalities in the world and propose new designs.

Registration will be open soon, and we look forward to welcoming your attendance and participation in an inspiring, exciting, lively, and safe conference in Michigan. Of course we will regularly keep you informed about any changes and updates, here in the weekly DVN newsletter.

Among the topical sessions will be *Automaker Achievements in Design and Safety* · *Effects of New Front and Rear Design on Safety* · *Effects of Safety Functions on Design* · *Status and Evolution of Regulations in the World* · *Light Source Effects on Design and Safety* · *Enabling New Design and Safety Functions*.

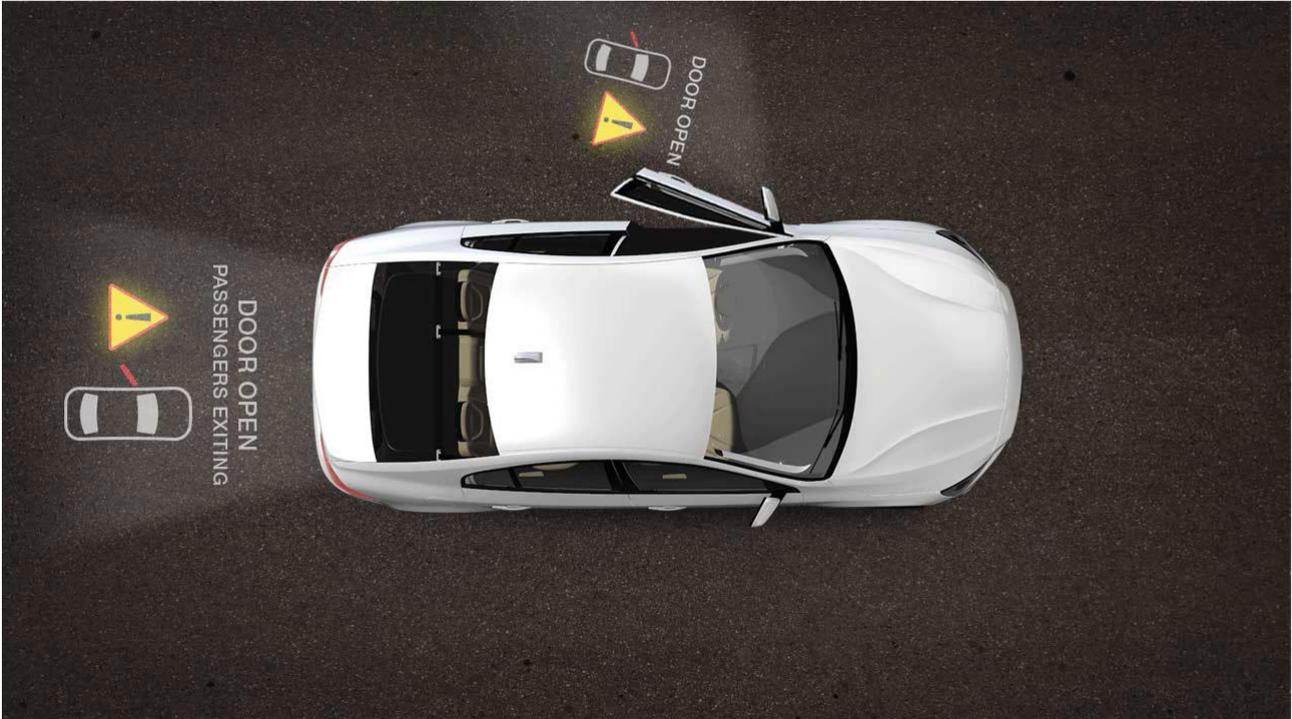
Attendees will have the great privilege of lectures from the likes of Audi, Ford, GM, Lucid, Rivian, Stellantis, and Volvo; Hasco, Hella, Koito, Magna, Marelli AL, Mind, Valeo, XingYu, and ZKW; the greatest and most innovative lighting-and-vision tier-2s; and research and regulatory voices from Europe, North America, and Asia. The speakers will explain how digital and HD lighting technologies allow communication with other drivers, pedestrians, and cyclists; the effect on safety for vulnerable road users, and how new technologies will facilitate new designs. The panel discussion will grapple with the rubric **Design Depending on Technology, or Vice Versa? Impact of Regulations**.

There will be ample time for individual communication and networking during the coffee breaks, lunches, and especially the cocktail and dinner as a highlight on the first day. The workshop will highlight how new technologies will contribute increasing safety in the world, while facilitating new designs. Topics will include front and rear lighting; ADB, LED, mini- and microLED, OLED, laser, and MLA technologies' effects on safety and design; and new functions including lit design elements like illuminated front grilles.

The event will bring together more than 300 participants from all over the world—managers, experts, decisionmakers, researchers, and practitioners involved in lighting and ADAS. Discussion panels and exhibition booths will host fruitful exchanges between all attendees.

# TI DLP: New Digital Micromirror Devices

## LIGHTING NEWS



Texas Instruments DLP® Automotive technology is established in high resolution headlights with individually controllable 1.3M pixels in a 0.55” array on digital micromirror devices (DMD). Today, several OEMs in Europe and China have introduced vehicle models using DMDs in headlamps; equipping *more* than 10 vehicle models. We expect the number of vehicle models equipped to roughly triple in this time frame.

To further facilitate V2X communication and personalization of vehicles, new DMDs were developed to support low cost miniaturized video projection modules. Such modules can be placed in various different locations around the vehicle, like in door panels, rocker panels, bumpers or side mirrors.

The majority of current solutions are typically either low cost static GOBO modules with simple black and white images or more sophisticated solutions, such the famous light carpet. Modules are supplied with only power and ground without a data interface.

The benefit of V2X communication enabled by our DMDs is that the modules open up a wealth of new use cases and unprecedented kind of personalization with full video capability combined with in-system programmability and over-the-air (OTA) updates.

OEMs can install modules and adjust dynamic content on-demand, which is not possible with static projection. The cost of implementing a dynamic ground projection module itself is higher than for a static one, however the in-vehicle programmability opens doors to new “on demand” business models.

To demonstrate the capability a DMD of such fully programmable module, TI just launched an evaluation kit that gives easy access to the technology and allows experiments and demonstrations of ideas

- The DLP products DLP2021LEQ1EVM evaluation module (EVM) is a complete electronic and optical system enabling accelerated evaluation of the DLP2021-Q1 chipset.

- The DLP2021-Q1 digital DMD interfaces with an FPGA-based DMD controller to enable a graphics processing unit free system architecture and instant-on video.

There are two versions available, one with RGB and one with white LED sources.

DMD samples will be available in next month for customers who like to start creating their own modules.

# Faurecia + Hella = Forvia - Set Course for Joint Future

LIGHTING NEWS



Faurecia and Hella, with a total of around 150,000 employees, are now the world's № 7 automotive supplier. Based on Faurecia's current stake in Hella, both companies will continue to operate as independent listed entities with their own governance.

Hella CEO Dr. Rolf Breidenbach says "Hella and Faurecia are strong companies, and together we are even stronger; thus, we have now created essential prerequisites for opening up additional sales opportunities together with Faurecia, as well as for realising a wide range of synergy potentials".

And Faurecia CEO Patrick Koller said "By combining our strengths, we will have the critical size and advanced technology capability in all our business groups".

New Faurecia members of the Committee are Patrick Koller; Nolwenn Delaunay (general counsel); Michel Favre (CFO); Christophe Schmitt (Operations), and J.P. Sounillac (Human Resources). They replace the previous representatives of the family pool on the Hella Shareholder Committee.

Dr Jürgen Behrend's appointment to the Faurecia Board of Directors, as representative of the Family pool, will be proposed at the next Faurecia shareholders' meeting. Hella CEO Dr. Rolf Breidenbach will continue to closely support the integration until his resignation date of end June 2022, after which he will carry on advising the group.

At the Press Conference last week, Patrick Koller, Faurecia CEO and Rolf Breidenbach, Hella CEO presented the main figures of the new company Forvia. <https://www.youtube.com/watch?v=DbDMInZn2Do&t=924s>

## 24 differentiating product lines shaping the future of mobility



The newly formed lifecycle solutions business group, which combines the present aftermarket and special applications business segments, will be managed by Lea Corzilius in addition to her role as DHR at Hella.

## Main cost reduction synergies to achieve €250m in 2025

- Direct and indirect purchasing
- Global business services
- Digital transformation & IT
- Electronic integration

## Revenue to increase to €300m by 2025

Faurecia also foresees revenues to increase by between €300m and €400m by 2025, while cashflow optimisations are forecast to generate around €200m on average each year from 2022 to 2025.

The company now forecasts 2021 sales of between €15bn and €15.5bn, and an operating profit margin of 5.5%. Hella have also revised their full-year guidance, now predicting currency and portfolio-adjusted sales of between around 5.9€ and 6.2 billion.

# American Mainstream News on ADB Headlights

## LIGHTING NEWS



For many years, popular media in the United States really write pretty much wrote and published only one article about ADB: *they're so much better; here's how they work; they're still illegal in the USA because of NHTSA's outdated regulations*. That was the only article it was possible to write. But now [NHTSA has been ordered](#) by the US Congress to allow ADB—and it has to be real ADB, compliant with SAE J3069—new kinds of news reports are possible, and they've been showing up. A reporter in the New York Times [recently wrote](#) about his experience with ADB, and how he was impressed by one of the most important advances in vehicle lighting technology in decades. And the script veered in a new direction:

*The bad news is that while widely used in Europe and Asia for over a decade, these smart headlights are illegal in US. On my drive, I was piloting a not-for-sale-here European model of E-tron equipped with Audi's digital matrix headlighting system. "The good news is that after years of unsuccessful attempts to allow the technology, ADB lights will soon be on American cars and trucks, thanks to a section in the recently passed Infrastructure Investment and Jobs Act that mandates their use. According to the infrastructure act, ADB must be approved for U.S. use within two years. And they will be allowed to meet the standard developed by the SAE, which is very similar to the systems already in use in Europe.*

The reporter went on to quote sturdy authorities on the subject including Audi's Stephan Berlitz (the light carpet "helps drivers to anticipate bends and stay in their lane; by visualising the position of the vehicle in the lane, the lighting function is particularly helpful where the road narrows") and GM's Michael Larsen, who was instrumental in shepherding SAE J3069 through its development and on to publication ("It's really night and day").

Now it remains to be seen whether articles sometime within the next two years can begin to say *they're finally here*.

# AMS Osram's Newest Projected Lighting

## LIGHTING NEWS



Projected light is the latest optical effect to be used to brand a car's interaction with driver and passengers and outside world at large tiny assemblies of LEDs and microlenses embedded in the wing mirror, door sills and elsewhere project light patterns on the nearby pavement, producing effects such as a *welcome light carpet*: the car's optical greeting to the driver when the wireless key fob comes into range.

AMS Osram have been working on refining the technology to include semi-dynamic light projection, opening up new creative possibilities to car makers.

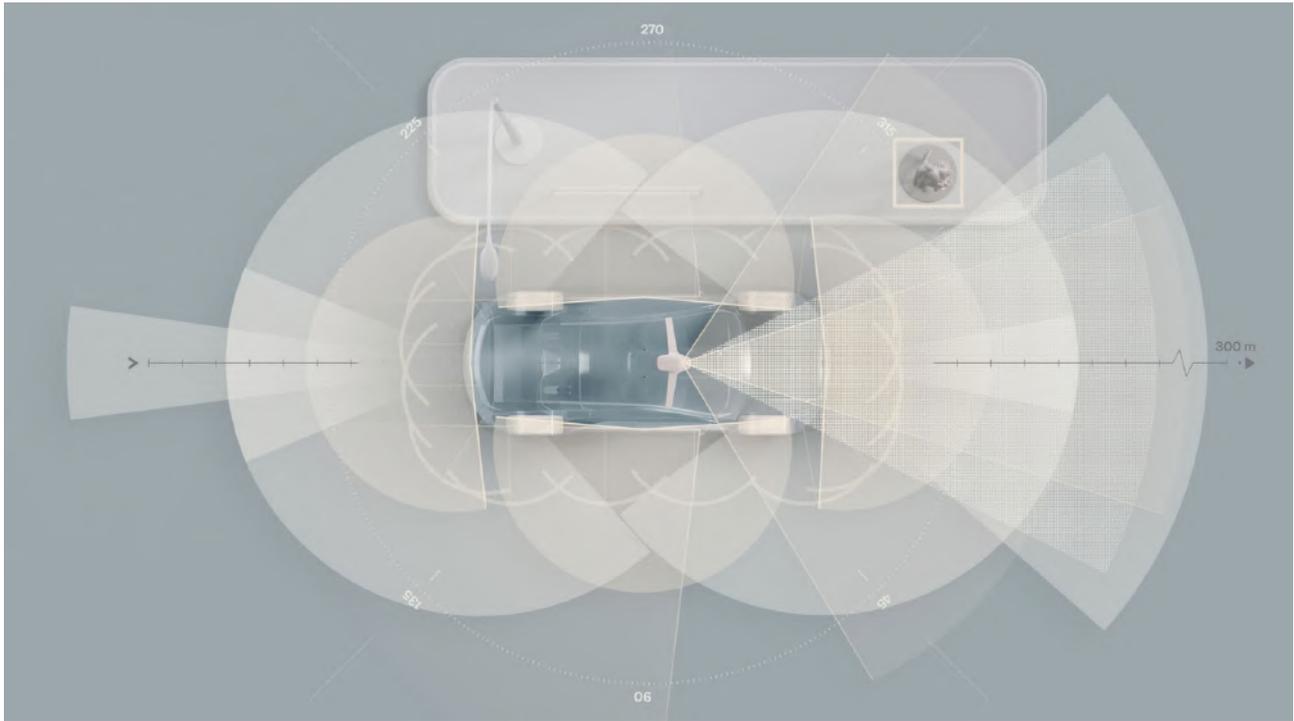
There are extremely tight packaging constraints on projected-light technology, so the entire projection system can fit in unused space, such as the underside of the wing mirrors or the door sills. It also must provide a sharp, well-focused rendering of a pattern, symbol, logo, or other suchlike. How? Individual lens features, each measured in micrometres, can be sculpted individually to produce the pattern required in the application when light is projected through the array, forming an ellipse on the image plane (the surface where the graphic is displayed, such as a floor or roadway).

Until now, the technology has only been capable of projecting static images on to the image plane, but AMS Osram now have semi-dynamic projected lighting. A segmented micro-lens array works in combination with four collimators split by an optical separator, with four independently-steerable LED light sources. The micro-lens components are produced as wafer-level optics using technologies and equipment common to the semiconductor industry. As described in [last week's article](#), the precision and miniaturisation possible when producing wafer-level optics is extraordinary: optic-to-optic alignment is of the scale of  $\pm 5\mu\text{m}$ , and optics-to-mechanics alignment is  $\pm 30\mu\text{m}$ .

# Driver Assistance News

## Musk looks isolated as rivals embrace lidar

### DRIVER ASSISTANCE NEWS



Elon Musk is skeptical of putting lidar sensors on vehicles, but a growing number of his competitors are quietly adding the technology to their lineup. As of January, according to the latest tally from Bloomberg, 17 automakers globally have announced a total of 21 lidar-equipped passenger car models, either in production or coming soon. This number will increase as systems like GM's lidar-based Ultra Cruise are added to specific models.

Lidar's ability to map surroundings as well as measure object velocity makes it a good complementary sensor in partially or fully autonomous vehicles. Lidars are unique in that they offer long and wide visual ranges. Falling costs and a boom in supply are driving greater adoption -- there are now over 150 lidar producers globally and there have been a spate of recent public listings, by Velodyne, Luminar and Innoviz, among others.

Lidar is commonly used today by the companies that are trying to build mobility services using fully self-driving vehicles, such as Waymo and Cruise. For example, Waymo vehicles operating in California and Arizona typically have five lidar sensors to help build a wide field of view.

More partnerships also are cropping up.

- Mercedes announced that it was working with Luminar and plans to integrate the technology into its upcoming production vehicles.
- Volvo announced a similar deal with Luminar in mid-2021,
- BMW partnered with Innoviz for its upcoming iX model.
- GM has tapped California-based Cepton as a lidar supplier.

As the price of lidar declines further and consumers come to expect more advanced safety features as standard, we will likely see more automakers add the technology to their vehicles. This will mean high-end vehicles at first, but eventually should include automakers' most popular models.

# How Qualcomm Shapes the Future of the Car

## DRIVER ASSISTANCE NEWS



Qualcomm have been active in the automotive industry for over 20 years, and over 30 years in the wireless technology field. As vehicles evolve toward rolling computers always connected to the cloud and to mobile services; to other vehicles and pedestrians as well as to the surrounding infrastructure, Qualcomm's areas of expertise become more and more synergistically applicable.

Qualcomm's role in the automotive industry has changed over time. Today, the company present themselves as a partner for the ecosystem of the automotive industry. Their offerings include telematics; digital cockpit; ADAS; efficient chipsets (SoC - System on Chip), and cloud services. These form the foundation that manufacturers use to create a digital chassis to meet the growing demands of buyers.

In [this video report](#), *Automobilwoche* editors Nicole Scott and Don Dahlmann talk to Qualcomm's Thomas Dannemann (senior director of CDMA product marketing) about the future of the automobile and how Qualcomm's' holistic approach supports further development.

# Continental Mull Part-IPO of AD Business

## DRIVER ASSISTANCE NEWS



Continental, Germany's third-largest automotive supplier, want to make their automated driving business more independent, and so are considering a partial IPO. That's according to a German *Handelsblatt* report, which cites anonymous sources. An IPO for the unit could significantly increase the value of Continental.

The Autonomous Mobility division of the company's automotive segment is to become its own legal entity from January 2023, but an IPO could also be floated, sources told the German newspaper.

# Deep Red Industrial Chair: AI Aids IR Imaging

DRIVER ASSISTANCE NEWS



The Grenoble INP Foundation are launching Deep Red, a new teaching and research chair, in partnership with Lynred, a world leader in the development and production of high quality infrared technology. The mission of this chair is to support research activities responding to the future challenges of artificial intelligence (AI) in the service of infrared imagery, as well as to provide teaching actions in connection with their expertise.

With an initial duration of 5 years, Deep Red is backed by the Grenoble INP, Phelma schools for training, and Gipsa-lab for research. Jocelyn Chanussot, a teacher at Grenoble INP-UGA and researcher at Gipsa-lab, is the chair holder. She says "whether for monitoring greenhouse gases or safety for night driving assistance, infrared imagery plays a key role. The objective is to develop advanced algorithms for digital data processing in order to optimise its potential, for automatic analysis or better visual interpretation. Image fusion and visual perception are complex subjects, for which the schools and laboratories of Grenoble INP-UGA have all the skills required, whether in signal processing, physical interpretation, algorithms, AI, on-board electronics, but also in cognitive sciences which play a key role in perception".

On the research side, different strategies will be explored within Deep Red to improve the readability of imaged scenes, whether by a human operator or by a processing algorithm aimed, for example, at detecting anomalies or objects. These might include the likes of:

- Fusion of visible and thermal infrared images, intended in particular for applications of **augmented reality, automotive, or autonomous systems** allowing an improvement of the resolution, a reduction of the noise, an improvement of the colorimetry, the contrast;
- Fusion with others modalities (radar, lidar, NIR, SWIR, MWIR, LWIR), and
- Deep learning models for noise reduction, information fusion, and object detection depending on the correction strategy image used.

Students will be trained and made aware of the potential and challenges of infrared imagery within the framework of the courses, design offices or practical work of their training and will also be able to become actors of the developments within the framework of engineering projects and internships on these themes.

# General News

## Audi to Axe Two Lower Models

GENERAL NEWS



Audi want to emphasise the upper bands of the market in their model range, in an effort to bring in more money with luxury cars in the future and phase out smaller models. CEO Markus Duesmann told *Handelsblatt*, "Specifically, we have decided not to build the A1 anymore, and there will be no successor model from the Q2 either".

VW Group have redefined the role of the individual brands. "We have also realigned Audi as a premium brand. We will limit our model range at the bottom and expand it at the top," said Duesmann. The compact Q2 SUV, introduced in 2016, will be phased out without a successor because it no longer fits into the planning of the portfolio and the development capacities: "We are prioritising other segments."

Audi are developing an all-electric luxury sedan with a very spacious interior, new wiring system, and new software. "We are on schedule and will bring the 2025 model onto the road," said Duesmann. "After that, however, there will certainly be other models on the platform, including variants from Bentley and Porsche".

Because of the ongoing semiconductor bottlenecks, the VW Group, like other car manufacturers, are tending to build the available chips into more profitable models—that is, more expensive ones. "In the Group, we try to secure the overall result. That's why we prioritize models with higher profit sharing," said Duesmann. "In addition, there is a trend towards more equipment".

Competitors BMW and Mercedes have also been increasingly focusing on profitable upper class and luxury cars and are expanding their range in that direction, to "generate more earnings per vehicle", in the words of BMW CFO Nicolas Peter. And Mercedes chief Ola Källenius has said "We are reflecting on the core of our company for everyone to see: building the most desirable automobiles in the world."

# Renault, Valeo, Siemens in New Electric Motor Pact

GENERAL NEWS



**RENAULT**



**SIEMENS**

Renault Group, Valeo, and Valeo Siemens eAutomotive have agreed to form a strategic partnership for the design, co-development, and manufacture in France of a new-generation automotive electric motor, eliminating the use of scarce, costly, and environmentally-fraught rare earths.

The three partners will combine their recognized expertise to design a unique electric powertrain system that is unparalleled worldwide, offering more power on less energy, without the use of rare earths.

Under this partnership, each of the three partners will contribute to the development and production of the two key parts of the electric motor: the rotor and the stator.

Renault will develop and produce EESM (electrically excited synchronous motor) rotor technology, designed without the use of rare earths, and with enhanced energy performance. In addition to the supply of components based on each company's best expertise, the overall architecture of the all-in-one motor for Renault Group will also be designed by Renault.

Valeo and Valeo Siemens eAutomotive will develop and produce the stator, which is based on Valeo's technological expertise in copper wire assembly, which allows them to create higher density of copper in the stator to generate more power without having to use more electrical energy.

Renault Group, Valeo and Valeo Siemens eAutomotive will be the first to mass produce a 200-kW (276-hp) electric motor without using rare earths, starting in 2027. Production of the motor for the automaker's own needs will be based at Renault Group's Cléon plant in Normandy, France.

Renault Group CEO Luca de Meo says "We are delighted to be partnering with Valeo, whose know-how is recognized the world over. Together, we will design and develop a new generation of high-tech electric motors, produced at our Cléon plant. "

Valeo's Christophe Périllat, for his part, says "This strategic partnership will result in a major step forward for electric mobility. Alongside Renault Group, we are creating a new-generation automotive electric motor that eliminates the use of rare earth.

# And Valeo Buy Siemens Out From EV-Parts Venture PNT

GENERAL NEWS



Valeo will buy out Siemens' 50-per-cent stake in their 5-year-old electric-car components venture to bolster Valeo's position in the rapidly-expanding EV market. The price: €277m. "Strategically, this is a very important step for Valeo," CEO Christophe Perillat said on a call with journalists. "The terms of the deal are good, and it comes at the right time." Last week, Perillat said the market "is growing very strongly" and predicted annualised 17 per cent growth to €92bn in 2030.

Perillat reiterated a previous forecast put forth by the company that 40 per cent of the overall market will be outsourced to automotive suppliers.

By the end of 2022, more than 90 electric and plug-in hybrid models will be fitted with Valeo's electric powertrain systems, motors, inverters or onboard chargers, Valeo said.

Valeo and Siemens joined forces on Valeo Siemens eAutomotive in 2016 to make e-motors, axles and powertrain electronics for plug-in hybrids and full-electric vehicles.