Tue, 6 June 2023
Weekly Newsletter

DVN
Lighting & ADAS

NEWSLETTER #806

Editorial

Audi's New Lighting Paradigm

I had a wonderful time visiting the Audi Museum; taking in the presentation on future technologies in Audi's light tunnel; night-driving the new A8 and Q8 e-tron, and talking with Stephan Berlitz, Audi's head of lighting development. Foremost in my mind as I recall this day is Audi's new lighting paradigm.

For context: before, we were in a time when optical innovations were the main driver of lighting innovation and evolution. Then came the dawn of Xenon and AFS: electronics meant lighting was now a system. We achieved at that time great strides in the quality and safety performance from car lights.
Now with LEDs and their huge possibilities, we are entering a time when we want to do more than improve lighting performance. We want to create emotion in the driver and to personalise the vehicle.
Call it the influx of marketing into the lighting sphere, joining safety and design focus already in progress. While safety remains the most important development aspect, future car lights will be able to give more than light for directly seeing and being seen. Lights are now used to improve personalisation, and as a channel for communication and interaction.

I warmly thank Stephan Berlitz and his team for the time spent with Wolfgang Huhn and me, and I congratulate all the team for their involvement and enthusiasm working in this wonderful area.

Last and not least, I discovered in the museum a lot of wonderful products unveiled during a century. Engineers worked a lot to develop and make them. These products deserve to be shown to the lighting world at large, and to a broader audience of people who love lighting. Why don’t we have our own museum, a museum of lighting?

Sincerely yours,

In Depth Lighting Technology

Innovations at Audi: Past - Current - Future

The Audi Museum's Special Lighting Exhibition:
The Speed of Light

The Audi Museum's lighting-focused special exhibit is the story of lighting development through the history of Audi, since the beginnings of vehicle lighting, with candles and fire for illumination.

Several vehicles trace the various epochs in lighting technology and illustrate the functionality and the fascination of headlight and rear light technologies:

Petroleum lamps; carbide headlights; electric lighting starting with the Bosch light in 1913 and then the Bilux two-wire lamps in 1924, enabling for the first time high and low beam from one headlamp.

With the advent of halogen technology in the early 1960s, intensive innovation in lighting technology led to projector and complex-reflector optics, Xenon light sources, and onward.

In 2004, Audi jumped in with both feet and made great strides in leveraging the full potential of new white LEDs on the front of the car first as daytime running lights in A8, then in 2008 they commercialised the first all-LED headlamps in the R8 sports car.

In 2017, Audi presented LED headlamps with the first ADB using five Ostars, each with five LEDs for making matrix and then HD matrix technology with a laser-based additional high-beam booster in the A8 luxury sedan, all operated with additional software and electronic input. What amazing progress in lighting! So many innovations!

Audi continue to point the way to the future of lighting technology through this digitalisation of light with, for example, digital matrix LED headlights and digital OLED rear lights. The museum shows very well the history of one century of lighting. There's nothing quite like seeing the exhibit in person, but they've put up an **online video** accessible from wherever you might be.

The museum also shows dozens of do-it-yourself experiments to learn; understand, and touch-and-feel lighting, and gives outlook into future communication with other traffic participants.

Technical presentation in the tunnel

Great OLED evolution since first presentations a decade ago

I first thank all the team in place at the tunnel, who were justifiably proud to present their latest achievements. On average the lighting team members have more than 20 years' experience in lighting, top level included. I am not able to unveil some developments (that would be spoiling the surprise!) but suffice to say there are many new designs and functions coming soon in Audi cars.

The presentations were done in the tunnel—in the Audi light assistance centre, not to present the light along the length of the tunnel, but more to present slides and the functions around the cars, in a small part of the tunnel. Priority is not on the quality of light but especially on the new digital lighting functions. The technical presentation was focused on the path taken by Audi: digitalisation for personalisation of the car and building new functions.

• Example: digital light in front of the car, giving the possibility for the driver to choose from four DRL appearance designs via HMI.

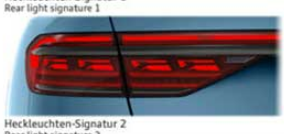
• Example: three small, high-resolution LED projectors built into each side of the body, transforming the ground beneath them into a stage when the doors are opened.

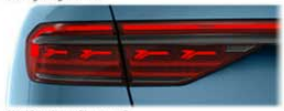
• Example: four high-resolution LED projectors, integrated into the corners of the vehicle, generate turn signal projections. The design of these projections can be modified to address different markets' preferences and regulations.

• Example: the same in the rear— already in series production in Germany in the Audi A8 and S8—with possibility for the driver to choose from four tail light design appearances, using digital OLED technology, able to make wonderful appearances in low depth, from a new generation of digital OLED elements that act like a display. Another feature in the taillights is the 3D architecture of the digital OLED elements, making it possible to experience the dynamic light show in 3D spatial effect.

Heckleuchten-Signaturen im MMI auswählbar
Rear light signatures can be selected in the MMI


Heckleuchten-Signatur 1
Rear light signature 1


Heckleuchten-Signatur 2
Rear light signature 2


Heckleuchten-Signatur 3
Rear light signature 3

The second family of presentations show the huge possibilities of DMD to make lane guidance and orientation light, the most useful light for the driver, and other symbols and since 2019 an optional light offering on some Audi models.

Several mock-ups presented the possibilities to produce appearance differentiation in front and rear. A surprise mock-up on a reduced scale shows the possibility of communication with light from the whole car.

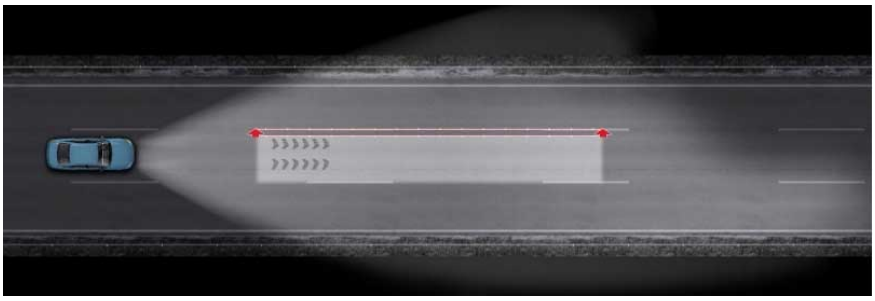
I could summarise the presentation by four words:
Emotion · Personalisation · Communication using **Digitalisation**.
With new levels of control over increasingly versatile lights, Audi is working to stimulate the driver and increase safety. Along with this, though, specifications become more difficult to formalise; software is becoming absolutely crucial.

Night drive with A8 and Q8 e-tron

Each headlamp on the Q8 e-tron (shown here) has two light modules; one makes the low beam up to the horizontal cut-off, without the kink and upstep, as well as the high beam with ADB. The second module uses DMD to make the low beam kink/upstep; the high beam, and the additional functions.

It is the first time I had the opportunity to evaluate DMD in a production car, with the feeling to see better lights with softer dynamic homogeneity, than in the several

prototypes I evaluated these last years.



Lane light including orientation light on motorways

The two cars produce all the latest functions depending on the road and the speed, but the most innovative and efficient function was the lane light which shows the car's immediate way path and really allows the driver to relax quite a bit more than without it. The projection of symbols—two arrows on the road—help the driver but not to the same degree. The lane light seems be the greatest function perfectly provided by the DMD, and providing this guidance on the road itself, outside the car with light, frees up the HUD to provide other kinds of information better suited to that in-car device. Unfortunately, there is no foreseeable chance to provide lane guidance lighting in the U.S. China, on the other hand is in the lead, allowing lane light and many other functions.

In conclusion, I was impressed by the change of paradigm: we didn't talk about quality of the light in terms of range; homogeneity, and spread. Audi's lighting team consider the quality of the light is close enough to perfect that it can be taken for granted, and the focus can shift to new functions.
The lighting community can take justifiable pride in the job done in these last years. But the work isn't over; there are new jobs in devising and perfecting more and more innovations!

DVN Interview: Stephan Berlitz · Audi's Head of Lighting Development

Stephan Berlitz (L) and Hector Fratty (R)

DVN: Audi are regarded as lighting pioneers. What do you reckon are the main achievements which make that so?

Stephan Berlitz: Audi is advancing into new dimensions in automotive lighting technology. Originally, vehicle lighting mainly served the purpose of ensuring traffic

safety for all road users. Previously unknown prospects are now opening up in the wake of digitalising headlights and rear lights: light becomes a medium of external communication and interaction; personalises design, and provides customers with new styling and customisation options. It is particularly visible in the new Audi A8: the forward-looking digital matrix LED headlights and digital OLED rear lights raise the customer experience to a whole new level: for the first time in any Audi model, light is completely digitalised.

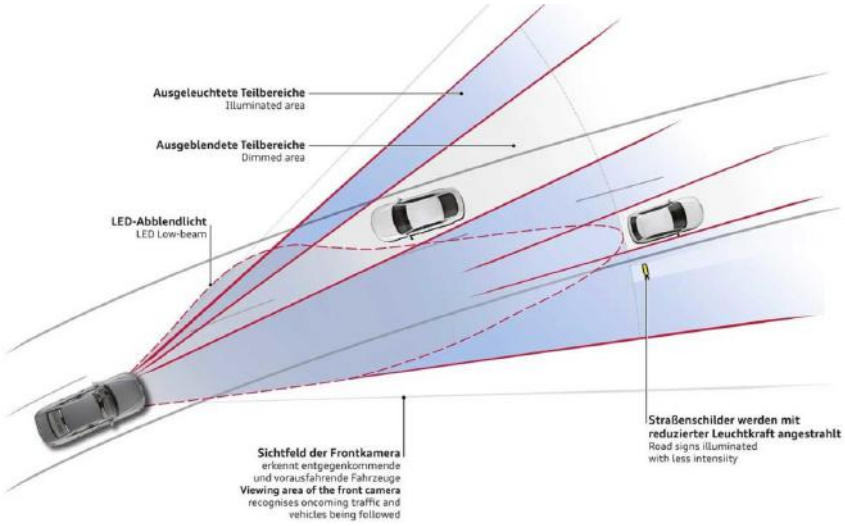
As far back as 2003, the A8 offered adaptive light with automatic dynamic headlight range control before a camera on the windshield began detecting other road users in 2010. Two years later, the brand underpinned its innovative prowess and pioneering role in the R8: The introduction of the dynamic turn signal that allows indicated directional changes to be perceived out of the corner of one's eye marked a significant gain in safety—and still does.

In 2004, Audi used light-emitting diodes for the first time in LED headlights, in the daytime running light of the Audi A8. In 2008, the first full-LED headlights followed in the Audi R8. In 2013, Audi was the first automobile manufacturer to be awarded the eco-innovation certificate of the European Union for using LED technology.

In 2017, following their debut in the R8 LMX, Audi presented LED headlights featuring HD matrix technology with the laser as an additional high-beam light in the A8 luxury sedan—a world innovation in large-scale production. Now, we are digitalising the matrix LED headlight while adding even greater variety. The digital OLED rear lamps in the new Q5 have been opening the door to car-to-x communication since this year and, for the first time, make choices of new taillight designs possible at the time of configuring the vehicle.

DVN: What achievement are you personally proudest of?

S.B.: From the technology aspect it was the introduction of the Audi matrix LED headlights. Actually, the idea was from one of my former PhD students, then we tried to find a technical solution.
All our suppliers tried to convince us the idea is physically impossible; much too complicated and we should use mechanical systems. We developed the concept internally anyway, and we launched that great innovation in 2013. Now matrix LED technology is the ADB standard, even our internal technology name "Matrix Beam" became the description name in the automotive industry.



Audi Q7 HD matrix lights

Unfortunately, Dr. Wolfgang Huhn retired in 2020; he was a great expert for Audi lighting development over 20 years. From an emotional aspect a great achievement was after the reorganisation and my nomination as Head of Audi Lighting. Covid was

quite a challenge, but together with my team we could even strengthen the meaning of Audi lighting technology. We're currently preparing the biggest new-model push in Audi's history. All these Audi models will have fascinating new lighting technologies, functions and design highlights. I'm very proud that my lighting team and I can be part of that.

DVN : After the ADB and its perfect high beam light, do you see a possibility to improve lighting performance further?

S.B.: Audi is advancing into new dimensions in vehicle lighting technology. Originally, vehicle lighting mainly served the purpose of ensuring traffic safety for all road users. Due to digitalisation, the perspective is expanding from driver-centric safety to comprehensive external communication and personalisation. Light will increasingly be able to indicate the intentions of the driver and the vehicle. We have smart, highly adaptive light control technology even today. Projections such as the marking light are an example of external communication with other road users. And the digital OLED, as well, shows how we can achieve car-to-x communication using light, a concept that may become even more important in the context of automated driving.

DVN: How do you foresee ADB evolving in premium cars? Will low/high beams disappear?

S.B.: No, I personally don't think so. The way light is used is changing, turning into a means of communication and, as a result, receiving a social and emotional component. Light will increasingly be able to indicate the intentions of the driver and the vehicle. Connectivity ensures smart functionality. Lamps turn into displays and the one-dimensional signalling and warning function of the past will evolve into a versatile means of communication with the external world, going forward.

DVN : How do you see the future of megapixel DMD with the arrival of µLEDs?

S.B.: The new DMD (digital micromirror device) technology is a plus in safety, through the direct projection of high-resolution light images as well as numerous adaptive light distributions. It is great to offer that technology in Audi models. In my opinion, µLED is an interesting technology for developing more functions due to its resolution.

DVN: What improvements do you foresee in design; marketing, and communication?

S.B.: Light at Audi stands for a symbiosis of technology; design; safety, and customer experience. Our formula for success has always been that lighting technology and light design are inseparable. As early as the pre-development stage, we, engineers, work together very closely with the design team. At Audi, light first and foremost means safety for drivers and occupants; in other words, to see and to be seen. Meanwhile, our highly functional technology—let's say, our HD matrix LED headlights with the laser as an additional high-beam light—provides scope for attractive styling as well.

DVN: Let's talk about the Audi Urbansphere concept. What can you tell us about its lighting?

S.B.: The entire surface of the Single Frame grilleboard becomes a stage known as the Audi Light Canvas and can be used for communication. Dynamic lighting effects give signals to other road users to improve road safety. Low and high beams are implemented via light segments in the outer sections of the Single Frame, and a similarly functioning LED surface is located in the rear. These 'Audi Eyes' in the front are digital lighting units that echo the brand logo, as they enlarge and isolate the intersection of two rings to form a pupil. The illuminated surfaces can be adapted to the traffic situation, environment, or even the mood of the passengers. A digitally-created eyebrow also functions as a dynamic turn signal when required. Thanks to its outstanding visibility, it makes an unmistakable statement in the service of safety.

A luminous accessory that passengers can take with them when they leave their Audi Urbansphere is a self-illuminating umbrella. This acts as a protective companion and multifunctional light source; gives users a better view of their path, and makes them more visible by means of artificial intelligence and sophisticated sensor technology.

DVN: And how about the Audi Aicon?

S.B.: Conventional headlights and lighting units are absent from both the front and rear of this car. Instead, there are fully digital display surfaces comprising hundreds of triangular pixel segments. Grouped around the Single Frame are large light fields, in which—as at the rear—more than 600 3D pixels are arranged in space. This enables versatile graphics, animations, and information visualisations in any colour. The Audi

Aicon supports its surroundings intelligently and uses animations on its display surfaces to warn pedestrians or cyclists of dangerous situations. The customisation is boundless. If the car detects passers-by or other road users, it literally makes eye contact with them and follows them with its 'eyes'. Horizontal stripes of light move from the bottom up when the car accelerates, and in the opposite direction during braking. Their speed increases or decreases in sync with that of the car. Future cars will expand their sphere of communication to the surroundings. The Audi Aicon uses projector modules to illuminate the road and surroundings in high resolution, and project signals onto the ground. This enables it to communicate warnings and vehicle information to passers-by with no direct line of sight to the car. One thing that an autonomously-driving vehicle of the future definitely won't need anymore is long-range headlights.

DVN: Do you have other thoughts you'd like to share?

S.B.: Lighting technology continues to become increasingly important, with its outlook now changing. While safety remains the most important development aspect, in the future, car lights will be able to do more than give light. Through our digitalisation efforts, Audi are pioneering a new dimension of vehicle lighting technology. Lights are becoming a medium for external communication and interaction. In other words, an important means of communication with other road users. In today's automotive design, headlights and rear lights are now the perfect design element for car customisation, for example with digital light signatures. And the evolution of vehicle lighting is far from over. The new special exhibition illuminates the current trend of digitalisation in lighting technology and offers an exciting glimpse into the future.

DVN: Thank you, Stephan, for your visionary thoughts, and for your efforts during my visit!

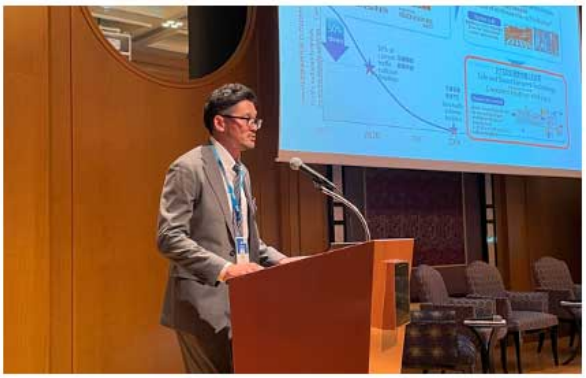
Lighting News

Tokyo DVN Workshop Gets a Great Start This Morning

LIGHTING NEWS

Opening of DVN workshop by Dr Huhn, DVN Senior Advisor

The 27th DVN Workshop started today at the Ritz Carlton in Tokyo. More than 250 attendees followed the opening speech of DVN Senior Advisor Wolfgang Huhn.



TAKESHI TAMADA – HONDA

KAZUYUKI MIYASHITA - ICHIKOH VALEO

Dr Huhn introduced the two keynote speakers. Honda Chief Engineer Manager Takeshi Tamada talked on the Future Prospect of Vehicle Lighting, then Valeo-Ichikoh CTO Kazuyuki Miyashita gave a speech on Lighting Transformation Through the Japanese Market.

FUMIHIKO MOURI - TOYOTA

TOMOHIRO WATANABE – MITSUBISHI

The first session started by the lectures of Toyota's Fumihiko Mouri and Mitsubishi's Yomohiro Watanabe.

NETWORKING AT THE DVN TOKYO WORKSHOP

Attendees had great opportunities for networking while visiting expo booths from the likes of Koito; Valeo-Ichikoh; Stanley; AMS Osram; Lumileds; Nichia; OLEDWorks; LG Innotek; AML Systems; Auer; Bicom Optics; Covestro; Spy; Synopsys; TechnoTeam; Suss MicroOptics, and Yejia.

Watch for initial coverage of the Workshop in next week's DVNewsletter, and a full report at the end of the month.

CATARC, TÜV SÜD Lighting Open House

By DVN Senior Advisor Wolfgang Huhn

LIGHTING NEWS

CATARC—the China Automotive Testing And Research Centre—and TÜV SÜD held an open house event in Erding, Germany on the last day of May, 2023. It was focused on Chinese and European lighting homologation topics, and the hosts welcomed around 20 attendees from ams OSRAM; HELLA Czechia; Marelli; Hyundai Mobis; Koito; Nihon Denkei, and other companies.

CATRAC's managing director Mr. Guanqi Hao introduced his company's full-service testing and certification ability, offered in cooperation with TÜV SÜD. They cater for CCC (China Compulsory Certification) and ECE homologation; audit support; COP testing, and R&D support. TÜV SÜD mobility VP Stefan Merkl gave a presentation on his outfit's worldwide testing; certification, and inspection abilities, with 150 years of history. The huge company has over 25,000 employees, and revenue of €2.7bn. Fully 350 automotive experts work for TÜV SÜD, but they've no lighting lab; cooperation with CATARC fills this gap.

As for technical presentations, Michael Ebert discussed LED retrofit approval, and Ling Li explained the differences between the 2021 and 2024 versions of C-NCAP (Chinese new car assessment programme). The biggest change for lighting is that ADB becomes an evaluation item in the 2024 edition. Low beam performance will count for 60 per cent of the grade; ADB 40 per cent. The measurement of the optical performance of the ADB is still under development. (*the HSPR Headlamp System Performance Rating, a recommended practice of the GTB, is a proven solution --ed*). It's worth noting what C-NCAP has to say about the reason for ADB testing:

The adaptive high beam function, ADB, is the main technological development trend for future automotive headlights. ADB can significantly reduce the proportion of driving accidents, and its installation rate is increasing year by year. The optical performance and system performance of ADB needs to be evaluated.

As an example of the 2024 specifications, the detection distance of oncoming vehicles shall be at least 400m and leading vehicles shall be detected at least 100m away, measured at an ADB vehicle speed of 60 ±10 km/h. Details are in the C-NCAP 2024 protocol.

On the lab tour, a headlamp with DMD HD ADB was shown on the LMT 1600 goniometer, and attendees also got to see all other test equipment CATARC have in their Erding facilities. A final networking dinner ended this interesting afternoon.

FORVIA Wrapped up its 2023 Annual Shareholder's Meeting

LIGHTING NEWS

Patrick Koller in the middle

«FORVIA is on track to reach all its objectives detailed in the POWER25 plan presented to investors in last November» CEO Patrick Koller said.

The points to retain of the meeting:

- The refinancing of the HELLA acquisition has been completely finalized and the asset disposal program is now fully announced to generate our €1 billion target by the end of 2023.
- Synergies with HELLA are now tangible and joint order intakes already reached €1,8bn in 2022.
- FORVIA growth is sustainable with strong order intake in 2022 of €31bn at a targeted average operating margin better than 7% and the creation of specific sustainable offers or entities like Materi'Act.
- In Q1 2023, FORVIA outperformed the market with sales growth of +29%, which combined to "our manage by cash" program, had an immediate and very positive impact on the cash generation.
- This change, which comes one year after the completion of the acquisition of a majority stake in HELLA, represents a further important step in the creation of the combined Group. A group we all can be proud of, 7th global tech automotive supplier, dedicated to the mission "Pioneering technologies for mobility experiences that matter to people".

ZKW Partner for Sustainable Headlamp Materials

LIGHTING NEWS

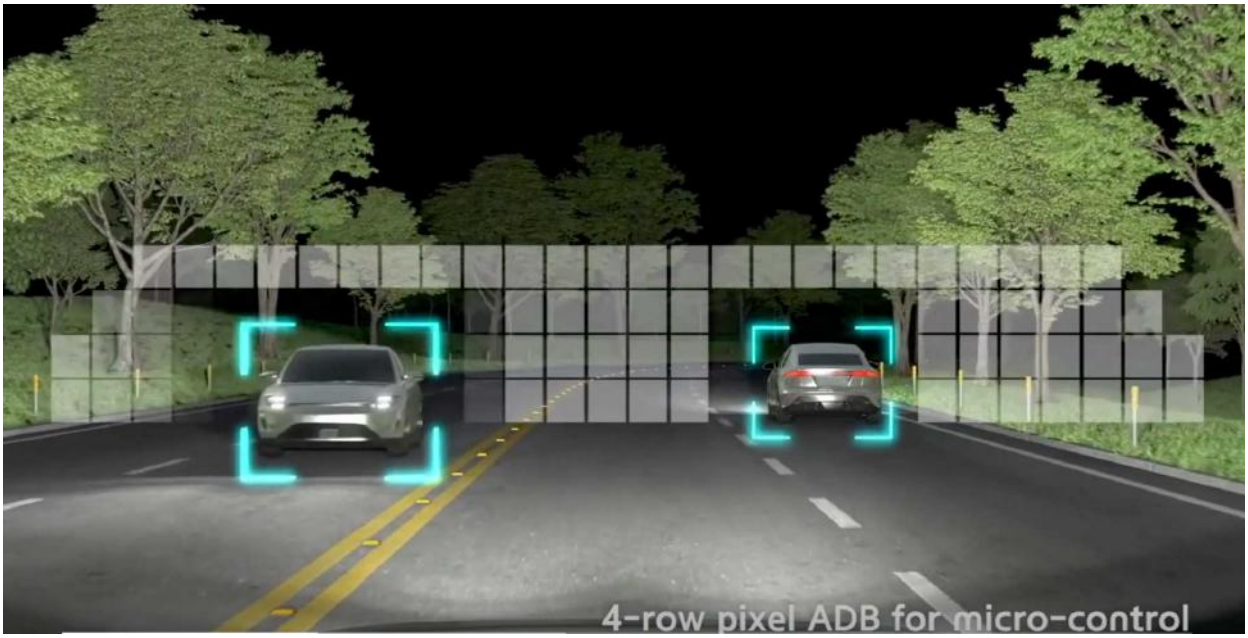
ZKW are partnering with the University of Leoben; Joanneum Research; and the Polymer Competence Center Leoben for research and development of sustainable materials for headlamps; notably, polymers based on renewable raw materials. The goal is to achieve high durability and improved separability in order to be able to fully recycle the materials. In addition, self-healing plastics are to be used.

Headlamps comprise many complex plastic components, currently made out of polymers based on fossil raw materials (oil). Increasingly, the automotive industry is demanding lighter weight and sustainable materials. So ZKW are working with research partners to develop new bio- and recyclate-based composites to enable sustainable headlamp design. The aim is not only to discover and devise basic materials, but also complex surfaces to protect the components.

To the partnership, ZKW bring their expertise and knowledge, as well as samples and laboratory and production equipment. The University of Leoben provides technical and analytical expertise as well as laboratory equipment to investigate, test, and process materials. The research and simulation of new, self-healing plastics is a focus of the Polymer Competence Center Leoben. Joaneum Research contribute their capacities for the development of new composite materials, and expertise in plasma and surface technology, as well as optical and modular lighting technology.

Hyundai Mobis ADB Prevents Night-time Crashes

LIGHTING NEWS



ADB help drivers drive safely at night, and high-definition lighting is being developed to factor in communication between the driver and pedestrians.
An HD lighting system developed by Hyundai Mobis visualises road signs in text or shapes, and projects them on the road surface. For example, the lamp shows there is road construction ahead using relevant symbols to drivers, or creates a crosswalk sign on the road surface to help pedestrians cross the road safely.

The system has about 25,000 μLEDs, each 40 microns in diameter—thinner than human hair, and one of its important features is that it reflects data fed by the camera sensor and GPS navigation in real time. For example, when a vehicle approaches a construction zone, the system displays a symbol that is 1.5 metres in size, 15 metres ahead of the driver; it also can inform the driver of the speed limit. The technology is meant to increase visibility and prevent accidents at night. Other use cases: the driver can easily recognise when the car will approach a speed bump, and where highway on- and off-ramps are. The system can also proactively prevent pedestrian accidents; the camera recognises pedestrians while driving along a remote alley, and shows a virtual crosswalk on the road when the car stops. This is 'communication lighting' technology at work.

BYD Denza Auto Sold 11,000 Units in May

LIGHTING NEWS

Denza Automobile recently announced their May sales. Their first MPV model, the Denza D9, sold 11,000 units in May, with a cumulative sale in 7 months of 55,000 units. The transaction unit price of Denza D9 exceeds C¥420,000 (€55,000).

In addition to the D9, the N7—the first SUV after the renewal of the Denza brand—opened blind ordering at this year's Shanghai International Auto Show. The order volume reached 10,000 units in just seven days. The N7 is slated to be launched this month, with deliveries beginning in July or August.

In addition, the D9 Premier Founding Edition four-seater made its debut at this year's Shanghai Auto Show, and official deliveries are planned for the first quarter of 2024. Moving forward, Denza plan to launch new products one after another to enrich the product matrix.

Xpeng G6 Starting Pre-sale

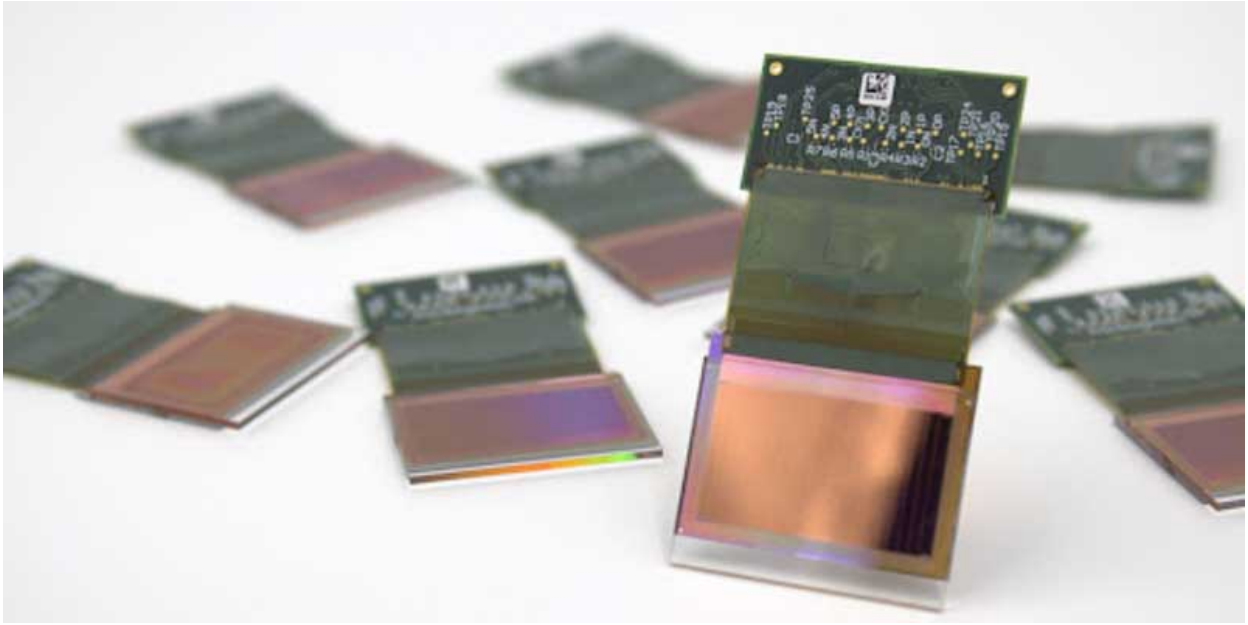
LIGHTING NEWS

Xpeng say their first new strategic model—the G6 coupe SUV—is starting pre-sale. It has an interestingly divided headlighting arrangement, brand-familial full-width LED strip, and illuminated logo. Cameras to sense road conditions are integrated into the lights to improve the performance of the car's driving assistance functions.

Driver Assistance News

Lumotive, Hokuyo Partner for 3D Lidar Sensing

DRIVER ASSISTANCE NEWS



Lumotive and Hokuyo have signed a multi-year production partnership contract to expedite the deployment of essential sensor technology in robotics and autonomous systems applications.

With Lumotive's advanced solid-state beam steering chip, Hokuyo are preparing to produce a revolutionary 3D lidar sensor based on Lumotive's M30 reference design targeted for industrial applications. The new product is expected to surpass conventional mechanical lidar and time-of-flight camera technology, fostering progress in automated guided vehicles (AGV); autonomous mobile robots (AMR), and other industrial applications. In addition, as part of this partnership, Hokuyo are using Lumotive's top-tier manufacturing partners and engineering expertise to bring their advanced sensing products to market faster.

***Lumotive**'s award-winning optical semiconductor solutions enable advanced sensing and perception capabilities in next-generation consumer, mobility, and industrial automation products such as mobile devices, autonomous vehicles, and robots. The company's patented Light Control Metasurface beam steering chips deliver high performance; exceptional reliability, and low cost in a tiny, easily-integrated package.*

***Hokuyo Automatic** are pioneers in automation technology, offering a full range of industrial sensor products for factory automation; logistics automation, and process automation. Hokuyo's products include collision-avoidance sensors; safety laser and obstacle detection scanners; optical data transmission devices; laser rangefinders (lidar), and hot metal detectors.*

Hesai and Cratus in Lidar Development Pact

DRIVER ASSISTANCE NEWS

Lidar specialists Hesai Technology are partnering with Cratus, a software solution integrator for lidar systems. The two companies have entered a strategic alliance to develop autonomous warehouse solutions using Hesai's safety-rated QT128 3D lidar, which Cratus have chosen as the lead sensor in their new lidar perception package for AGVs and AMRs. Cratus and Hesai will work together to release a series of drivers; middleware, and end solutions centred around the QT128 lidar sensor.

Guided Vehicles (AGVs) and Autonomous Mobile Robots (AMRs) have AGVs (automated guided vehicles) and AMRs (autonomous mobile robots) have been used for many years in warehouses and manufacturing plants, to accomplish a variety of material handling tasks. So far, though, they've mainly used 2D laser scanning, which provide only a limited amount of perception data. Hesai's 3D lidar enables new features for AGVs and autonomous forklifts.

The QT128 has a 360° horizontal FOV, compared to 270° from traditional devices. This eliminates AGVs' blind spots, thus avoiding unseen safety threats. The QT128 also meets the ISO 26262 ASIL B – Performance Level D functional safety standard. Functional safety-certified lidar can detect potential risks in electronic systems, sending an alarm to the autonomous driving system and initiating protections. This allows AGVs to operate safely and more efficiently.

Compared to 2D lidar, which typically has only one laser channel, the QT128's 128 channels provide additional safety redundancy and enable rich 3D perception data. In situations where a single laser fails or gets impeded by strong light sources like sunlight, a 2D lidar-equipped AGV would lose visibility. With 128 laser channels, the QT128 can continue to operate effectively, even in complex environments. This enhanced perception capability allows for various AGV applications, including outdoor operations and between-warehouse transfers.

General News

Tesla Model Y Was World's Top-Selling Car in Q1

GENERAL NEWS

China was the biggest market for Tesla's Model Y, helping that car become the world's top selling model in the first quarter of this year.

Tesla sold 267,000 Model Ys in Q1-23, of which 95,000 were sold in China (84,000 in the United States and 71,000 in Europe). Based on overall sales, the United States was the biggest market for Tesla, who don't provide regional breakdown of their global volumes.

In the global sales ranking, the Model Y was followed by the Toyota Corolla; Toyota Hilux; Toyota RAV4, and Toyota Camry.

JATO Senior Analyst Felipe Munoz expects the Model Y will be the world’s top-seller by the year-end in 2023 because of price cuts that enable premium midsize SUV to access the benefits of public incentives for EVs. More production from Tesla's new plants in Texas and Germany and easing supply chain issues, as well as increasing EV demand in the developed economies, should also buoy Model Y sales, he said.