



## Editorial

### 4th DVN Lidar Conference: A Great, Live Event!

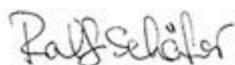
Due to the high Covid counts, it was a close call if we could hold our conference as a live event or not. Fortunately, we were able to safely go ahead under German 2G regulation. We were very happy to welcome about 150 visitors; it was a real pleasure to meet so many of you in person again, and interact in person rather than over video calls and emails.

Participants experienced 26 presentations, two keynote speeches, and two live panel discussions. We had automakers; tier-1s; lidar specialists; component suppliers; testing and equipment specialists; researchers, and analysts. It was gratifying to see the passion and enthusiasm around the topic of automotive lidar. And we saw the same passion with our 21 exhibitors: each break saw great foot traffic through the booths and for networking, and socialising which was finally(!) possible again.

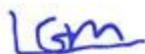
Although it is impossible to capture this conference in a short DVN editorial, we would like to highlight two takeaway points: lidar is growing and becoming more mature; past conferences centred around the *why* of lidar in cars, and now it is more about *how and when*. That's a major shift. And partnerships, standardisation, and neutral and objective testing seem to be important requirements for a higher and faster market adoption.

See below short summaries of the lectures and [click on this link](#) to see corresponding presentation slides in downloadable .pdf format except for a few speakers whose companies objected to their publication.

With best regards from Frankfurt and on behalf of DVN,



Ralf Schäfer  
Senior Consultant to DVN



Leo Metzemaekers  
Senior DVN Consultant

# In Depth Lighting Technology

## 28 Lectures at the DVN Lidar Conference: Summaries



EXHIBITORS:



### Session 1 • Automotive Lidar Applications

#### ***Ford: Prof. Dr. Peter Zegelaar • Automated Driving Journey***

The challenge to go to automated driving is to manage the gradual delegation of driving to automata—hands-off, then eyes-off—for longer and longer periods. For this, Ford are currently acquiring experience with lidar short range sensors, representative in terms of technology, of what can be put into series later. We will need to integrate sensor systems that are redundant in terms of coverage and orthogonal in terms of measurement principles. Ford are therefore experimenting with different technologies—radars, cameras, and lidars—with this in mind. We must be able to detect any type of unconventional object (tire rubber strips, suitcase, bicycle, stopped vehicle) on the road and react automatically, promptly, and correctly to avoid them. At the same time, Ford are studying progressive visual, audible, and haptic warning systems to ask the driver to resume control of the vehicle in the event of failure or the imminent exit of the area where automated driving is possible. Flash lidar is one of the technologies tested on Ford's fourth-generation AD prototypes.

#### ***Volvo: Paul-Henri Matha • Status About Volvo Lidar Integration***

The Volvo strategy is to have a lidar from Luminar placed in an optimal position on the roof to collect data on the environment around the car. A lidar is important, but by itself not sufficient. From the automaker perspective, sensor integration is a key issue and brings challenges including transmission through outer lens; location; contamination; cleaning; scratch resistance, and thermal load.

Constraints include:

- Power consumption: we can't accept a total AD load of 500 W while a great progress of 50W was done by the shift halogen bulbs to LEDs, right?

- Performance in fog, rain, snow, and other inclement conditions
- Regulations on AD signal with discussions inside UNECE while in China, three draft proposals for RID (Road illuminating devices); LSD (light signaling devices), and RRD (retro reflective devices) have been published.

***Marelli AL: Frederic Chave • Versatile use of LiDAR modules into Smart Corner and grille***

Key figures of the modular approach of Marelli are presented: a true full solid-state lidar, a large range from standalone, to grille and Smart Corner integration, lower development effort and time, and a combination of standard CMOS imager and last generation VCSEL array. The software Marelli solution uses an artificial Intelligence SW developed by a dedicated team inside Marelli organization, a combined deep learning/rules-based approach for redundancy, 3D objects detection and classification.

Then the project TINKER is presented: 10 key industrial partners, 3 research institutions, 2 consultancy and service associations from October 2020 to September 2023 with the target to lower weight, power consumption, sensor size and costs, and to improve performance, reliability, safety of ADAS systems.

Timing is Fabrication of RADAR and LiDAR prototypes in 2022 and Demonstration/validation in 2023.



Q&A SESSION 1

**Session 2 • Automotive Lidar Applications**

***Koito: Akinori Ito • Impact of Lidar Performance Degradation***

Koito have been integrating lidar in headlamps for several years; they consider this the best location particularly for short-distance scanning. But scratches by car washes or flying rocks; stains by dust, sand, and mud and water adhesion with rain or fog significantly reduce lidar efficacy.

For a better evaluation of the consequences on performance of these environment aggressions, Koito have realised a specific bench able to measure both the evolution of the maximum detection distance and the evolution of the detection position. The maximum detection distance is particularly decreased with mud, naturally in relation to the quantity of mud. Water droplets also strongly reduce performance.

The detection position is more impacted by droplets: a deviation of 20 cm for a target at 20 m. Mud likewise cuts performance sharply, while scratches have a more limited effect.

To reduce these effects, Koito recommend the use of post processing countermeasures. Koito have also developed specific cleaning systems with air jets to remove droplets, and with water projection to clean away mud. As cleaners are essential for lidar performance, Koito are pursuing efforts to improve these cleaning systems, still with the target to integrate lidar in headlamps.

***ZKW: Georg Pitterle • Lidar Integration Solutions***

ZKW are working to integrate lidars in lighting systems, on grounds that the four corners are very well suited for this application; headlamps offer protection and the best orientation thanks to existing levelling systems, and can readily be equipped with off-the-shelf cleaning systems. ZKW have analysed particularly the effects of integration for optics, cleaning, and

thermics. For optics, they have taken into account all the possible effects both by the environment of the external lens or the effects of the external and internal coatings, both with road tests and in wind tunnels. To clean the lens in front of the lidar, they have analysed high-pressure water nozzles; coatings for omniphobic properties; air blowing, and heating systems. They have also analysed the thermal conditions, as the temperature inside a headlamp can rise to 105°C, that can exceed the maximum limit for lidars. Fans and other active cooling techniques are therefore indicated. After these different studies, ZKW think integration in headlamps is feasible and useful, but that other points have also to be taken into account like design, exchangeability, or technology dependency to choose between a full integration, a partial integration, or only an attached mounting.

### ***Fraunhofer ILT: Andreas Brenner • Radar and Lidar Integration in Headlights***

The target of this advanced development is to realise a smart headlight integrating both an advanced lighting solution and the two ADAS sensors that could be efficiently integrated in headlamps, a lidar and a radar. To optimise the packaging, the idea was to have a coaxial output, but with lidar and radar devices put in a perpendicular direction with their waves reflected by specific multispectral combiners.

The lidar system is designed on basis of a VCSEL array simple to address selectively. Detection is done using SPAD arrays, so with no movement. The key innovation here is to use signals with coded signature for being protected against interactions with other lidar systems.

The radar FHR has high resolution and an extended field of view, and for lighting, segmented light sources with apertureless microoptics are used. Finally, one of the key elements is the multispectral combiner that has several facets functioning via coating and laser structuring in different manners.

There is a common field of view for the three kinds of waves. Current packaging of H270 × L235 × D480 mm is too large for a quick implementation.

## **Session 3 • Market and Ecosystem**

### ***LeddarTech: Franz Saintellemy • Why Flexible Platforms are Required for ADAS/AD***

*Franz Saintellemy gave an excellent presentation on the importance of partnerships in the automotive lidar ecosystem. Partnerships are in the DNA of LeddarTech, and they very advanced in making assessments on partnerships and execution.*

### ***VSI Labs: John Cooper • How Sensor Avancements are Adressing Higher Levels of Automation***

*VSI Labs John Cooper made a lively presentation on the importance of sensor evaluation. VSI have the capabilities to measure, test, and compare various sensors such as cameras, lidars, and radars, with a neutral and agnostic approach.*

### ***Yole: Pierrick Boulay • Lidar Technology Roadmaps***

*Pierrick Boulay shared Yole's lidar market research on lidar and the lidar ecosystem. He showed us the landscapes of the many different active companies and various technologies used. The combination of multiple ADAS applications is needed to reach high level of autonomy, and requires increasing need of sensors. Mechanical lidar at 905nm still dominates the market. There is not one lidar that fits all applications. The lidar market is expected to grow fast after 2023, to reach more than \$2bn in 2026.*

### ***Carhs Training: Ralf Reuter • NCAP Roadmaps Regarding Accident Avoidance Systems***

*NCAP programs around the world will add multiple scenarios in the future, including intersections requiring larger angles, nighttime operation, VRU detection and avoidance, and oncoming cars at high speed. For our lidar community, it will be crucial to keep an eye on the future NCAP initiatives. Although NCAP will not recommend any technology as such, the*

scenarios they define and the potential role lidar can play are important factors which can influence strongly the automotive lidar adoption curve.



## **Session 4 • Automotive Lidar Systems 1**

### **Cepton: Brunno Moretti • High-performance Lidar Scalable for Auto Application**

Cepton have developed an affordable, reliable automotive lidar. They have chosen for the illumination a 905-mm edge-emitting source due to its low cost—less than \$1—and its brightness. They use time-of-flight detection with Si PAD for its simple design and low cost, and MMT (Micro Motion Technology) imaging to form 3D images. They have developed their own ASIC to combine the illumination control and detection functions. Their compact Nova Lidar is for near-range applications. It can be placed behind the windshield, behind the front fascia, or in the headlamp as done in a common study with Koito.

Cepton have developed specific software—the Helius Smart Lidar System—for vehicle and people classification and tracking. They are also claiming to have the industry leading frame rate at 380Hz with various applications like e-tolling or vehicle/container scanning.

### **Xenomatrix: Filip Geuens • How to Assure a Clear View for Solid-State Lidar**

Xenomatrix are developing multibeam lidars targeting a homogenous resolution with no gaps between scan lines, simultaneous measurements with a global shutter, no aging or calibration drift, and easy assembly. These lidars could have applications naturally for ADAS, but also for road scanning to assess the road quality. To maintain lidar performance, Xenomatrix have collaborated with Kautex on developing tests to analyse different materials including Gorilla Glass, hardcoated polycarbonate, and soda lime glass. These tests were done with various cleaning parameters: pressure, duration, nozzle position and shape, and water:air ratio. In the end, Xenomatrix obtained good results with their compact multibeam XenoLidar modules, and concluded that close cooperation with tier-1s is necessary for good final results, particularly for cleaning as the design and parametrisation of the cleaning system as well as the choice of the cover material and the coatings are part of the lidar integration exercise.

### **Ibeo: Mario Brumm • How Solid State Sensors are Making AD Suitable for Mass Production**

Ibeo have been in the lidar business since several years, having introduced their technology in the Valeo Scala automotive lidar in 2017. They are now preparing a new generation, the IbeoNext, with a SOP in 2022. Its development is supported by strong investors convinced that lidars will have strong sales increase, with increasing importance of the solid-state technology chosen by Ibeo. IbeoNext will be a lidar for corners, and Ibeo are saying it will be the only system to address all corner cases like detection of small obstacles with high resolution, overhanging truck loads, and close cut-ins. They have developed standardised transceiver plates for all sensors, a variety of optics for different FOVs, and lidar software.

### **Blickfeld: Terje Noevig • Seamless lidar integration**

Blickfeld are a relatively young German company, founded in 2017 with presence also in Palo Alto. One of their is seamless sensor integration compared to some initial bulky sensors particularly when they are on vehicle roofs. Blickfeld's solution is compact lidars called Vision Mini, packaged in a 5-cm cube. These are aimed at providing safety in ADAS and AD applications, but also for comfort for instance with pothole detection and automated door opening. The evolution of norms—particularly EuroNCAP which will tighten the requirements in 2023-24 for VRU protection to obtain a 5-star rating, or the possible integration of car-to-car junction scenarios—will certainly boost the need of lidars on vehicles.



Q&A SESSION 4

## **Session 5 • Automotive Lidar Systems 2**

### ***Continental: Heiko Leppin • High Performance, Agile Lidar for Flexible Integration***

Heiko Leppin, a senior expert for lidar architecture, covered topics on lidar technology and vehicle integration in combination with use cases as well as cleaning. Flash lidar can best serve short-range use cases, whereas MEMS lidar is developed together with AEye for long range sensors. Preferred positions for lidar sensors in a vehicle are grill, roof, headlamp, and windshield—depending on use case. Different methods of lidar lens cleaning are available, and will become an important element in real-life application success of lidar systems.

### ***AEye: Hod Finkelstein • Intelligent Lidar: A Pragmatic Approach***

In his talk, R&D chief Hod Finkelstein addressed the topic of lidar implemented with intelligence. One of his clear statements was that for the automotive market, lidar systems have to deliver reliable data even under adverse conditions, be of small size, draw little power, and have low cost. AEye's approach to support this direction is a "bistatic" lidar hardware which is affordable and mechanically robust. The key element of the system is intelligent software which controls scanning of the scene and gathers data depending on the density of objects. In areas where object density is high, scanning is repeated with higher resolution to gather more reliable information.

### ***Lumentum: Matt Everett • High-Power VCSEL Arrays for Next-Generation Lidar***

Matt Everett is the sensing product line manager at Lumentum. In his talk, he presented the newest developments in VCSEL and array technology. He explained why latest multi-junction VCSEL array chips have superior benefits for ToF lidar systems. Addressing individual emitters of the VCSEL array will allow an optimal match between the VCSEL emitter and the lidar detector topology. VCSEL arrays have the advantage of proven reliability in other applications, and a high-volume production infrastructure is available. Additionally, they can enable simpler optics, feature high peak power densities in pulsed operation, and support more options for lidar architectures.

***Liangdao: Shiyao Shou • A Location-Independent, Lidar-Based, Real-Time Approach for Validation of Lanekeeping Assistance and Lane Departure Warning Systems***

This presentation by software engineer Shiyao Shou incorporated as an interesting element, that lidar was not used as a safety feature of the vehicle itself, but to test and measure the ADAS performance of a lanekeeping or lane departure warning assist. Extension of the testing system to other ADAS functions like AEB and ACC is planned.



Q&A SESSION 5

**Session 6 • Technology Enablers**

***Auer: Christian Paßlick • Multilayer Coatings Enabling Sensor Solutions***

Dichroic coatings create precisely-defined optical interference between the reflected or transmitted partial beams of incident light. An alternating-layer system is usually used, consisting of a material with a high refractive index like  $\text{TiO}_2$  ( $n=2.7$ ) and a material with a low refractive index like  $\text{SiO}_2$  ( $n=1.46$ ). Reflectivities and transmissions of almost 100 per cent can be achieved for a selected wavelength range. Coatings maximise the light signal, increase the distance and accuracy of the laser ranging, minimise background noise, and protect against environmental influences.

***Canatu: Juha Kokkonen • CNB Heaters as Key Enabler of Any-Weather Safe AD***

Conventional wire heaters cause wavefront distortion blocking the optical path of the light and heating wires obstruct the camera sensor field of view causing pixel distortion. Canatu propose their CNT films to overcome this. They offer record-high transparency and conductivity, ultra-low haze, and no reflection. They're wire-free to enable maximum transmittance. These thin-film heaters offer even heating across the entire surface because the whole surface is conductive. They're 3D-formable, enabling easy integration in lidar sensors embedded in the front bumper, emblem, or other parts.

***Kyocera SLD: Jisip Kovacevic • All-In-One Enabler for Ranging, Lidar and LiFi***

Laser light is brighter than LED (1100 vs 200  $\text{cd}/\text{mm}^2$ ), smaller (350  $\mu\text{m}$  vs 1 mm), and faster (>2 gbps data transfer vs 100 Mbps). The DataLight LiFi today can be 20x faster than 5G and WiFi with up to 10 gbps out to 1,000 m (long range); 20 gbps between 10 and 50 m (mid range), and 100 gbps out to 10 m (short range).

***AMS Osram: Clemens Hofmann • Lidar System Advantages Using 905nm***

AMS Osram are developing a laser wavelength stability technology for significant lidar performance improvements. Key characteristics:

- Halving the optical filter bandwidth increases the range by 15 to 30 per cent vs existing laser technology, and/or keeping the achievable range to a target the same, the  $\lambda$ -stable laser can be driven at 25 to 40 per cent lower power level versus standard lasers;
- Removing any TEC, the associated power consumption, and processing necessary for monitoring and activation will yield lower system costs, and
- By narrowing the spectral operating range of the laser, photodetector technology can be optimised to improve responsivity and efficiencies for overall lidar system performance improvements.

## **Panel 1: Lidar Market and Ecosystem**

*moderated by Leo Metzemaekers, DVN Senior Consultant*



*Eight panel members representing Ford, Volvo, ZF, ZKW, Cahrs Training, Marelli, LeddarTech, and Yole discussed the automotive lidar ecosystem. The panel addressed questions of why lidar is essential, as well as technology accelerators, enablers, and roadblocks. The panel compared a competitive (solo) versus cooperative (partnership) ecosystem approach. We saw consensus that partnerships will play in important roles in the further adoption of lidar and that the availability of common test and evaluation procedures will also become crucial.*

## **Panel 2: Cooperation opportunities of lidar suppliers and technology enablers to improve market adoption**

*moderated by Ralf Schäfer, DVN Senior Consultant*



Panel 2 was devoted to the co-operation along the value chain. Members of this panel discussion were Brunno Moretti (Cepton), Mario Brumm (Ibeo), Juha Kokkonen (Canatu), Niklas Andermahr (Dioptric), Xiaohan Li (Liangdao), Matt Everett (Lumentum) and Dirk Seebaum (Trioptics).

During the discussion, it turned out that the statements of the panel members converged to a main opinion about co-operation along the value chain. In logistic and commercial terms, a “standard linear” pattern will develop from OEM to T1 and T2/3. On the other hand, a triangular or even circular communication pattern about technical as well as marketing aspects has to evolve along the supply chain. In this way lidar market adoption can be supported best by all players in the field. DVN conferences and activities can contribute to generate this type of communication scenario.

# Lighting News

## U.S. Congress Orders NHTSA to Allow ADB & Fix Aim—Yay?

*Analysis by Daniel Stern, DVN Chief Editor*

LIGHTING NEWS



The American motoring and popular press has been abuzz for the past few days with big, breathless headlines like **ADAPTIVE BEAMS FINALLY APPROVED FOR USA**. Chance would be a fine thing, but that is not what has actually happened. Rather, Congress has *directed* NHTSA to approve ADB. A trillion-dollar infrastructure bill U.S. President Biden signed into law last week contains the following text:

**SEC. 24212: HEADLAMPS**

(a) *In this section:*

(1) *The term "adaptive driving beam headlamp" means a headlamp (as defined in Standard 108) that meets the performance requirements specified in SAE International Standard J3069, published on June 30, 2016.*

(2) *The term "Standard 108" means Federal Motor Vehicle Safety Standard Number 108, contained in section 571.108 of title 49, Code of Federal Regulations (as in effect on the date of enactment of this Act).*

(b) *Rulemaking: Not later than 2 years after the date of enactment of this Act, the Secretary shall issue a final rule amending Standard 108—*

- (1) to include performance-based standards for vehicle headlamp systems*
- (A) to ensure that headlights are correctly aimed on the road; and*
- (B) requiring those systems to be tested on-vehicle to account for headlight height and lighting performance; and*
- (2) to allow for the use on vehicles of adaptive driving beam headlamp systems.*

Given what we might call the 'slow-motion sickness' of a decade's wait for action on ADB in the world's second-largest auto market (and the only major market where ADB remains illegal), reasons for optimism and hope almost jump off the page at us from this block of text — which, remember, is now *law*. For example, NHTSA's severely flawed ADB technical standard is now a dead letter, and the much more thoughtful, much more internationally-compatible SAE J3069 standard shall prevail. That is quite righteous! However, it would be premature to pop any champagne corks just yet. For one thing, the law gives NHTSA two years to allow ADB. As we [described](#) last week and the [week before](#), NHTSA is hopelessly behind on just about everything on its docket, including many regulations, and the agency has been found in a long string of audits to be structurally incapable of carrying out its mission.

Sadly, then, the smart bet might be to put this latest two-year deadline on top of the tall stack of missed deadlines and broken promise-dates we've slogged through over the last ten years. One cannot squeeze orange juice from a rock; a dead mule will not walk—let alone run—no matter how hard it might be whipped, and a sturdy collection of evidence suggests it's not reasonable to expect NHTSA will meet this latest deadline. Perhaps that's a wrong prediction; maybe it's overly pessimistic. Perhaps NHTSA, relieved of the responsibility of choosing how to implement ADB, will comply with this congressional directive forthwith. Hope springs eternal, as the saying goes! We will have to wait (some more) and see. Now, the ADB provision of this congressional directive is, at least theoretically, an easy drop-in: NHTSA amends FMVSS № 108 to permit ADB as defined and specified in SAE J3069...done!

# Launch of the International Automotive Lighting Regulatory Harmonisation Forum (IRHF)

## *Status Report from Geoff Draper*

LIGHTING NEWS



Following the announcement in the 19 October 2021 DVN newsletter, I have widely distributed my invitation to join the International Automotive Lighting Regulatory Harmonisation Forum (IRHF) and the responses already reveal that I will not have the support necessary to achieve the objectives.

My initiative was to create an association to contribute to the development of a consensus to actively encourage the worldwide harmonisation of technical requirements. However, for IRHF to succeed it needs wide international support of a significant number of stakeholders to be able to influence the NGOs and contracting parties (governments) at the UN World Forum (WP29). IRHF cannot have NGO status and would therefore, have no automatic rights to participate at the World Forum (WP29). Nevertheless, it could have offered its conclusions by demonstrating a strong international interest in harmonisation based upon a strong consensus.

Based on the feedback that I have received through LinkedIn and other channels, I cannot proceed with the development of IRHF because it could not claim to be a voice of the worldwide vehicle lighting community. My decision therefore is to reluctantly stop my initiative with immediate effect.

It remains very clear to me that the industry needs worldwide harmonisation, and EVERYONE continues to wait for SOMEONE to make the first move!!! Unfortunately, my initiative did not provide a solution to this impasse!

I sincerely thank those who have expressed their interest and support and I encourage them to actively work with the NGOs (e.g., GTB, OICA and IMMA) who participate in the UN World Forum (WP29 and GRE).

# Faurecia's Hella Acquisition Motors Along

LIGHTING NEWS



Faurecia announced last week that their public-purchase offer launched from September 27 to November 11 will allow controlling 79.5 per cent of the actions of Hella. Of this total, the 60 per cent held by Hella's family shareholders were already acquired, as agreed in the acquisition agreement announced this past summer.

To buy back 100 per cent of the capital would have cost Faurecia €6.7bn. With the 79.5 per cent of shares, the investment will be limited to €5.3bn.

Faurecia will, however, have to contend with a fund activist with 6.5% Hella's voting rights, who seems to be betting that Faurecia will end up making a better offer to minority shareholders.

With the Hella acquisition, Faurecia will position themselves as the N° 7 automotive supplier worldwide, with a turnover expected at €26.5bn in 2022. Faurecia have already got approval from close to ten national competition supervisory authorities, and now are awaiting the agreement of the European Commission. Pending that approval, finalisation of the operation is confirmed for the start of next year.

# LED Drivers Enable Smooth Beam Transition

## LIGHTING NEWS



Allegro MicroSystems are expanding their vehicle lighting offering with two new devices which can be used both stand-alone and in ADAS solutions.

The unique selling point of the A80803 is a multi-topology converter architecture to enable smooth transitions between low and high beam with a single IC. The A80804 linear LED driver offers high performance for automotive lighting via multiple independently configurable channels. Both devices help designers reduce the number of ICs needed to create lighting systems for vehicles, enabling more powerful and compact designs at a lower system cost.

The A80803 is a constant-current switching regulator for high-power automotive LEDs that addresses common problems for headlight designers, with innovative features that make it easier for designers to integrate advanced features into even midrange vehicles. The multi-topology single-ended controller design, together with a wide input/output voltage range, provides a universal solution for a wide range of applications or LEDs. Options for SPI-based control or EEPROM-based end-of-line programming for stand-alone operation further expand the possibilities.

The A80804 is Allegro's first 4-channel linear driver for high-power LEDs. In addition to targeted applications such as DRL/position and stop/tail lights, it offers designers more design flexibility for popular functions such as sequential flashers and animation effects. It also offers analog and PWM dimming and a dual brightness mode. The chip is configurable without a microcontroller, reducing cost and design complexity.

# Continental Win Large Supply Bid for OLED Interior Displays

## LIGHTING NEWS



Continental have received their first major order—worth about €1bn—for OLED displays in a production vehicle. The order includes a multi-display that extends from the driver's area to the centre console, and integrates two screens optically bonded behind a curved glass surface. Series production is scheduled to start in 2023.

One of the ways OLED technology achieves an aesthetically pleasing user experience is through its ability to light itself up; no backlighting is required, so these displays can be particularly thin and lightweight, with much greater design freedom. The technology also allows for more complex shapes as well as curved installation of the display. Furthermore, the OLED display provides brilliant colours and a deep black background, which increases contrast and improves readability for high-quality, user-friendly content. Contrast and colour diversity are maintained by OLEDs over a very wide viewing angle of almost 180° without loss, which makes the display in the centre console in particular interesting also for front-seat passengers.

The self-luminous property also makes OLED displays use relatively little energy. Instead of the entire backlighting of conventional screens, OLED technology only lights up those pixels needed for the momentarily relevant information of the human-machine interaction. As a result, the OLED solution consumes significantly less energy than a comparable LC screen for typical automotive content.

# Lucid, Rivian are NA Vehicle of the Year Finalists

## LIGHTING NEWS



Electric vehicle startups Lucid and Rivian are, for the first time, in the running for North American Car, Truck, and Utility of the year.

The winners, based on votes by a panel of 50 journalists, will be announced in early January. After three days spent driving the 23 eligible vehicles, jurors settled on nine finalists: two sedans and a hatchback; three pickups with quite different designs; and three crossovers, two of which are from the Hyundai group. One finalist in each of the three categories is an EV. Car of the Year finalists are the Honda Civic, Lucid Air, and Volkswagen Golf Mk VIII. Truck of the Year finalists are the Ford Maverick, Hyundai Santa Cruz, and Rivian R1T. And Utility Vehicle of the Year finalists are the Ford Bronco, Genesis GV70, and Hyundai Ioniq 5.

The finalists were chosen from eight cars, six pickups, and nine utilities that are completely or substantially new and are either on sale in U.S. showrooms or will be by year end. The awards are intended to recognise the most outstanding new vehicles of the year, based on factors including innovation; design; safety; handling; driver satisfaction, and value for the dollar.

# Driver Assistance News

## Marelli AL at DVN Lidar Conference

### DRIVER ASSISTANCE NEWS



Marelli, at their DVN Lidar Conference expo booth, showed off their new range of lidar modules, developed together with partner Xenomatix.

Marelli's novel sensors use VCSEL and CMOS for reliability and affordability. They come with a wide range of view fields and resolutions to best meet whatever requirements may present. Modules are available with integral proprietary tracking and classification software as standalone units or integrated into front and rear lights and other parts of vehicles to provide short-, mid-, and long-range distance measurement sensors.

Marelli ADAS Sensors and Smart Corner product management and business development director Frederic Chave gave, during the opening session, an interesting lecture on the topic of "Versatile Use of Lidar Modules in Smart Corner and Grilles". An update was shared on the future Optical Phase Array lidar technology developed together by 10 European industrial partners under the TINKER Horizon2020 research project.

And Marelli business development and product management senior director Thomas Fröhlich chaired session 4, wherein lidar start ups including Marelli partner Xenomatix presented their latest developments, roadmaps, and market experience.

# Valeo's Multi-Task Fisheye AV Camera

DRIVER ASSISTANCE NEWS



Valeo have launched WoodScape, the first ever surround-view fisheye camera with open-source dataset.

Valeo Comfort and Driving Assistance business group president Marc Vrecko says "With WoodScape, we would like to encourage the research community to develop computer vision algorithms for fisheye cameras aimed at both low- and high-speed vehicle automation scenarios, in order to make roads safer".

WoodScape comprises over 10,000 images captured by multiple Valeo vehicles across Europe using four automotive-grade surround-view fisheye cameras and annotations for a variety of tasks such as semantic segmentation, depth estimation, 2D object detection, visual odometry, motion segmentation, soiling detection, and end-to-end driving.

While datasets from narrow field cameras are available, there are no extensive multitask surround-view fisheye camera datasets publicly available. In addition, most automotive public datasets limit research to three or four tasks.

One of the biggest challenges in automated driving research is obtaining sufficient relevant data that has been thoroughly labeled and human-annotated to allow perception systems to classify objects surrounding the vehicle. WoodScape will help to address this challenge.

*Valeo have developed the most comprehensive sensor portfolio in the automotive industry, comprising ultrasonic sensors, radars, cameras, and the first and only series-produced lidar to meet automotive standards and able to be fitted in vehicles that are already on the market. In particular, Valeo produce fisheye cameras enabling 360° perception, key for automated driving.*

# Lotus E-SUV May Have Lidar Sensor

DRIVER ASSISTANCE NEWS



Lotus have begun teasing their Type 132 electric SUV. The second video released by Lotus shows what gives every appearance of being a lidar on the vehicle's roof. At first glance, it opens and closes. It is assumed that this system will only be opened when the vehicle is running, the rest of the time it will be closed.

Lotus say lidar really is the eyes of the car, and it will be very useful for intelligent driving. We will be keen to see how this particular aspect of the E-SUV develops toward commercialisation!

# Laser Components' Opto Product Lines for Lidar Markets

DRIVER ASSISTANCE NEWS



Laser Components is an optoelectronics provider supplying the likes of pulsed laser diodes; VCSELs, Si-APD-Arrays, and CMOS SPADs for lidar. Winfried Reeb heads up LC's Active Components business unit, and he recently described the company's innovations in trench-chip pulsed laser diodes and photodiodes.

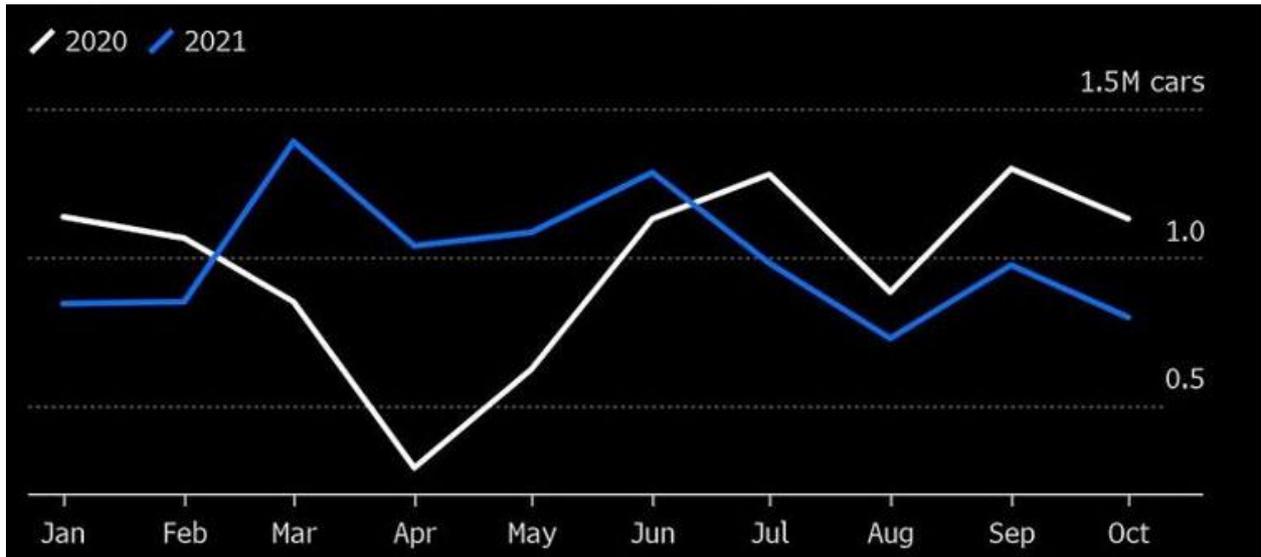
Reeb says the industrial lidar market bloomed in 2021, as well as rangefinding for industry, military, and defense markets. However, carmakers have paid much attention to electric vehicles, so ADAS development has been still slow, pushing large-scale deployments out by several years.

LC have been providing pulsed laser diodes and avalanche detectors for more than 20 years, and have accumulated a wealth of experience in the automotive industry. Regarding laser diode requirements for lidar applications, discrete solutions available on the market usually have a pulse length of 5-10 ns. Reeb says LC's standard QuickSwitch Pulsed Laser Diode with 2.5 ns pulse length and 76-93W @80V is a perfect match for the automotive and industrial lidar market. For applications requiring higher peak power levels, customised arrays and special designs can be put together. The huge benefit of shorter pulses is the ability to detect with a very high resolution at short and long distances. The other benefit is that lidar can work with higher peak power reaching 93W or even more which allows measurement of longer distances while still being eye-safe due to the lower-power laser.

# General News

## Europe Sales Drop to Record Low in October

### GENERAL NEWS



Passenger car sales in Europe fell 29 per cent in October, the worst sales on record for the month, as the shortage of semiconductors constricted the supply of new vehicles.

Registrations in the European Union and UK were lower than 800,000. Hyundai, Kia, Porsche, and Smart had sales increases despite the overall market decline, while Jaguar and Ford saw their registrations drop steeply.

Volkswagen Group's 42 per cent drop in deliveries last month made VW fall behind Stellantis as Europe's top-selling automaker; nevertheless, Stellantis saw a volume drop of 32 per cent. Stellantis sold 166,000 cars last month, compared with VW Group's 165,000.

"We are getting by. We are trying to deal with it," Volkswagen Group CEO Herbert Diess said this week at a conference in Berlin. "I hope we are through the worst."

VW Group, like other automakers, are prioritising their most profitable brands and cars for chips. The group's Porsche brand increased sales by 13 per cent in October.

Hyundai Group was Europe's № 3 group by sales, with registrations up 6 per cent to 86,000, passing Renault Group, which recorded a 32 per cent decline to 81,000. Hyundai brand sales jumped 11 per cent, while Renault brand's registrations fell 36 per cent.

Nissan was down 29 per cent, and Toyota brand sales fell by 24 per cent. Mercedes-Benz registrations dropped by 36 per cent, and the BMW brand was down 21 per cent. Ford's registrations plunged 41 per cent. Jaguar Land Rover had a bad month, with Jaguar sales down 55 per cent and Land Rover falling 39 per cent.

Nevertheless, European sales in the first 10 months were up 2.7 per cent to 9.96 million.

# Leoni Thrive in Challenging Market Environment

## GENERAL NEWS



The production stoppages among car manufacturers, caused mainly by bottlenecks in the supply of semiconductors in the third quarter, increasingly affected the volumes of the Wiring Systems Division; in some cases Leoni's production also continued to suffer due to shortages of input materials. CEO Aldo Kamper (photo) says the company "continued to stabilise despite the substantially cloudier conditions in the third quarter. Despite our progress to date, we will remain vigilant as the negative effects from the semiconductor crisis and disruption of supply chains will persist and continue to challenge us".

Sales recovery continues; third quarter sales, seasonally characterised by the summer break and additionally affected by production stoppages among car manufacturers due to supply chain disruptions, are up around 10 per cent year-on-year at €1.169bn; consolidated sales for the nine-month period amounted to €3.818bn.