DrivingVisionNews.com
Automotive lighting and driver assistance technologies

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Editorial

Optical Wireless Communication In Traffic?

During the Shanghai Workshop I had the chance to renew a nearly-lost contact with a former Audi Beijing colleague who left the company to run his own startup—yet another example of how fruitful DVN events are! He's made a speciality of OWC (Optical Wireless Communication), also called LiFi. In my opinion OWC was never interesting for vehicle lighting because of the high modulation frequencies and the need to fight the sun during daytime. But after some discussion, I've changed my mind.

I've learnt OWC is already integrated in the 6G wireless communication standard definition in China because of latency, bandwidth and especially environmental reasons. In big Chinese cities, the load of electromagnetic radiation is extremely high, mainly caused by 5G communication. There's extreme density of antennas, such as at road crossings and inside stadiums. The electromagnetic load is very high inside a fully occupied bus with everyone using at least one (increasingly two) mobile phones, and that seems like it can't be healthy. China is the forerunner in wireless communication, so sooner or later this problem will rise up in every big city worldwide. Nobody's going to accept a cutdown in bandwidth; in fact we're sure to keep demanding more of it. OWC has real possibilities as a way to maintain and increase the available bandwidth without negative health influences.

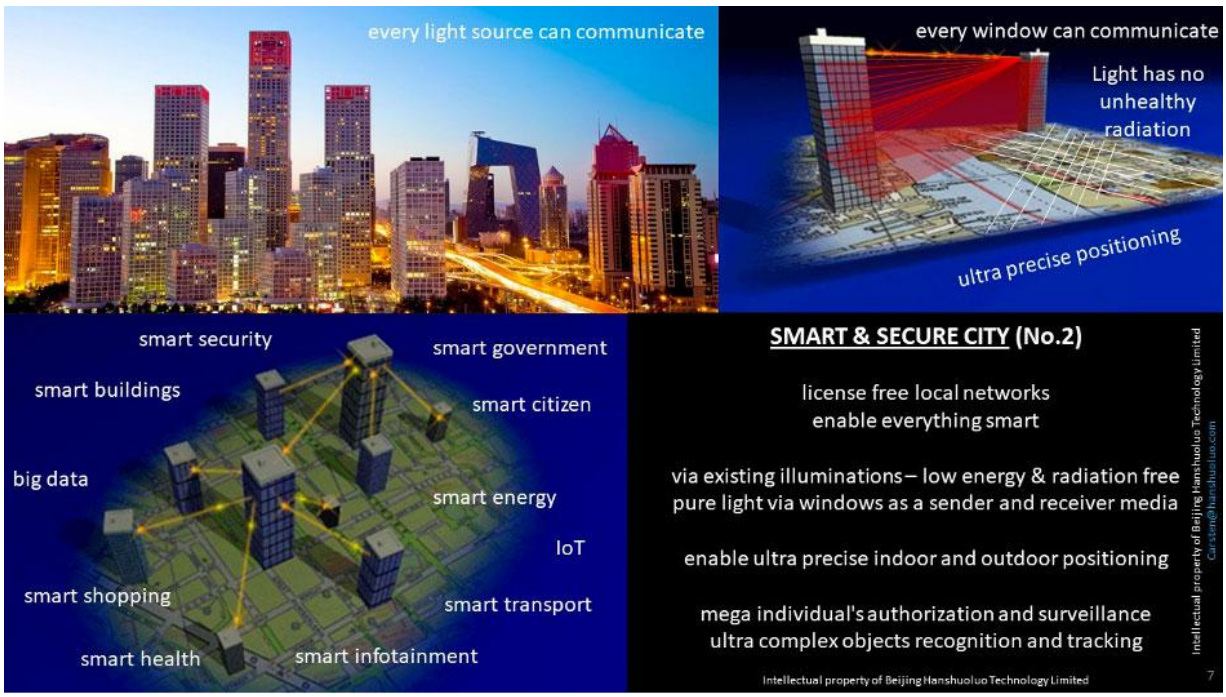
Today's OWC use cases are not yet defined by clamour for "healthy" bandwidth; they are mostly military applications like stealth communication in aircraft, ships, or even while diving: high price, low volume, ultra-secret. None of that is what we need and want in the automotive business. But now the door seems to be opening for short-range communication with light for public applications. As a lighting community, we must at least be aware of this and discuss the opportunities and risks it presents for our business. Imagine there comes a potentially huge future business into our playground and we are sleeping! This must not happen. Let's consider OWC as a potential additional opportunity in vehicle lighting.

I remind you the DVN US workshop in the Detroit area 21-22 September on the theme **“How to Save lives in Night-time Traffic”.** Save the date, it will be the greatest workshop on automotive safety concerning Lighting !

Wolfgang Huhn
DVN Senior Adviser

In Depth Lighting Technology

About the future necessity of Optical Wireless Communication



Carsten Kausch lives in Beijing and runs a start-up company named “Beijing Hanshuoluo Technology Limited” in the field of optical wireless communication. Before his entrepreneurship he worked for Audi as an electronic engineer in Ingolstadt and in Beijing.

Dipl.-Ing. Carsten Kausch studied at TU Carolo-Wilhelmina zu Braunschweig, major mechanics-dynamics, 20 years AUDI R&D for electronics & engineering services, investment projects.

His name in Chinese “考什 卡斯滕”delivers on www.baidu.com several hits, for example the “autonomous driving device”, which covers the full eco system for metropole AVs. He holds 36 patents & filed innovations.
Latest and since 2019: Startup founder with R&D partners in USA, Israel, Saudi Arabia, Ukraine and China. Resident in Beijing,
carsten@hanshuoluo.com

DVN: How could you define your mission of your company?

Carsten Kausch: We sell and develop optical wireless communication (OWC) solutions. The most advanced experts and fathers of the technology “downgrade” military technology to civil use cases. Our OWC developments cover much wider fields than suggested by the buzz word LiFi. There are robust products for under water-, space-, infrastructure-, wearable-, aviation- and vehicle communications by unbound free light. Furthermore, measurement tools and systems for object localization and orientation, material and molecule surface analysis, light spectroscopy can be customized for extreme use cases or smart factories. We oversee the global standards and IP situation for OWC.

DVN: Why should the Automotive lighting industry have interest in OWC?

Carsten Kausch Technological steps secure the leadership of civilisations (keyword China) as well as the automotive industry. Radio frequency and optical wireless communication can be compared to a sail-ship and a steamboat regarding the technological step and market entry.

For the automotive lighting industry, it must feel like a lottery win, because the (only) illuminating light will be the carrier and new media of communication beyond 5G. Inside the vehicle and outside up to long distance communication into space and under water. OWC is License Free & operates ad hoc on low energy levels.

A respectable share of global digitalization businesses can be achieved and is bound to the core knowledge how to read and write the light.

DVN : Why is OWC interesting when 6G arrives?

Carsten Kausch: OWC is already part of the 6G definition in China. It is not only interesting, but also already a fact and a “must have” to be a part of the world’s largest automotive market. Technically wise RF is at its physical limit because of the Doppler effect and the limited amount of regulated frequencies and amount of connections in too dense – life relevant – radiation levels. The entry point for automotive communication forced by these 5G limits is in direct short-range communication (DSRC). 5G cannot fulfill automotive DSRC requirements and 6G will only achieve these requirements by hybrid eco systems in combination with OWC. That is why China is leading and standard defining authorities are already aware of these complex metropole requirements. In general bandwidth demanding applications like holographic communication will be supported by OWC.

DVN: What are the chances of OWC? Which disruptive potential does OWC have?

Carsten Kausch: We identified 30 disruptive use cases and 45 products, profitable & ready to develop or adapt with the right investor or customer. For example high speed cable replacements, Lidar including high speed communication, Hi definition Headsets/VR without cables and without radiation nearby the human brain, end user devices and routers reliable in outdoor / dust / fog / rain environments. Smart factory communication with up to 32.000 devices, real time, mm precise locating and encryption is possible.

DVN: What are the risks?

Carsten Kausch: The global patent check will require filing of Y-patents in some cases, but we know how to do that legally and sustainably.

DVN: Where is OWC used today? Can you give us examples?

Carsten Kausch: Surely there is the old fashion origin in the military like in ship to ship communication, voice and data communication between divers, stealth communication inside military aircraft, robust vehicles and weapon systems connections, drone steering, automated landing, helicopter close formation flying, sniper finder, etc.

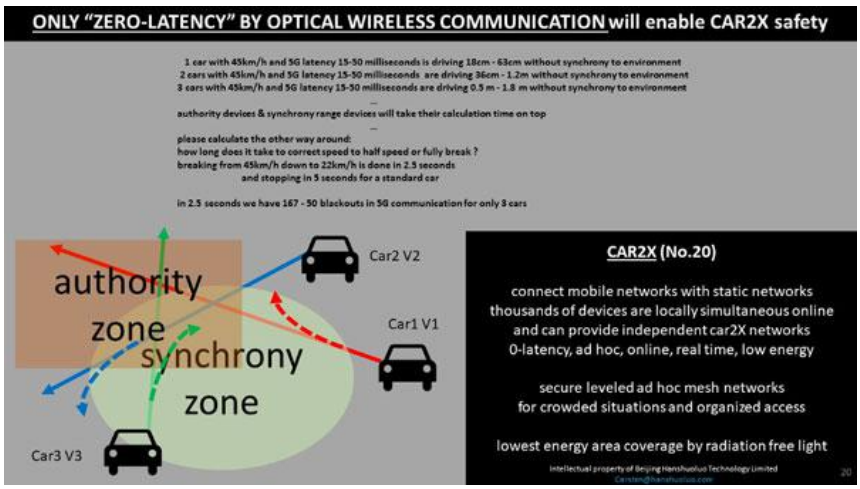
Civil startup solutions can be found in office routers and connections between buildings. These setups are more or less limited by direct sunlight, missing quantum encryption, and chip technology 10 years behind the military.

DVN: How can LiFi contribute to traffic safety today and in the future in traffic with AVs?

Carsten Kausch: DSRC with practically zero-latency – multi point adhoc connections – quantum encrypted – EMP safe – combined Lidar & Communication, all these advantages of OWC solve actual problems and

save lives. Ranging and positioning within a swarms near-field situation is outstanding compared to other solutions.

Improperly protected smart factory machines and the logistic chains behind them can be protected by OWC. OWC is EMP safe and also free from electromagnetic overlays by illegal jamming or just by too many standard WiFi connections.



DVN: Isn't LiFi super expensive because of the high frequency modulation?

Carsten Kausch: 10 Terra Bit Rockstar solutions have surely Rockstar prices, as always. BUT exactly to bring down military grade costs and meet acceptable civil cost levels while maintaining beyond 5G qualities is our secondary mission. The high frequency modulation is not necessary at all, costs for an OWC relevant clock chip is about 5 cent. OWC Systems for military use cases are absolutely free of radio emission and are EMP safe. That has some value.

DVN: Do you see any health impact by OWC systems ?

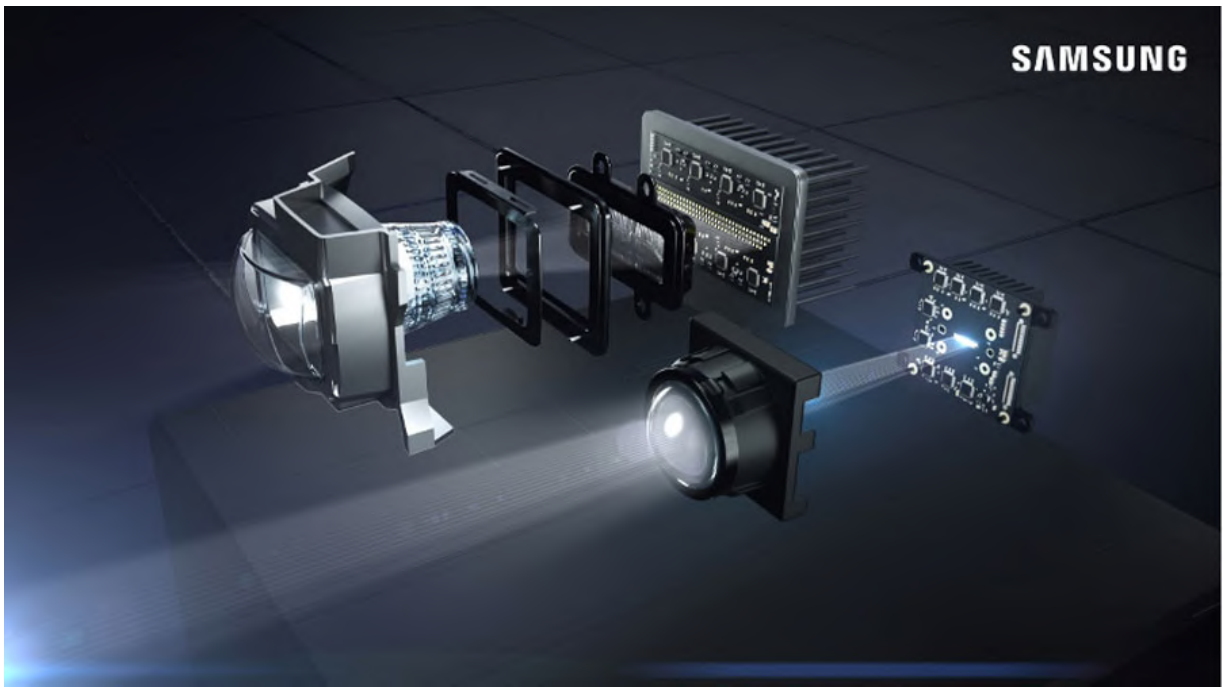
Carsten Kausch: Blue light and ultraviolett light can damage human cells. There are Standards for eye- and skin- safety to regard. We just do not use these frequencies.

Please let me mention at this point that 5G radiation has a proven dangerous impact on insulin, testosterone, adrenalin, melatonin, and calcium metabolizim. That is absolutely not the case with OWC.

Lighting News

{Safety & Beyond – Part 2} Samsung's PixCell LED for Slimmer Automotive Designs

LIGHTING NEWS



The development of slimmer, more contemporary automotive headlamps is being propelled by the evolution of safety in mobility, and the automotive industry's push to create unique brand identities. In response to this market shift, demand is skyrocketing for more compact light sources that can be used in building sleek, futuristic headlamps.

The most recent development in the automotive lighting industry has been the intelligent headlamp, also known as the Adaptive Driving Beam (ADB). This transformative new technology enhances driving safety with the help of individually-controlled light segments, leading the industry to seek out more advanced light sources.

Among the offerings to date, Samsung's PixCell LED represents good fit for ADB. It has an extremely small light emitting surface (LES), which is roughly 1/16 the size of a conventional LED. The key to this impressive feature is Samsung's Monolithically Integrated LED technology. Most LED light sources for ADBs on the market are composed of separate LED packages. However,

Samsung takes an entirely new approach by devising a single light source made up of over 100 individual segments. Each is separated by a thin silicon wall, minimizing the space between segments to less than 25μm, which more than satisfies the industry's strong desire for slimmer lamps.

Thanks to its compact LES, the PixCell LED can operate with a small printed circuit board and heatsink, allowing the entire module size to be reduced by 50%. The compact LES also enables direct projection of an LED light, eliminating the need for a primary optic. All in all, the total optic system is not only simplified, but dramatically slimmed down, too.

Besides slimming down the optic system, increasing design possibilities and improving operations, the Samsung PixCell LED significantly eases a lamp's environmental footprint. With global warming, regulations regarding carbon emission are becoming increasingly strict, in improving fuel efficiency and battery efficiency. These are no longer choices, but absolute necessities. Faced with such considerations, slimmer parts are an important technological trend that reduces vehicle weight, minimizes energy waste, and helps to boost driving efficiency. The PixCell LED is particularly meaningful in this respect.

Because of the Samsung's PixCell LED, automotive lamps can deliver excellent performance without ignoring the growing demand for striking, modernistic design. Engineered using PixCell LED solution offers well-engineered and headlamps with a competitive edge.

EVs are Exciting Opportunity for Those who will Grasp It: Geely Design Boss

LIGHTING NEWS

Extract of interview with Automotive News

Peter Horbury has been Geely's Executive Vice President of Design since 2011. He shared his thoughts with Automotive News recently:

"My first job was the grille, headlamps and bumpers of a Chrysler Horizon. I was given the responsibility to design that bit because you never got to do a full car until you were much older. As soon as you gain some seniority you start to be a mentor. We have lots of young designers who have so many fantastic ideas, many of which are impossible. But as a manager, when you spot a talented designer, then you help by showing him how to get an idea into a more producible form without losing any excitement or any creativity. The lifeblood of any company is to have new, young people who follow ideas and don't know they're impossible. That's critical. As we gain experience, we realize that there are 1,000 reasons why you can't do that, but a young designer doesn't know that. So, you let that creativity flourish and give people confidence."

On EVs: "The electric car is a great opportunity. I'm pleased to see some companies really grasping that opportunity. There is no longer this great lump of an engine out front. You look at Lucid Motors, Faraday Future, and our own Lynk & Co Zero Concept, which we presented at the 2020 Beijing auto show, we are taking advantage of that lack of an engine to move the upper part of the car forward. That creates momentum toward this modern profile of the automobile."

On relationships with the manufacturing, engineering and marketing teams: "I have worked in the UK, Sweden, Holland, the U.S. and China, and everywhere is different.
But there is a similar theme where you have got to be convincing. It's always a compromise somewhere. It has to be a complete team effort between Engineering, Marketing, Design, because so many different skills are needed. I'm sure members of my team think I give in too quickly, but I know the clock is ticking and we only have a few months left to get to the final stage. We cannot risk another round of experimentation. We have to get there. So, everybody has to make some compromises. It's not easy."

Rehau, Osram Continental in Development Partnership

LIGHTING NEWS

In the area of vehicle design, the combination of material, light and "shy-tech" is becoming increasingly important.
In response to this exciting trend, Osram Continental and Rehau are joining forces in a development partnership. The two companies want to identify market trends, and shape and form them at an early stage with the aim of creating the greatest added value for automakers, automotive designers and engineering service providers. Series production is expected to be possible by mid-2024.

Dr. Markus Distelhoff, CEO Rehau Automotive and member of the Group Management Board, says "Individual design is becoming an important differentiator for automakers, making design freedom increasingly important. By developing exterior components that fuse with light, we can enable new design possibilities together with our strong partner Osram Continental". And Dr. Dirk Linzmeier, CEO of Osram Continental, says "By integrating our innovative and connected solutions directly into automotive components, we are getting closer to this vision. With Rehau, we have the ideal partner for this on our side. Together, we can fuse light and material to enable additional functionality and design aspects, thus pioneering seamless lighting and exterior systems".

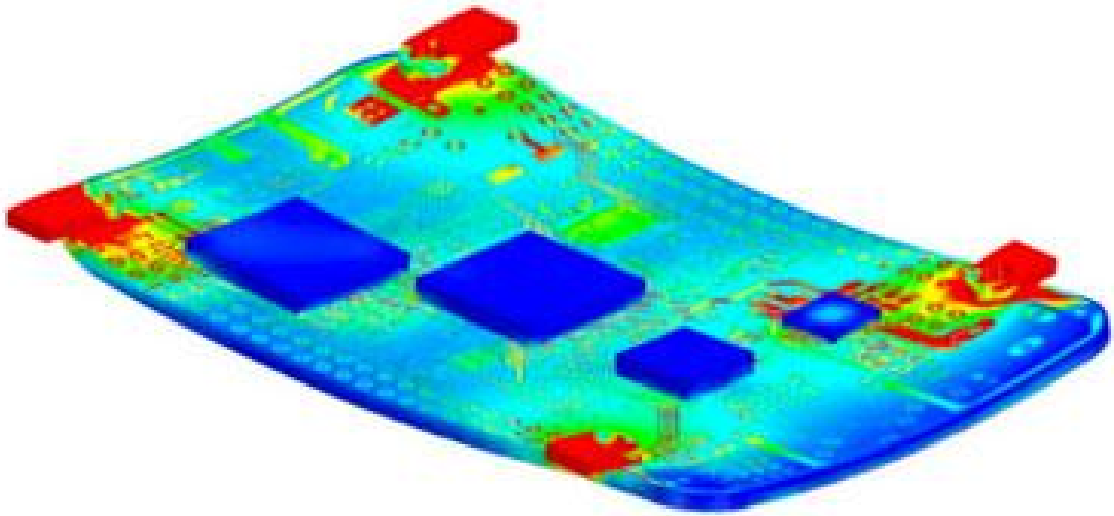
Osram Continental are a JV between Osram and Continental. The globally operating company combine modern lighting technologies with electronics and software and offers a broad portfolio of innovative lighting solutions for the car industry. In September 2020, the mother companies agreed to end the JV and reintegrate the respective contributed businesses back into their companies. All Osram Continental product solutions will be continued after

the reintegration. The projection solutions as well as the front and interior lighting divisions will be integrated into Osram Automotive in the future, and the coöperation with Rehau will also be continued under this umbrella at Osram in order to drive forward the fusion of exterior components with light.

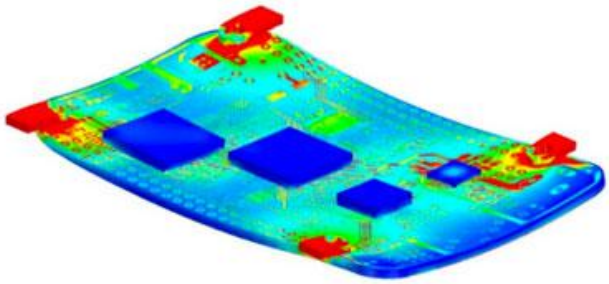
The Rehau Group are a polymer specialist with annual sales of around €3.3bn and 20,000 employees at more than 170 locations worldwide. They make solutions for construction, automotive, and industry throughout the world.

Simcenter™ FLOEFD™ 2021.1: What's New?

LIGHTING NEWS



Simcenter FLOEFD is going big-time multiphysics with CFD, electromagnetics and structural simulation all in one tool and one solver run.



SIMCENTER FLOEFD STRUCTURAL MODULE SIMULATION OF A PCB.

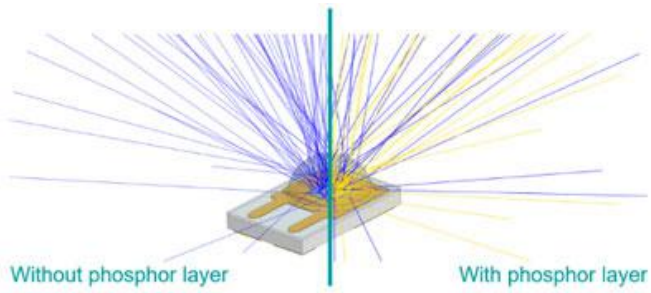
The latest release of CAD-embedded Simcenter FLOEFD 2021.1 has just been announced. Simcenter FLOEFD is a CAD-embedded computational fluid dynamics (CFD) solution and supports NX, Solid Edge, CATIA V5 and Creo. Due to its unique technology, it can reduce the overall simulation time by up to 75%.

Simcenter FLOEFD 2021.1 has a handful of new features specifically for lighting applications

- Pulse-width modulation can be modeled for thermal-electrical-optical LED models. Pulse-width modulation is widely used in lighting to control the brightness of LEDs. We can set the duty cycle in percentage which allows for an easier and more accurate definition of the LED boundary condition which in turn results in more accurate simulations

- We can now set the Forward Current as an LED specific goal to use the driving current as a parameter for other equation goals. This allows for more complex interdependencies of boundary conditions and more advanced goal definitions.-

- Photoluminescence and Mie scattering of phosphor particles can be simulated. As some blue light passes the phosphor unchanged, the yellow and blue light creates white light. Temperature dependency of the luminous efficiency is taken into account.
This allows to model more detailed LED models as well as LASER lights where originally blue light gets converted to white light. Hence this capability increases simulation capability for such lighting applications as well as the accuracy of results.



MIE SCATTERING SIMULATION OF A PHOSPHOR LAYER IN AN LED.

Luminous intensity can now be output for many user-defined Azimuth angles. This makes post processing a lot easier when considering various angles.

AMS to Launch Delisting Offer for Osram

LIGHTING NEWS

AMS have announced their intent to launch a public delisting tender offer for the remaining 28 per cent of Osram shares not presently owned by AMS.

AMS CEO Alexander Everke calls the offer "the logical next step in the integration of Osram and the implementation of our strategy to create a global leader in optical solutions".

Subject to approval by the German Federal Financial Supervisory Authority and publication of the offer document, the offer is expected to commence around 21 May and be open for acceptance during a four-week period until around 18 June—it will not be extended and is not subject to any conditions. In line with the financial strategy of AMS, no additional financing will be needed to implement the offer.

New LED Street Lights from Ledvance

LIGHTING NEWS

Ledvance have launched a new Osram NAV LED family as a direct LED retrofit for high-pressure sodium vapour lamps. The new LEDs offer compelling benefits for areas of application such as streets, area lighting, pedestrian zones, and parks.

The new Osram NAV LED retrofit lamps increase efficiency on two different levels: consumption and maintenance. They boast efficacy of up to 185 $^{lm}/_{W}$ and consume up to 52 percent less energy than HPS lamps, but they also reduce maintenance costs thanks to their lifetime of up to 50,000 hours. Besides cost savings, another bonus of the new product family is the easy replacement thanks to compatibility with conventional control gear, compensation capacitors, and igniters without rewiring. A nighttime switching feature allows additional dimming at low traffic density.

F2J Buy Valeo Lighting Brazil

LIGHTING NEWS

F2J Industry have announced their acquisition of Valeo Lighting Brazil and the creation of F2J Interlagos.

F2J Lighting Cordoba specialise in the design and production of vehicle lighting products for the automotive industry. This company was acquired in 2018 from Valeo.

F2J Industry are a subcontractor based in the automotive market in different domains of activity. Two factories specialise in remanufacturing engines and components, one factory in plastic injection (F2J Lighting Cordoba in Argentina), and another in stamping.

The Brazillian Valeo lighting operation began as Cibié do Brasil, a local operation producing simple, low-technology car lights under licence from Cibié. Valeo eventually bought out Cibié in France and eventually took over Cibié do Brasil; the F2J acquisition represents the start of the next chapter for the operation.

Driver Assistance News

UN Regs Will Address Connected-Car Cybersecurity

DRIVER ASSISTANCE NEWS

The connectedness of connected cars makes them vulnerable to cyberattacks with potentially devastating consequences.

According to a report by the McKinsey Institute, today's vehicles contain up to 150 engine control units and a combined 100 million lines of software code. By 2030, that number is expected to balloon to about 300 million lines, with IEEE projecting some autonomous vehicles will hit a billion code lines. In comparison, a passenger aircraft has an estimated 15 million lines of code, a modern fighter jet about 25 million, and a mass-market PC operating system close to 40 million. Every additonal bit of code represents the potential for an insecurity prone to attacks by bad actors.

From July 2022 to July 2024, UN Regulations will phase in requirements for cybersecurity and software update management systems long past the sale of the vehicle. Automakers will have to demonstrate adequate risk-management practices from vehicle development clear through to post-production. Failure to complete the upfront and ongoing engineering

demands could result in billions of dollars of palpable and opportunity costs. The regulations have not yet taken effect, and so far compliance is spotty. In the European Union the regulations will be mandatory for all vehicles starting July 2022. Japan and South Korea plan to introduce them in steps. Altogether the three regions accounted for the production of about 32 million vehicles in 2018, according to the UNECE.

New AEye Value Set for SPAC Merger

DRIVER ASSISTANCE NEWS

Last February, AEye agreed to go public through a merger with special purpose acquisition company CF Finance Acquisition Corp III, in a deal that valued the company at $2bn. Now AEye and a blank-check firm backed by financial services company Cantor Fitzgerald have amended their merger agreement, valuing the lidar sensor maker at USD $1.52bn on valuation changes of publicly-traded lidar companies. The companies are attributing the terms of the amended deal to changing conditions in the automotive lidar industry

Aeye was founded in 2013 by former Lockheed Martin and NASA engineer Luis Dussan

Hella: Latest 77Ghz Radar in Production

DRIVER ASSISTANCE NEWS

Having supplied over 90 million 24-GHz sensors, Hella are one of the world's largest suppliers of radar sensors. With the introduction of the 77-GHz radar sensors, Hella's commanding position looks set to increase still further. Series production of their latest 77-GHz radar technology for an international automobile manufacturer has now started at the Hella electronics plant in Hamm. The technology was first brought into series production in the truck sector last spring. On the basis of numerous major orders for passenger cars —including one from a German premium automaker—and for trucks, further production starts will follow in the near future. Hella also are already developing their next generation of 77-GHz radar sensors to enter series production for another German premium manufacturer in 2024.

On the way from assisted to autonomous driving, radar sensors have established themselves as one of the core technologies for seamless perception. They continuously record the environment, recognise pedestrians and other traffic participants and objects around the vehicle, and deliver reliable results regardless of weather and lighting conditions. Especially with regard to functions such as autonomous parking or automated lane changes, 77-GHz technology is becoming increasingly important, as it offers a significantly larger signal bandwidth and thus improved environmental

resolution compared to 24-GHz. This makes it easier to detect and classify objects on the road.

The centrepiece of the 77-GHz radar sensors from Hella is the radar system chip, which is based on RF-CMOS technology. Thanks to the special architecture, digital components as well as systems for self-diagnosis can be integrated on the chip in addition to the components for transmitting and receiving. Hella radar sensors are also based on a modular, scalable platform concept. They thus support different vehicle architectures and interfaces such as Ethernet. Customer-specific requirements as well as current and future NCAP requirements can thus be implemented flexibly and efficiently.

General News

Chip Shortage to Persist for Years: Intel CEO

GENERAL NEWS

The global semiconductor shortage roiling a wide range of industries likely will not be resolved for a few more years, according to Intel's new CEO Pat Gelsinger.
In an interview with CBS News, he said Intel are reworking some of their factories to increase production and address the chip shortage in the auto industry, but it may take at least several months for the strain on supply to even begin easing: "We have a couple of years until we catch up to this surging demand across every aspect of the business", Gelsinger said.

Demand for semiconductors was boosted in 2020 as consumers snapped up home gadgets during the pandemic. But meeting that increase has been hard, thanks to shuttered plants, among other factors.
Gelsinger said U.S. dominance in the industry has dwindled so much that only 12 per cent of the world's semiconductor manufacturing is done there today, down from 37 per cent 25 years ago. Intel are the only manufacturer of high-end, cutting-edge chips.

The shortage has forced the entire auto industry to cut output, with Ford announcing the shortage will reduce production by 1.1 millin vehicles this year. Jaguar Land Rover, Volvo, and Mitsubishi recently joined the growing list of manufacturers cutting back on production for want of chips.

Jaguar Design Boss Leaves

GENERAL NEWS

Jaguar's design chief Julian Thomson is leaving as the automaker heads into a new future as an all-electric marque. Jaguar have struggled to match expectations under the turnaround envisaged by JLR's owner Tata, with lagging sales of Jaguar's XE and XF models.

Thomson's departure comes after Land Rover's former head of design, Gerry McGovern, was promoted in November to oversee design at the Jaguar and Land Rover brands.

Future Jaguars need to be "absolutely modern and contemporary," McGovern told investors during an online presentation in February.

Thomson joined Jaguar in 2000 as advanced design director after stints at Lotus, Ford, and the Volkswagen Group's concept design centre. At Lotus, Thomson won acclaim for creating the 1996 Elise sports car.