



REPORT
THE WONDERFUL STORY OF LIGHTING
History, Current Technologies & New Challenges

Preview "Automotive Lighting Today" [CLICK HERE](#)

Editorial

Fourth Week At Home...And Counting...

North Americans and most of us in Europe, except our Swedish colleagues, are now in our fourth week of home confinement. I am regularly talking with several of you, and the word is you're mostly not suffering too much boredom — technology to the rescue; audio- and video-conferences, online movies and shows, and of course email. Some of you work all day long; others have work only half a day because of partial technical unemployment, but most of you can keep easily in touch with your family on Skype or another such service.

What most of us are missing is the total absence of sports on TV. No football, and no tennis. Ordinarily they're difficult to follow because we don't have time. Now we have the time, and they're not there!

As I've been saying all along, in this difficult time the DVN team are working hard as usual, using information from all lighting community members to deliver not only the usual updates on industry technology, but also to keep you informed on how Covid-19 will affect all of our working lives—now and in the future. *DVN* will continue to keep the vehicle lighting community connected, just as we've been doing for the last 12 years. New challenges are ahead, and new opportunities will arise. We didn't ask for this global stop, but we got it. It presents opportunities to take time we usually don't have, to think about how we might change the world for the better after this unanticipated re-set.

This is a time that calls for cooperation, for sharing, for coming together to lead through this Coronavirus crisis. And that's what we are doing at DVN, opening exceptionally the total content of our DVN website to all our registered members, whether they have subscribed as DVN or as DVN-Interior members.

Starting from this Tuesday, and for a period of 4 weeks, you will have access to the full contents on our DVN website at : www.drivingvisionnews.com

This week there's a [new chapter](#) in our on running saga "The Wonderful Story of Lighting" and we've got an in-depth piece from Volvo's Matha, one of the greatest expert in lighting, explaining his strange feeling with this corona virus, and especially for our automotive industry. Automotive always represents freedom and from some weeks we have lost this freedom to move, staying at home.

Take good care of yourself and your family,

A handwritten signature in black ink, appearing to read "W. Frally". The signature is written in a cursive, slightly slanted style.

DVN President

In Depth Lighting Technology

Matha's Thoughts On Our Industry In These Strange Times

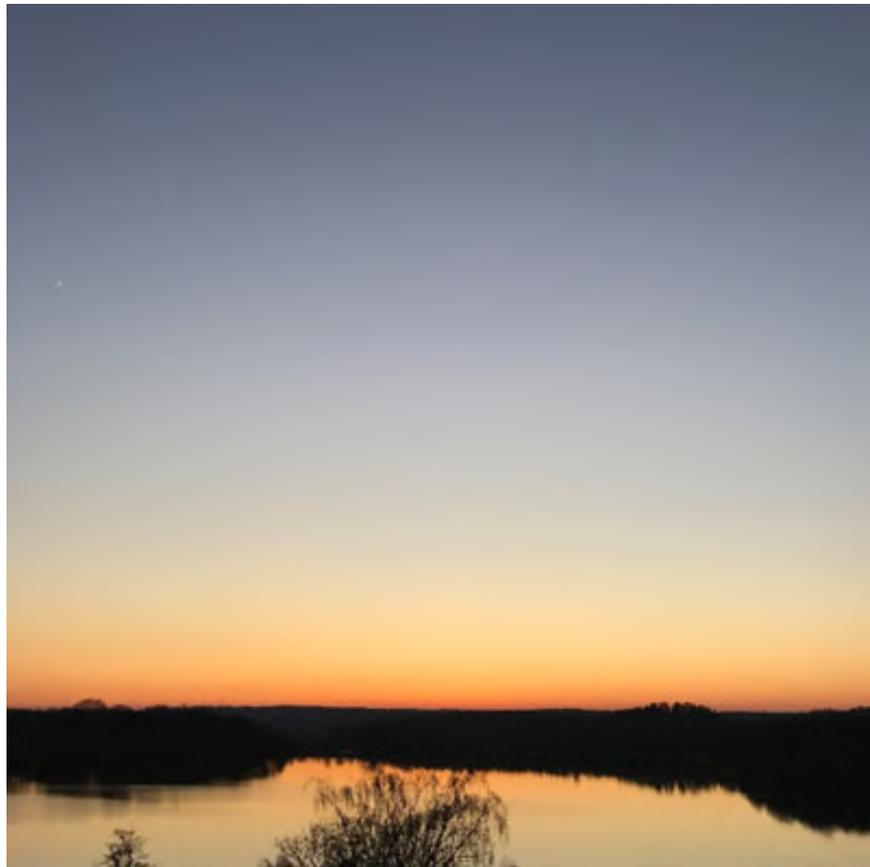
This ongoing pandemic really makes life strange for everyone, especially for our automotive industry. Because what has the existence of the automotive industry represented for over a hundred years? instinctively I would say freedom to move. And for some weeks now we have lost this freedom to move, having to stay at home.

In the vehicle lighting community, we are used to travelling all around the world. For my side, to launch cars in Europe, China, and the U.S.; to visit suppliers in Europe, the U.S., China, and Japan; to participate in congresses (motor shows, ISAL, VISION, IFAL, CES, DVN...) and regulation meetings with GTB, OICA, Chinese authorities, and so on. And I know that most DVN members who read this newsletter have got used to similar amounts of travel.

I was in China at the beginning of January when the crisis began; I was with my GTB friends for a WG-S meeting and I was with my Volvo colleagues during two weeks to homologate our new cars. Just after my travel, we closed our office and our plants. After hard work at home, we are again in our nice office, and car production is running again in our three plants in China. We supported them as we can during these two last months and now they support us as they can. It is a nice definition of what is a team.

Just after my business trip in China I was in quarantine in Sweden and I missed the DVN workshop in Munich. With Hector, we tried to find in the last 24 hours before the opening of the congress how I can support from home, and we have done the first DVN presentation with phone and Video. Perhaps just the beginning of a new era of DVN congresses...?

And how is life in Sweden today? Volvo has now closed the production plant and R&D team is encouraged to work at home, which I am doing. We continue our development with Skype "as usual" we could say. Most of our suppliers are also at home and we can continue the activity. We have done our first OICA meeting last week from home to prepare for the GRE meeting, and we will do also our first GTB session from home in May.



Sunset is beautiful
but we have to stay at home



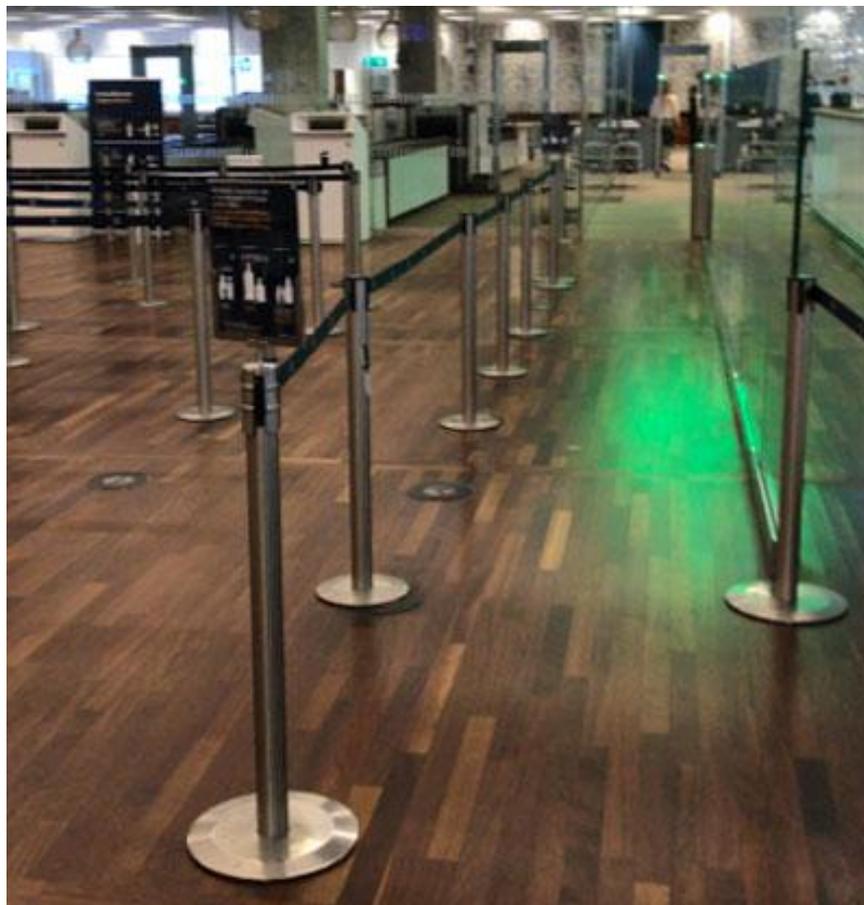
Landscape is beautiful
but we have to stay at home

As you perhaps know, Sweden has not chosen for the moment a very strict confinement policy. So we can walk outside respecting the guidelines provided by the authorities. I send you these pictures done during the weeks to take some fresh air after a full day home office.

Even if there is no confinement, you can see that in Gothenburg airport also there is not a lot of activity and few flights per day. Sweden is not an isolated island, we are still in touch with Europe.



"Right now, a safe car is a well-parked one."



Right now, the safer place to be, isn't in an airport

We are all waiting for the end of this coronavirus crisis and hope that we will see all our lighting community, friends and family in the coming weeks. Perhaps we will change our way of working and we will redefine our goals.

Volvo Cars' company purpose is "Freedom to move in a personal, sustainable and safe way". I think this goal will not change and will be even more important now. Not only for Volvo, not only for automotive companies, not only for business, but for all of us. We have to think collectively what it means about automotive lighting.

Lighting News

Automatic Lights Now Required In Japan



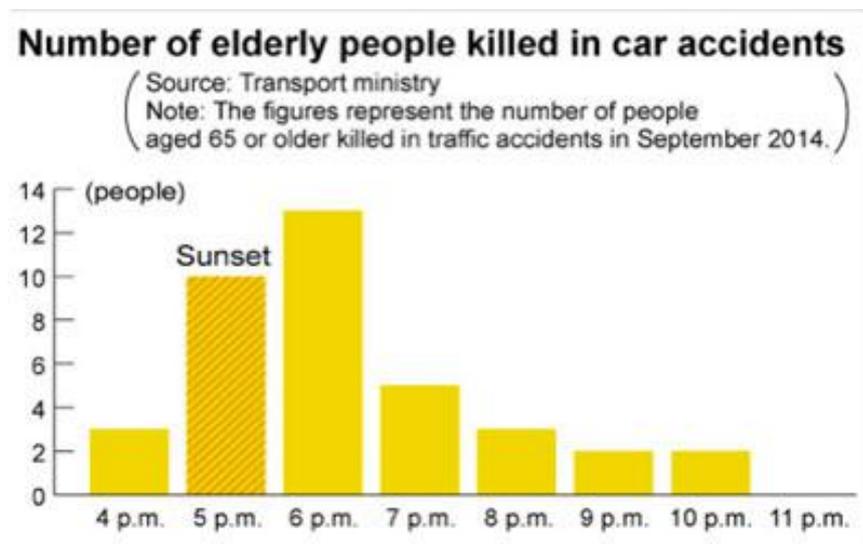
Automakers must equip all new vehicles with automatic headlamps, .

The mandate is being phased in: it first applies to all newly-introduced passenger vehicle models from 1 April 2020, while models introduced before that date can't be offered for first sale without automatic lights from October of 2021. Newly-introduced buses with more than 11 seats and trucks heavier than 3.5 tonnes will

come under the requirement from April 2021, and finally all trucks and buses from October 2023. Some sources report DRLs per UN R87 are to be phased in on the same schedule.

The system won't automatically turn on the lights of a vehicle that's running but parked (defined as the transmission being in Park and/or the parking brake applied).

A requirement of this sort has been [advocated here in DVN](#), but Japan's is believed to be the first such mandate in the world. It comes in response to an alarming number of elderly pedestrians and cyclists being hit in traffic at dusk because drivers had not switched on their headlamps.



According to a survey by the Japan Automobile Federation, 30% of automobiles in Japan were equipped with automatic lights as of August 2014. Those systems allowed drivers to override the automatic switching and turn the lights on or off manually in the conventional manner. But under the new standards, drivers will be allowed to operate the lights manually only during daylight. After dark the lamps will be switched on automatically, and drivers will not be able to turn them off while the vehicle is running at night. That will take some adaptation by drivers in Japan, where local custom is to be polite toward opposing drivers by turning off the headlamps and using only position lights while waiting at red stop-and-go lights.

But too many drivers forget to switch the headlamps back on once the traffic light goes green, and people generally tend to believe they can still see objects outside even when it starts getting dark, so they don't turn on the headlamps until it becomes very dark, rendering pedestrians invisible and vulnerable.

The new requirements are generally in accord with UN Regulation 48: the lamps must switch on within two seconds when the ambient light level decreases to less than 1,000 lux—a level comparable to that of 15 minutes before sunset on a clear day. And they'll turn off automatically in 5 to 300

seconds when the ambient light exceeds 7,000 lux, a level internationally recognized as sufficient for safe driving.

In 2014, a JAF survey covering 45,000 vehicles revealed that the headlights of only 0.9% of the surveyed vehicles were on 30 minutes before sunset. While the lights of 10% were on five minutes before dusk, the headlights of just 22.8 percent were on even when the sun set. "Switching on car lights earlier is important, not only in that it allows drivers to see objects outside more clearly, but that it helps pedestrians see approaching cars", said an official of the ministry's Road Transport Bureau. "We believe turning on the headlights earlier will help elderly people who have weakened eyesight see vehicles around them, leading to fewer accidents at dusk."

Lighting Enables New Car Functions



In the ElectroOptics March 2020 monthly edition, Matthew Dale explains in three pages, to the photonic community, how high-resolution LED matrices and blue lasers increase the functionality of automotive lighting. He focused his article on ADB, presenting Osram's technology; and on laser, presenting SLD

technology.

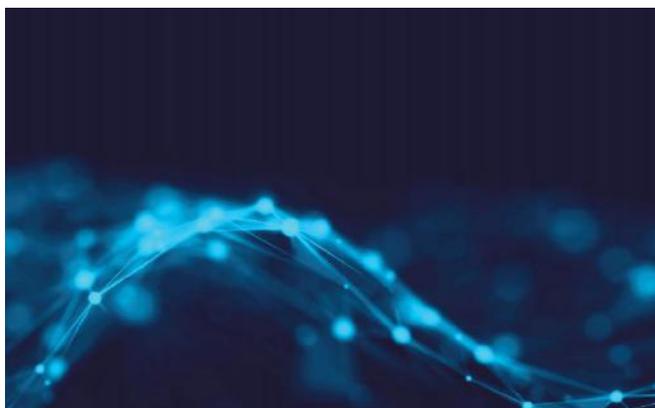
- Osram developed Eviyos, a solid-state active LED pixel matrix capable of catering for ADB, while at the same time projecting high resolution symbols, such as navigation prompts, distance warnings, or road condition warnings (photo) onto the road for the driver or other road users to see. The first iteration of the technology, which will be available commercially this year, comprises a matrix of 1,024 individually-controllable pixels on a single LED chip. The next iteration, under development and due for release in 2023, will feature 25,600 pixels.

- SLD Laser are developing lasers for vehicle lighting. The lasers' great brightness brings the ability to fulfill the maximum visibility that road lighting regulations allow in compact form factors. Co-founder Dr. Paul Rudy says "The laser technology enables the creation of eye-safe, high-brightness headlights that are highly efficient, cost-effective, and compact. With it, we have been able to completely eliminate droop, while being around a hundred times brighter than LEDs. We can achieve maximum visibility, most light on the road and maximum range, with the smallest possible headlight—which helps with the styling of vehicles. We are working with automotive-certified, 1mm bi-axial MEMS mirrors, which can be used to shape the laser light in patterns with very high luminance per pixel. We're currently in the range of 0.5° to 1° resolution, with the expectation of being able to get to 0.1° resolution in the future".

The SLD solution can fit into a 50mm cube capable of providing full automotive lighting functionality in any pattern of light, including ADB. As of last year, SLD Laser's headlight technology can be found on the road in BMW's M5 cars. Rudy noted that will also be available on vehicles from other top-tier automotive firms in the future.

SLD also are working on laser-based communication and sensing. The laser light can be coupled into fibres that can then be used to either transport or emit the light. The latter option, known as emissive fibre, could be used for aesthetic lighting on the interior and exterior of vehicles, which could then be used to transmit data via lifi. Rudy says tail and side lights are also possible, meaning data could effectively be sent in all directions from vehicles via lifi. The eventual idea is SLD lasers being used in smart city scenarios, for example for communication between vehicles, or between streetlights and vehicles.

Darpa's Invisible-Headlights Program



In military applications, headlights allow adversaries to detect a vehicle's presence, in some cases from long distances away.

Darpa—the U.S. Defense Advanced Research Projects Agency, who first devised the internet—are trying to address this with their "invisible headlights" research, which seeks to discover

and quantify information contained in ambient thermal emissions in various environments and create new passive 3D sensors and algorithms to exploit that information.

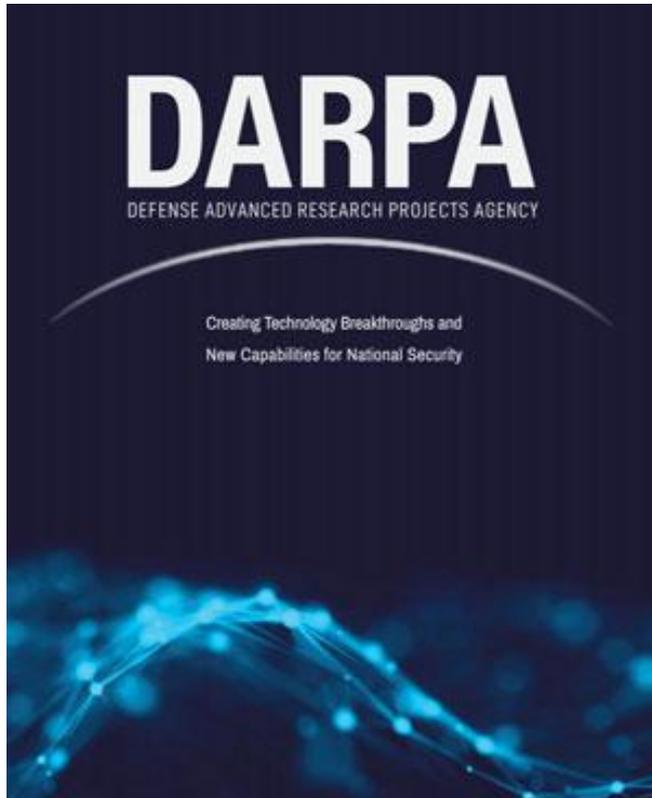
The researchers' premise is since everything gives off some thermal energy, the goal is to find out what information can be captured from even an extremely small amount of thermal radiation. In turn, this information would be used to develop algorithms and passive sensors into a 3D scene for navigation.

According to Darpa, the program includes three phases:

- Discovery, to determine if thermal emissions contain sufficient information to enable autonomous driving at night or underground;
- Optimisation, to refine models, experimental designs, and ensure system feasibility for achieving 3D vision at both low and high speeds and high speeds
- Advanced prototypes, to build and test passive demonstration systems that compete with active sensors.

Dr. Joe Altepeter, who joined Darpa's Defense Sciences Office last September, says "If we're successful, the capability of invisible headlights could extend the

environments and types of missions in which autonomous assets can operate at night, underground, in the arctic, and in fog".



Samsung Stopping LCD Production



Samsung Display will stop LCD panel production by the end of this year and turn their activities fully to OLED and other display technology.

SAMSUNG DISPLAY

Samsung Display currently have LCD production lines in China and South Korea, but they're planning to convert one of their LCD facilities in South Korea for quantum-dot screen production. Reports are that Samsung haven't yet decided on the future of their Chinese facilities.

The display industry has been going through a tough time lately due to oversupply and price competition. Now with the coronavirus pandemic which has led to cancellation or postponement of most big events including the Olympics, global end market decline is expected.

With Samsung quitting the LCD business, the oversupply issue of the panel industry might lessen and other panel makers including AUO, Innolux, and BOE could benefit. At the same time, Korean panel producers are turning their focus into new display technologies covering OLED and Micro LED, pushing the industry to move away from LCDs generally.

Hella's Expectations Are Bright Despite Crisis



Hella sales and earnings declined as expected in the first nine months of the fiscal year 2019/2020 (June 2019 to February 2020) in a considerably negative market environment. Currency and portfolio-adjusted sales decreased by 3.7% to € 4.8bn; reported Group sales decreased by 6.2%

due to portfolio changes.

"In the third quarter, we have already been affected by the first impacts of the Covid-19 pandemic," said Hella CEO Dr. Rolf Breidenbach. "From a nine-month perspective, however, we are still in line with our overall expectations. Above all, we have once again performed significantly better than the automotive market, which further confirms the strength and resilience of our business model."

- Reported sales of the aftermarket segment declined by 1.7% to €464m in the nine-month period. Although the independent aftermarket business recovered in individual target markets in the third quarter and thus led to a sales increase, demand for spare parts was significantly lower overall, particularly in southwestern Europe and the Middle East.
- Business in special applications declined due to market weakness of individual customer groups. Business was impacted in the nine-month period, particularly due to the continuing weakness of the market for agricultural and construction machinery as well as trailers. Consequently, reported segment sales declined by 8.7% to €272m.

In view of the continuing spread of the pandemic and the related impact on the global automotive industry, Hella had already announced last month that their company targets for the current fiscal year 2019/2020 won't be achieved. Due to declining customer demand and possible disruptions in logistics chains, they now expect currency and portfolio-adjusted sales to be below the originally forecasted range of €6.5bn to €7bn. As there is currently only limited visibility regarding the consequences of the pandemic, it is not possible to estimate the amount more accurately at this time. Depending on the development and duration of the loss of business, also the EBIT margin adjusted for restructuring measures and portfolio effects is estimated to fall considerably below the originally forecasted target of 7%.

Pandemic Puts Prices Up at Lumileds



Affected by the ongoing pandemic, worldwide businesses continue to update their measures and business outlook in the past weeks. Lumileds, for instance, reported price increase due to Covid-19. They've announced a 4% price increase on their LED products, integrated Luxeon solutions, automotive lamps and accessories.

Lumileds noted that due to the coronavirus epidemic and its impacts on the global macroeconomic environment, the cost increases for transportation, raw materials, components and other inputs have gone beyond control and could no longer be absorbed. As a result, a 4% price increase will be applied to all new orders from 15 April.

Before Lumileds, Signify also announced a temporary price increase of 3% on their LED and lamp products in mid-March.

Driver Assistance News

Nvidia Lead In AV Chip Development



Navigant's research on more than 70 companies to determine who is leading the charge in hardware for AV technology has come up with an answer: Nvidia.

The research looked at three technologies required for the development of AV: sensors,

software and computer platforms in the forms of central processing units, field programmable gate arrays, ASICs and graphics processing units.

Determining those companies leading the development process was based on 10 criteria: vision, go-to-market strategy, partners, production strategy, technology, sales, marketing and distribution, product capability, product quality and reliability, product portfolio and staying power.

Of these attributes, Navigant found that Nvidia are the top vendor in terms of automated driving chip development.

Top 10 vendors

1. Nvidia
2. Intel-Mobileye
3. Qualcomm Technologies
4. Xilinx
5. Waymo
6. Tesla
7. NXP Semiconductors
8. Renesas Electronics
9. Apple
10. Almotive

Rearview Cameras of Tomorrow in the future



The rearview mirror has been a staple in big trucks for as long as big trucks have existed. Now engineers at Daimler are investigating the feasibility of replacing them with cameras.

The MirrorCam from Daimler replaces the rearview and wide-angle mirrors that cover large

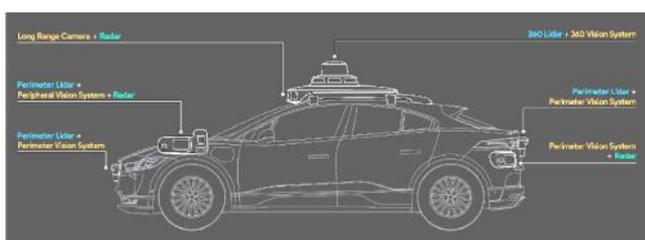
areas of the truck. It swivels an image from the camera mounted toward the inside of the bend of the vehicle so that the driver has the end of the trailer in view. The system is set for standard semi-trailers, but it can be regulated individually.

Advantages over standard mirrors include improvement of aerodynamics and visibility. And it's possible to heat cameras on cold and damp days to provide a clear, condensation-free view.

Additionally, the MirrorCam features distance indicator lines to help drivers estimate the distances behind the truck. Three fixed lines are shown together with a line that the driver can adjust to mark the end of the vehicle before starting a journey. This can be used in combination with the displays for the assistance systems.

The light transmission of the camera is high and results in light that is brighter than natural light, so drivers receive better information about its surroundings. It works both on the open road and in tunnels. When it is completely dark outside, the MirrorCam will show only the areas illuminated by the vehicle itself.

Waymo's Newest Driver Has Super Vision



Waymo have unveiled their 5th-generation Waymo Driver, the combination of hardware and software that guides the company's AVs. According to Waymo, the new tech can spot a car door opening a city block

away, give trucks the ability to see debris hundreds of metres ahead on the highway, help vehicles peek around blind spots and more.

The new driver is the result of more than a decade of work. It brings together new lidars, cameras and radars, and it's informed by 32 million self-driven kilometres on public roads , plus over 16 billion km of simulation.

The system includes a rooftop "360 Lidar," which provides a bird's-eye view of the vehicle and objects around it, and four lidars on the sides of the vehicle to detect closer objects. Long-range cameras and a "360° Vision System" can spot pedestrians and stop signs more than 500m away. Peripheral cameras look around objects, like other vehicles, to reduce blind spots, and the imaging radar system detects the velocity of objects..

Thanks to a simplified design and manufacturing process, Waymo managed to deliver the new driver at half the cost of the previous generation. The company have already manufactured and integrated the first of their new sensors into the Jaguar I-Pace platform, and are planning a scaled deployment.

Veoneer and Volvo Cars to Split Zenuity Software JV



Volvo Cars and auto tech supplier Veoneer will split their jointly owned software venture Zenuity as the Swedish carmaker focuses on developing autonomous driving software, the companies said last week.

In parallel, Veoneer will integrate the current Zenuity business focused on ADAS software, while Volvo Cars will set up a new

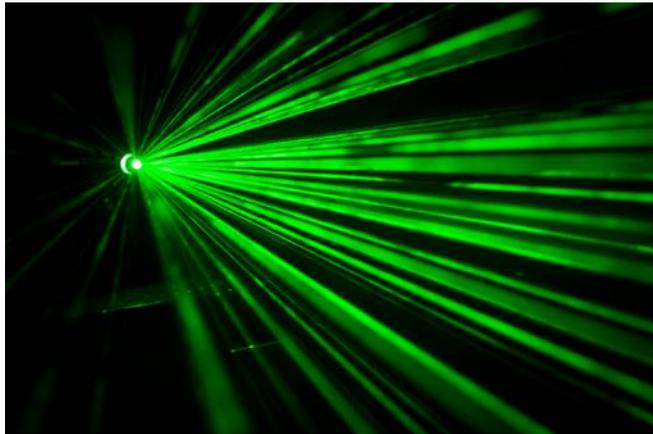
stand-alone company to take over Zenuity's development and commercialization of unsupervised autonomous drive software.

."This means that we will buy today's systems ADAS from a more traditional supplier relationship, but development-wise we now want to put our focus on the next generation of products," Volvo cTO Henrik Green said.

Volvos' part of Zenuity will focus on software that will be introduced in the next generation of cars based on Volvo's SPA2 vehicle architecture platform, starting from around 2022, Green added.

Veoneer, which also makes radars and vision systems and expects 90% of its available market to be for ADAS in the next decade, said the move would help it drive its business strategy more effectively.

AOI's Narrow Linewidth Laser for Auto Lidar



Applied Optoelectronics Incorporated have released a high-power, narrow-linewidth laser specifically designed for lidar applications, particularly for automotive use.

Current automotive lidar systems are based on near-IR lasers, which aren't eye-safe and therefore are limited in terms of emitted power.

This power limitation, in turn,

restricts the effective sensing range of the lidar system. AOI's laser operates at longer wavelengths near 1.55 μm where eye-safe emission limits are much higher and therefore detection distances are longer, making them better suited for real-world automotive sensors.

Combining high optical output power with narrow linewidth further increases the detection range of a lidar system by increasing the coherence length of the laser output compared to similar lasers with wider linewidth. The lasers are intended to be used in FMCW lidar systems, which have better noise rejection compared to the more common amplitude modulated lidar systems available today.

"AOI's expertise in semiconductor laser design and production has enabled us to offer this innovative narrow-linewidth laser," said Dr. Fred Chang, AOI's Senior VP and GM. "The current automotive LIDAR systems have limitations imposed by the available lasers, and AOI's new 1550-nm eye-safe laser will enable advanced FMCW LIDAR systems with improved detection range and accuracy, which are critical to advanced autonomous vehicle technology."

General News

Europe's Auto Industry In Unprecedented Crisis



Europe's automakers are calling for immediate support from the European Union and member states after suffering a production loss that could render companies short of cash in just weeks.

EU-wide production losses amount to 1.2 million vehicles so far, with some 1.1 million workers affected, ACEA said. The wider sector provides jobs for 13.8

million people across the European Union, ACEA said.

Recently, the ACEA together with the European industry associations for suppliers, dealers and tire makers, wrote that "several companies could face cash shortages within a matter of weeks" and called on the EU to delay compliance of important regulatory targets as the crisis has presented unforeseen obstacles. "We believe therefore that some adjustment would need to be made to the timing of these laws," the organisations said. "It is very likely that new car and trucks sales will have to take the biggest hit since 1945," said Juergen Pieper, analyst at Bankhaus Metzler.

- Continental said about 30,000 employees, or half their local workforce, have been registered for state wage support and shorter working hours. In scrapping their outlook, the company followed a spectrum of firms across Europe who have said the outbreak makes it nearly impossible to predict revenue.

- Valeo are slashing investment and costs as well as putting staff on partial unemployment, including development engineers. "April will also be very difficult because populations will remain confined in many countries," CEO Jacques Aschenbroich said. "We must be prepared for a very, very difficult next few months."

VW China Sales Perk Up



Volkswagen Group expect vehicle sales in China to quadruple in March, their China boss said, pointing to a recovery following the coronavirus pandemic. "We are cautiously optimistic that the worst effects of the crisis will be behind us in two to three months," said Stephan Woellenstein, head of VW Group's China business.

Demand is still limited, the automaker said, but they are prepared to ramp up capacity at their plants in the country, 22 of which have resumed production. Two vehicle plants in Changsha and Urumqi are still closed. Woellenstein said he expects total market sales of up to 1 million in March, up from 250,000 in February.

In 2020, Volkswagen expect a decline of 3% to 15% in the Chinese market but confirmed plans to invest more than €4bn this year there, with about 40% of that sum earmarked for electric driving. "We assume that the recovery will continue and that we will be operating in a normal market environment again in 2021," Woellenstein said.