

# Editorial

## Whistling While We Work

All during these fraught, topsy-turvy months, we've carried on bringing you relevant news and analysis every Tuesday, and every month a detailed report of one kind or another. We keep ourselves so busy working on the next thing that it's sometimes good to pause and take note of what we've done. This week we bring you a summary of DVN work during the first half of this year.

It's just a brief pause, though; we're not stopping. For us there's nothing such as summer holiday; the entire DVN team are on duty and hard at work to keep you informed and bring you ever more value for your DVN-subscription money.

Over the next four months you can anticipate reports on topics including:

- Evolution of Automotive LED Light Sources (29 September), in which we will present the newest LEDs and describe the newest applications for safety, performance, and styling;
- VISION Congress (October), wherein you will find summaries of the lectures, and links to released lecture slide shows;
- Evolution of ADB (November), looking in on how the many technologies in play are developing to improve resolution, performance, and cost;
- Audi profile (December) which will show the changes since our previous Audi profile a decade ago.

And don't forget the three upcoming DVN events:

- 24 September: Car Smart Interior Online Conference
- 17 November: Automotive Lidar Online Conference
- 1-2 December: DVN Tokyo Workshop at the Ritz-Carlton

Dear readers, from all of us at Driving Vision News, we wish you happy holidays for those going and already on holiday, and a lot of pleasure reading our Driving Vision News productions for those who are sticking around in their office this summer!

Sincerely yours,



DVN PRESIDENT

# In Depth Lighting Technology

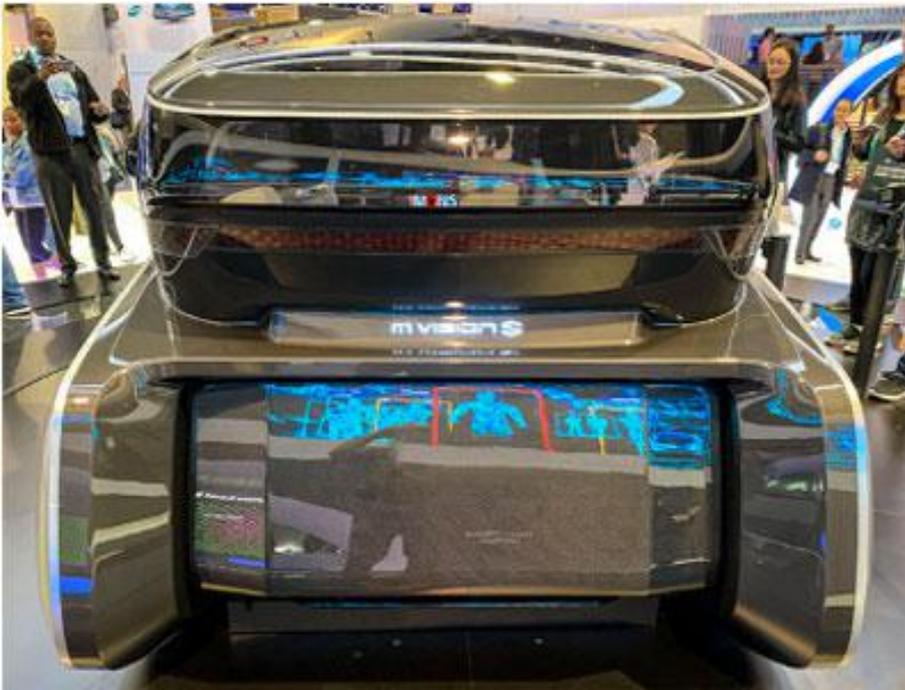
## DVN's H1-2020 Achievements

As the Summer holiday season starts (where that's a thing), it's a fine time to evaluate DVN's achievements over the very difficult first six months of 2020. Despite the pandemic, DVN has kept on churning along, finding ways to foster fruitful communications among DVN Gold members. We've steadily grown the DVN community, and we held a successful Workshop just before the pandemic began closing down the world.

We published **26 Newsletters**, week after week without fail. That's 26 editorials, 26 in-depth features, and more than 300 news articles about lighting, driver assistance, and relevant industry news. The weekly DVN Newsletter's purpose is to provide news and analysis of the important events, happenings, and product launches in the realm of lighting, driver and vehicle vision, and ADAS. We work hard to make it the one-stop source for relevant news and views for our industry.

We put out **Six DVN Reports** on events:

- **CES 2020 in Las Vegas**



This report was put together by DVN Chief Editor and Canadian lighting expert Daniel Stern. CES, the massive Consumer Electronics Show in Las Vegas, increasingly caters for the long-run concepts in the reimagining of mobility, and our DVN Report brought it to you.

- **DVN Munich Workshop**



The Munich workshop was a great success with the high level of lectures by worldwide speakers, the very interesting panel discussion, and the quality of the exhibitions. It was surely one of the most successful DVN Workshops ever, and the feedback we received indicate DVN members find the report most worthy.

- **Geneva *ersatz* auto show**



For the first time we made a report on a event which didn't happen. Daniel Stern—very active during these last six months!—used automakers' information plus DVN insight to build our report.

- **US lighting**



Another of Stern's DVN Reports, this was our third periodic in-depth look at vehicle lighting on the North American regulatory island.

- **Marelli AL profile**



MARELLI'S LIGHT HALL

We chose to make this report because Marelli Automotive Lighting is now one of the three largest front and rear light suppliers in the world and because in 2019, Magneti Marelli (owner of Automotive Lighting) was bought by Calsonic Kansei to create one

of the world's largest independent automotive suppliers, under one worldwide brand, Marelli.

• **50 Years of Lightstyling**



This report shows how front and rear lamps have played a big part in the evolution of car design, influencing and being influenced by styling and regulations at the same time. It presents significant design innovations, ten in front and ten in rear lighting, which have been particularly impactful on automobile styling evolution.

These six reports in H1-2020 were followed in July by the report on **ADAS and Lighting**, wherein we explored and explained the increasing linkage between these two aspects of vehicle design and equipment.

In our **DVN website** there's a new photo album section where DVN members can get high-resolution pictures—too large to put in our downloadable Reports—from our visits to major auto shows (NAIAS, Geneva, Mondial, Los Angeles, etc). There's also now a provision in the Workshop section to access lecture slides that have been released for publication by their presenters. And we began reaching successfully in an exciting new direction as we launched **DVN-Interior** with the aim of organising and serving the vehicle interior community in much the same way as we do for the lighting and vision community.

Beyond that, we cordially remind you of the great benefits Gold members can access by logging in at [DrivingVisionNews.com](http://DrivingVisionNews.com): Access to the DVN database with over 8,000 news articles and 150 published reports (and counting!), the DVN community directory with its detailed presentation of products and services from over 150 global supplier companies, and all of it readily siftable through an efficient keyword search engine.

# Lighting News

## Computing is the New Horsepower: Audi

LIGHTING NEWS



Automaker competition long centred round the power of their engines. Now a different kind of power is fuelling the race: computing. New Audi CEO Markus Duesmann is assembling a team of about 200 engineers within the Volkswagen Group to accelerate their pace.

Named Project Artemis—after the ancient Greek goddess of hunting—the goal is to blow past Tesla, widely viewed as the industry leader in software. Duesmann admits that at the moment "When it comes to digitalization we are lagging behind for now"

In the past, bigger cars with more powerful engines were considered inherently superior, but now computing power and intelligence will be crucial stats for defining what is premium. Increasingly automated vehicles need better, faster, more versatile processors and software operating systems to analyse sensor and camera data and driver performance.

"Technical development of vehicles is no longer organised according to a vehicle's size, but by the car's electrical and electronic architecture," Duesmann says. Premium and high-value models will now differentiate themselves by computing power and equipment.

Project Artemis will be led by Alexander Hitzinger, who was responsible for autonomous driving at VW and built up the Porsche racing team that won the Le Mans endurance race in 2015, 2016 and 2017. Previously he worked at Apple, where he set up and managed product development for autonomous vehicles. The Project Artemis team will leverage the engineering expertise within VW Group, as well as bringing in partners from outside the Group. "The result will be a common concept which is scalable for all of us," Duesmann says. "The first model will be an Audi".

# Bugatti Digitally-Designed Divo

LIGHTING NEWS



The Bugatti design team, under chief designer Achim Anscheidt, have digitalised more than 90% of the creative model development process.

"I had always wanted to understand how technical things work, and optimise them if at all possible," said Ahmet Daggün, Bugatti's Director of CAD and Visualisation. Half of the design of the Bugatti Chiron was already produced digitally, and this share increased to 90% for the latest Divo hyper sports car that is just entering production.

"With the Divo, we proved for the first time that we could use the digital design process to develop a breathtaking shape into an extraordinary vehicle that is ready for the prototype stage within just a few months," said Daggün. This would not have been possible within such a short timeframe with traditional 1:4 scale models in clay.

Around half the time and a quarter of the development cost can be saved by using the digital process. The significant improvement of VR data goggles, which now provide designers with a hyper-realistic view of virtual models, was crucial for the technological breakthrough.

"Today, we are the leading manufacturer to apply this form of development in such a systematic way, and not just in the hyper sports car segment," said Stephan Winkelmann, President of Bugatti. "As the manufacturer of the world's most outstanding vehicles, we are obligated to always develop new ideas, both in terms of technology and design".

# A Promising Peep out of NHTSA...?

LIGHTING NEWS



[www.nhtsa.gov](http://www.nhtsa.gov)

TruckingInfo reports that NHTSA's acting administrator James Owens is making encouraging noises about advanced automotive lighting and crash avoidance technology:

*"NHTSA is also working on issuing a final rule later this year that would allow truck and motor vehicle manufacturers the option to install adaptive driving beam headlamps, which use automated technology to provide more light for drivers, while also identifying and shading drivers and other vehicles from the upper beam headlamps."*



The report also quotes Owens as saying "NHTSA is also actively engaged in research and rulemaking related to the safe development and testing of automated driving systems. These systems hold the potential to one day help prevent fatal crashes, save lives and reduce crash severity."

*James C. Owens serves as the Deputy Administrator of the NHTSA, leading the execution of NHTSA's mission of setting safety standards for motor vehicles and vehicle equipment, facilitating the testing and deployment of advanced vehicle technologies, rooting out vehicle defects, and educating Americans to help them drive, ride, and walk safely.*

# Get Rid Of That Aim Screw Before Someone Gets Hurt!

## LIGHTING NEWS



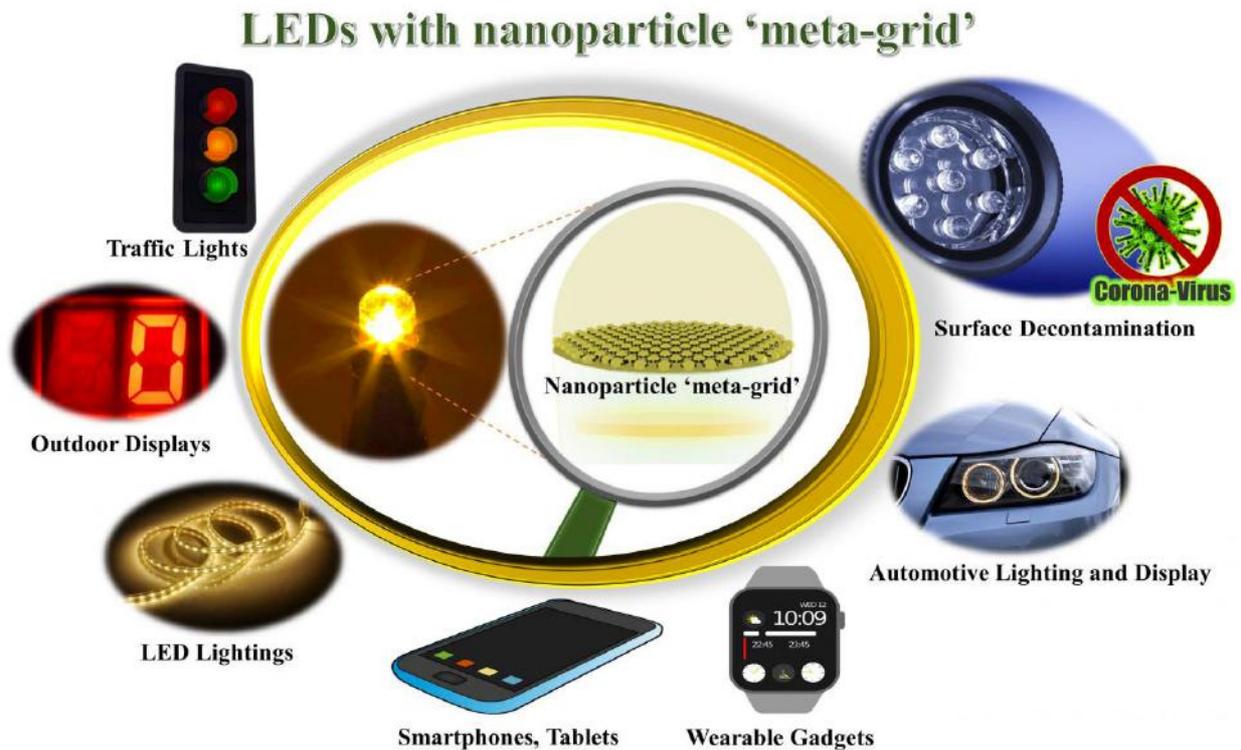
Ford are recalling 130 replacement headlamps installed on 2013–16 Lincoln MKZ cars. It seems some dealers began ordering and installing ECE headlamp assemblies for the Korean and Chinese markets when the American-spec lamps were unavailable on an extended backorder. The affected replacement headlamps—which cost about USD \$1,300 a piece—were sold directly to customers or installed as replacements.

It seems the dealers either didn't know or didn't sufficiently care that the lamps they installed or sold did not comply with U.S. Federal Motor Vehicle Safety Standard 108—they produce beam patterns considered safe and effective only in those countries that are not within North America, they lack side marker lights, and—perhaps most worrisome of all—they allow for horizontal aim adjustment.

There are no reports of crashes or injuries related to the misequipment. Dealers will inspect headlamps in affected vehicles and replace them as needed, and will contact customers who purchased over-the-counter parts and provide replacements.

# Nanoparticle Grid For Better LEDs

LIGHTING NEWS



LEDS WITH NANOPARTICLE «META-GRID»

The world demands ever-increasing performance from LEDs, and now a research team at Imperial College in London have embedded tailored meta-grids of nanoparticles into LEDs to enhance their light output and lifespan.

Their method was [published](#) in Light Science & Application. Dr. Debabrata Sikdar, Prof. Sir John B. Pendry, and Prof. Alexei Kornyshev reported increased transmission of the light generated inside the LED chip by reducing the Fresnel reflection loss at the chip/encapsulant interface within a fixed photon escape cone, with only minimal changes to the manufacturing process.

The analysis shows that transmission across a typical LED-chip/encapsulant interface at the peak emission wavelength can be boosted to 99%, versus 84% without the new technique. With further development the new method could provide improved transmission within the photon escape cone over an LED's entire emission spectrum, not only boosting light output but saving energy and increasing the lifespan by reducing chip heating unwanted reflections within the chip.

# DVN's EPIC Interview

LIGHTING NEWS



## EPIC Introduction to Driving Vision News

*This editorial was originally published in Electro Optics magazine to introduce a very active network: Driving Vision News. I video talked with Hector Fratty who is DVN's President and General Editor. Fratty, who holds 20 patents, has dedicated his entire career to automotive lighting. From 1995 to 2006, he was Valeo Lighting Systems' chief of R&D, managing a staff of 650 engineers and technicians and a budget of over €70m.*

### What is DVN - Driving Vision News?

DVN is the automotive lighting and ADAS (Advanced Driver Assistance Systems) industry's journal of record, dedicated to keeping the community informed and communicating about the latest progress and developments.

### What is the purpose of DVN?

There are 3 main objectives:

- Technological watch on new emerging technologies through the weekly electronic newsletter, and monthly technical reports focused on lighting & ADAS on cutting edge tech, company profiles, motor shows, regulatory updates, and suchlike;
- Networking with high level decision-makers to forge new business through two workshops per year held in the USA, Europe, China, Japan, India, Korea, gathering more than 300 participants, and
- Promotion of innovations to and from the 150 companies member of DVN, getting in touch through our active facilitations, enabling to build new relationships in the DVN community to find and realise new business prospects worldwide.

### Who are your members / stakeholders?

DVN has 150 Gold company members worldwide: 25 car makers, 30 lighting & ADAS Tier 1 suppliers, 15 light source suppliers, 50 Tier 2/3 suppliers and 25 universities. 1,000 DVN Gold members receive the full published output of DVN, while another 2,500 members receive a subset of it.

### What opportunities do you see for collaboration with EPIC and its members?

Photonics is a key enabling technology with numerous relevant applications for the automotive industry. As both organisations are leaders in their respective fields, I look forward to greater collaboration facilitating interaction among our members.

Carlos Lee concluded that "Through a strong partnership with DVN (Driving Vision News) I am pleased that we bring EPIC members closer to the Automotive sector".

# LEDs Magazine "40 Under 40": Isaac Wildeson

LIGHTING NEWS



Dr. Isaac Wildeson, PhD has risen from senior development engineer to director in nine years' time, driving his team at Lumileds to new levels of LED efficiency. He is senior director of epitaxy technology research and development at Lumileds, where he leads epitaxy process development, hardware development, characterization, and applications teams

Wildeson's nomination is substantiated by the numbers, which is fitting due to his dual degrees in physics and applied mathematics. According to the submission, teams under his leadership have achieved greater than 35% relative improvement in the external quantum efficiency of high-power blue LEDs, and greater than 60% relative improvement in green LEDs.

His present role includes developing and executing external collaborations with companies, universities, and national laboratories on technology evaluations and joint development work, and he has participated in several successful government-sponsored research programs including a role as a principal investigator. Wildeson has served on various roundtables and as a panelist for the DOE, and has delivered invited talks as well as chaired sessions at major research conferences. He earned a master's of science and PhD in electrical and computer engineering from Purdue University,

*To recognize and celebrate lighting design talent, 40 young lighting designers are selected by LEDs Magazine as North American representatives of this new generation and ambassadors for their industry. All are outstanding young people with much to contribute*

# LRC Staff Cited by LEDs Magazine

## LIGHTING NEWS



Two staff members and three alumni at Rensselaer Polytechnic Institute's Lighting Research Center have been named as promising professionals in the LED and solid-state lighting industry by *LEDs Magazine*.

The five were chosen for the magazine's "40 Under 40" list of leaders, which was published in the July 2020 issue.

Research scientists Charles Jarboe (photo, L) and Indika Perera (photo, R) were recognised for their pioneering and creative research work and for their collaborations within the industry.

Jarboe's work is focused on the area of light and health and the effects of lighting on the human circadian system. He has been instrumental in developing lighting apparatus and devices for LRC studies into the spectral sensitivity of the circadian system and how coloured light affects sleep quality, mood, and performance. Perera's work has centred on LED package and system materials, including thermal management solutions, optical design, and system life and reliability. His most recent investigations are in the field of 3D printing for lighting and how 3D printing machines and materials can be used successfully to produce lighting fixtures and components.

*The Lighting Research Center (LRC) at Rensselaer Polytechnic Institute is the world's leading center for lighting research and education. Established in 1988 by the New York State Energy Research and Development Authority (NYSERDA), the LRC conducts research in light and human health, transport lighting and safety, solid-state lighting, energy efficiency, and plant health.*

## VW South Africa Ex-Chief is New Škoda Chairman

LIGHTING NEWS



Škoda have chosen Thomas Schaefer as their new leader; he's formerly the Volkswagen Group's head in South Africa. Schaefer replaces Bernhard Maier, who left at the end of July after nearly five years in charge.

Schaefer, a mechanical engineer, started his automotive career with Daimler in 1991, holding management positions in production and quality in Germany, the U.S., and South Africa until 2002. He then worked for DaimlerChrysler in Malaysia until 2005, when he moved to Daimler in Germany, working in the emerging-markets operations business field. He moved to VW Group in 2012 and was named chairman and managing director of VW Group South Africa in 2015, responsible for group brands in the sub-Saharan Africa region.

# Driver Assistance News

## Where Should the Lidars Go?

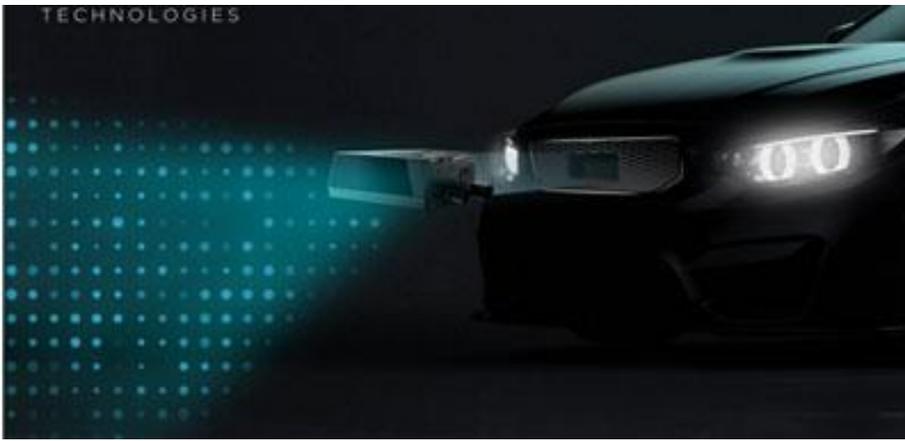
DRIVER ASSISTANCE NEWS



Balancing the styling aspects of vehicle integration with functionality is becoming increasingly important. The table below lists the various locations that a lidar could be integrated in a car. Each presents different challenges in achieving the right balance of performance, styling, reliability, and durability.

No.	LIDAR Location	Lower Complexity		Medium Complexity		High Complexity
		Size Impact	FOV Coverage	Thermal Management	Style Considerations	Obscuration
1	Rooftop	Can be large	Can offer 360° HFOV with single unit	Less complex, can consume and dissipate more heat	Worst option from styling and aerodynamic aspects	Need additional mechanism to keep optical surfaces clear
2	In Cabin	Need low size and weight	Difficult for HFOV coverage	Difficult, need low power unit	Compatible, ensure no acoustic noise	Easier to keep optical surfaces clear
3	Head and Tail Lamps	Need low size and weight	Can get 360° HFOV coverage with multiple units	Higher ambient temperatures	Compatible	Easier to keep optical surfaces clear
4	Behind Grill	Need low size and weight	Difficult for HFOV coverage	Higher ambient temperatures	Compatible	Exposed area for dirt and water
5	On Side View Mirrors	Need low size and weight	Difficult for HFOV coverage	Less complex, can consume and dissipate more heat	Compromises styling to some extent	Need additional mechanism to keep optical surfaces clear
6	Bumpers	Need low size and weight	Can get 360° HFOV coverage with multiple units; VFOV more challenging	Less complex, can consume and dissipate more heat	Compatible	Need additional mechanism to keep optical surfaces clear

LIDAR LOCATIONS ON VEHICLE



In the new BMW iNEXT electric car to be launched in 2021, the lidar is integrated within the front grill.

Going forward, Innoviz intend to follow the same principles for vehicle integration in the side and rear panels to enable 360° FOV.

### **Ouster**



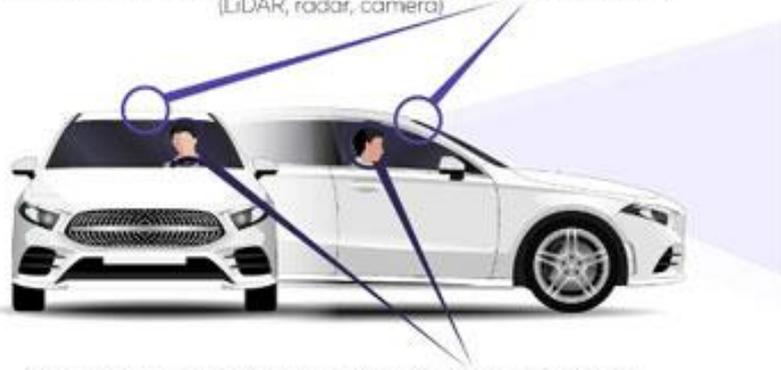
Ouster's approach to integration on a rooftop (HFOV of 360°) or lower FOV (180°) for the engine mounted on side-view mirrors or behind the grill. For other mounting locations, they can simply offer the flash solution with a more limited HFOV (60°) that can be embedded through body panels and headlamp locations.

### **Sense Photonics**

Engines can be mounted at independent locations in the vehicle. As an example, the transmit engine can be mounted within the headlamp assemblies while the receive engine along with its processing electronics could be mounted behind the windshield. This enables simpler cleaning solutions and protects the optics from dirt, stone chipping, and sand abrasion. The windshield and headlamp glass surfaces need basic anti-reflection coatings to enable 940 nm transmission.

### **Baraja**

Ideal positioning for the "eyes" of a **non-human driver**  
(LiDAR, radar, camera)



Ideal positioning for the eyes of a **human driver**

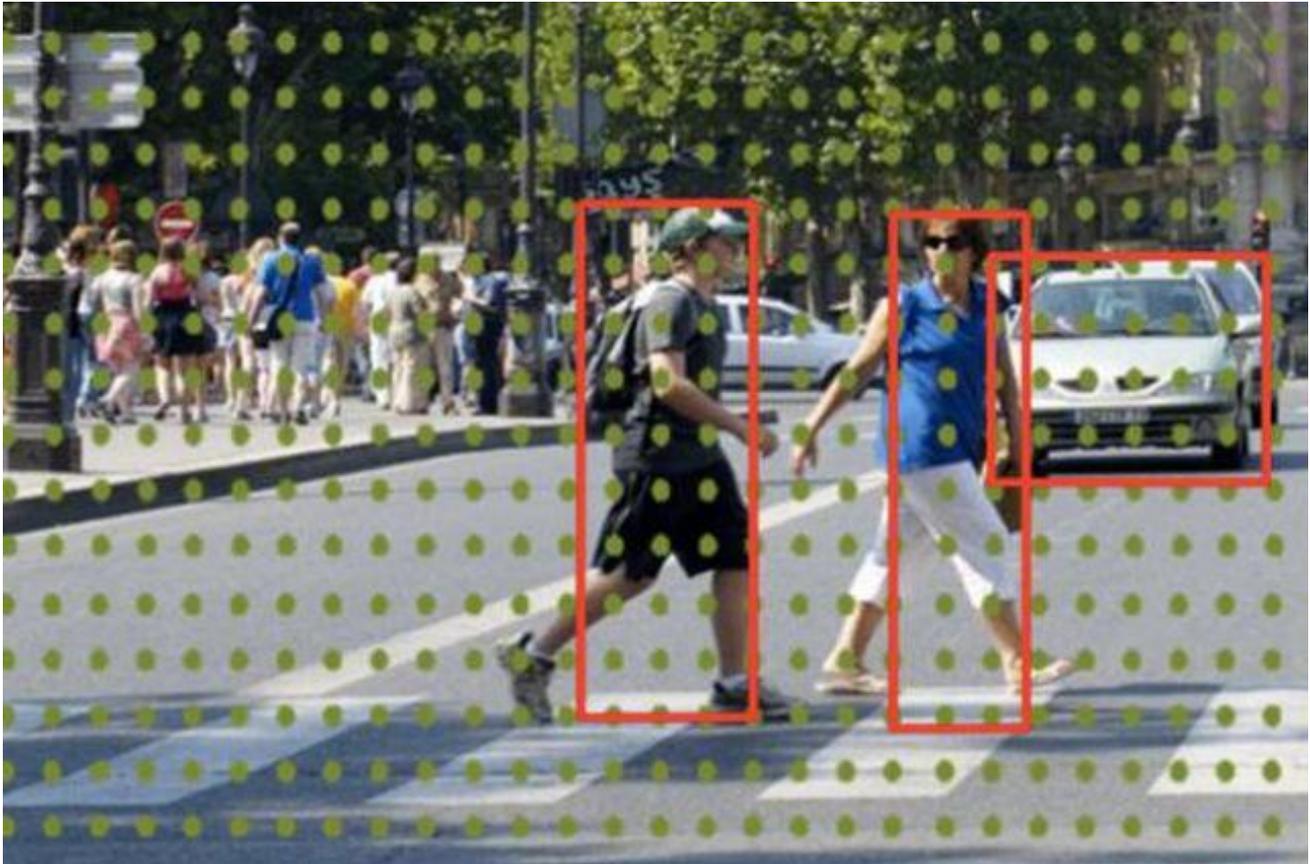
The passive optics portion can now be deployed behind the windshield or within the headlamp assemblies while the active optics can reside in other areas where active cooling is more manageable.

Modularity can be beneficial in terms of form factor constraints and allow for more optimal locations for thermal management.

Automotive Tier 1 suppliers have a wealth of knowledge regarding the myriad issues that can arise due to integration and real world testing. Working with them can help to proactively address potential issues before they emerge and require expensive re-designs.

# First Automotive 4D Radar-On-Chip

DRIVER ASSISTANCE NEWS



Israeli startup RFSee have launched their first chip to improve radar detection in automotive designs using phased-array technology.

The all-weather 4D radar on a chip can detect cars at 500 metres' distance, and pedestrians at 200 m with an angular resolution of greater than  $1^\circ$ . Prototypes of RFSee's radar are under evaluation by top automotive OEMs and Tier-1 automotive suppliers.

RFSee's 4D radar chip uses a phased array of dozens of transmitters to produce a focused radar beam. The method provides an improved radar image and a better signal-to-noise ratio, the company claims. It goes further in asserting that its radar detection range is six times broader than existing radars.

"Our breakthrough all-weather Phased Array 4D radar on a chip is going to be a game-changer in the field of global automotive radar," said Moshe Meyassed, CEO of RFSee. "Today's automotive radars typically provide low resolution and limited detection range. Our ability to combine long range, high resolution and superior accuracy can be the key for the high-quality sensor fusion between the camera and the radar that the automotive industry is looking for."

"The sensor fusion that RFSee is introducing will open new frontiers for adding effective AI layers to the fused radar and the camera data," he added. "As a result, car manufacturers and drivers alike will benefit from crucial improvements in safety and accident prevention, effective operation in low visibility and increased automation in vehicles".

# Lucid's ADAS Platform

## DRIVER ASSISTANCE NEWS



When customer deliveries of the Lucid Air begin in early 2021, Lucid hope to be first to market with the combination of a driver monitoring system and a sensor suite that includes high-resolution lidar.

According to the company, their DreamDrive technology suite supports 19 safety, driving and parking assist features that will be available upon start of production, with another eight features expected later via over-the-air updates. It says additional capabilities are also in development to enable L<sup>3</sup> driving in certain conditions.

"We have developed DreamDrive to be among the most advanced ADAS to ever be offered to consumers," said Dr Eugene Lee, senior director, ADAS and autonomous driving, Lucid Motors. "By prioritizing safety and updatability, Lucid DreamDrive also sets the stage for offering increasingly sophisticated driver assistance features".

The vehicle has 32 sensors comprising camera, radar and ultrasonic sensors, as well as a long-range, high-resolution lidar placed at the front of the car. Lucid says it also includes an in-car driver monitoring system designed to share relevant information with the driver while ensuring their necessary attention to the driving configuration.

Lucid say it's the first ADAS built on a high-speed Ethernet ring, which additionally serves as a fully redundant platform for key functions such as steering, brakes and sensors, including redundant independent power sources and communications paths, fail-operational actuators and fault-tolerant computation.

# General News

## China Sales Rise As Outbreak Eases

GENERAL NEWS



Vehicle sales advanced for a 4<sup>th</sup> straight month in China. Sales of passenger cars increased 15% in July from a year earlier to 2.08 million, according to the China Association of Automobile Manufacturers. From January to July, vehicle sales declined by 13% to 12.3 million units.

Shoppers in the world's largest car market are slowly resuming buying as the government eases restrictions, raising expectations that the auto slump currently in its third year may be nearing an end. Yet challenges remain: ride-hailing apps are reducing the need for personal ownership, and U.S. President Donald Trump's trade war threats pose complications for economic recovery.

# 100K Jobs At Risk in German Car Industry

GENERAL NEWS



Industry expert Ferdinand Dudenhöffer expects to see 100,000 jobs cut from the German auto industry.

Demand in Europe and America is slumping this year, production in Europe is likely to drop by a quarter to twelve million cars. There is overcapacity for seven million cars, the professor writes. "It is extremely unrealistic to drag these cost burdens over longer periods of time because long periods of loss cannot be afforded in the highly competitive automotive market."

Car makers had shut down their factories around the world for weeks in the second quarter due to the Corona pandemic, partly because car dealerships had to lock down and dealers were unable to sell cars. Demand from suppliers was also put on hold.

# CEO Shake-'n'-Shuffle at Ford

## GENERAL NEWS



Ford CEO Jim Hackett (photo, R) will retire soon, after more than three years leading the company. Current COO Jim Farley (photo, L) is to become CEO and President on 1 October.

Farley has also been elected to the Ford board of directors. He will work closely with Jim Hackett on the transition over the next two months "I am very grateful to Jim Hackett for all he has done to modernize Ford and prepare us to compete and win in the future," said Bill Ford, Ford's executive chairman. "Our new product vision, led by the Mustang Mach-E, new F-150 and Bronco family, is taking shape. We now have compelling plans for electric and autonomous vehicles, as well as full vehicle connectivity. And we are becoming much more nimble, which was apparent when we quickly mobilised to make lifesaving equipment at the outset of the pandemic".

Farley joined Ford in 2007 as global head of Marketing and Sales and went on to lead Lincoln, Ford South America, Ford of Europe and all Ford global markets in successive roles. In April 2019, Farley was chosen to lead Ford's New Businesses, Technology & Strategy team, helping the company determine how to capitalize on powerful forces reshaping the industry – such as software platforms, connectivity, AI, automation and new forms of propulsion. He was named COO in February of this year

"My goal when I took on the CEO role was to prepare Ford to win in the future," Hackett said in a statement. "The hardest thing for a proud, long-lived company to do is change to meet the challenges of the world it's entering rather than the world it has known. I'm very proud of how far we have come in creating a modern Ford and I am very optimistic about the future."

# Toyota Turn Profit Despite Slowed Sales

GENERAL NEWS



Toyota have wrung a profit out of the 2nd quarter despite plunging sales amid the COVID-19 pandemic. The relatively robust results come as all major Japanese automakers—Nissan, Honda, Subaru, Mazda, and Mitsubishi—slumped to quarterly operating losses in the April-June period. Operating profit nearly evaporated, plunging 98% to \$129m in the automaker's Q2 ended June 30 and net income tumbled 74% to \$1.48b in the period, as revenue fell 40% to \$43b.

A faster-than-expected rebound in China also helped keep Toyota above water. Operating profit in China actually surged in the April-June period as sales rose 14%. Toyota predict operating profit will fall 79% to USD \$4.7bn in the current fiscal year ending March 31, 2021, while net income is expected to drop 64% to \$6.8bn Revenue is seen down 20% to \$223bn.

Global sales are forecast to fall back 13% to 9.1 million vehicles in the fiscal year through March 31, 2021, from 10.46 million vehicles in the previous year.