



DVN STUDY

NEW LIGHTING FUNCTIONS 2020-2030

To Improve Safety, Communication, Comfort, and Styling

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Editorial

New DVN Report; GTB Interview Series Starts

DVN and GTB have a mutually beneficial working relationship, ongoing for over a decade and still strong, facilitating each other's work and bringing together experts from all over the world. This week we bring an exceptional interview with GTB Secretary-General Davide Puglisi. His might be one of the lesser-known names in the vehicle lighting world, but he's a crucial cog in the machine, as evidenced by his participation in DVN Workshops. His lectures on simplification and update of the UN Regulations show his broad, deep knowledge in regulatory matters, and his management of GTB's administrative and technical work is quite amazing. Puglisi's interview is first in a series with GTB VIPs; in future DVNewsletters we will interview Bart Terburg and new GTB President Valter Genone.

And today our new [DVN Report](#) on Lighting in Developing Countries goes live. In it, we scrutinise the vehicle lighting situation in India, Brazil, Mexico, Turkey, and more. Developing countries have particular conditions that make challenges for good lighting. And these countries account for only a minor proportion of worldwide automobile production—so these countries are a large reservoir of future activity for the automotive industry and particularly the lighting industry. In the Report we forecast production levels in these countries—India should lead the developing world strongly in 2050 with around 25 million vehicles produced, and there's a whole lot more detail than that, so DVN Gold members, download your copy today!

Sincerely yours,


DVN CEO

In Depth Lighting Technology

We Can Move Only As Fast As Industry Support: GTB's Puglisi



GTB Secretary-General Davide Puglisi ("DAH-vee-dey pool-YEE-zee") is one of the vehicle lighting community's utmost regulatory experts.

After earning his diploma in Electronics and Telecommunications Engineering in 2000 in Turin, Italy, Puglisi moved to London to study English and web design. In 2002 he moved back to Italy where he started to work for CUNA, the Italian standardisation body for road vehicles. He became involved as Italian representative in ISO and CEN standardisation activities in automotive electronics, lighting, and telematics; active and passive safety; ergonomics, and visibility.

Aside from his standardisation work, since 2004 he has managed the GTB secretariat. His GTB work has increased significantly over the years, and in 2018 he left CUNA to devote full-time effort to GTB in his new position as Secretary-General. That same year, he graduated in Political Science and International Relations with a thesis on geopolitical and geo-economic impacts deriving from the electrification of the automotive sector.

In addition to his core GTB duties, he is the secretary of the GRE Informal Working Group on the Simplification of the UN Lighting and Light Signalling Regulations (SLR) since its establishment in 2014. He is married and has two children. He was kind enough to talk with us about his work.



DVN: What was your mission during the presidency of Geoff Draper?

Davide Puglisi: For more than 50 years GTB had successfully operated without any major changes. Nevertheless, the need for a comprehensive modernisation became more and more important if GTB wanted to keep and reinforce its prominent role, and Geoff was able to lead the deep transformation which resulted in the present GTB. During Geoff's Presidency my mission was to concretely support him in this task, together with Bart Terburg, and to execute the necessary changes to achieve our goal. The legal registration of GTB in 2011 and the subsequent achievement, in 2014, of the special consultative status by the UN ECOSOC were the first milestones of this transformation. However, to achieve these results, GTB had to create a completely new organisation structure with a proper Statute, By-laws, Competition law compliance policy, GDPR policy, audited accounts, etc. As GTB Secretary-General and Treasurer I have been deeply involved in all these significant developments to guarantee transparency and to ensure compliance with Italian law.

In addition to that and to the daily management of the secretariat, my mission was to increase the international awareness of GTB by contributing to conferences and workshops such as DVN, ISAL, IFAL, ALE, and the ACEA Sino-Europe Conference.

DVN: How did your role change following your move into the full-time career position as Secretary-General starting in January 2019?

Davide Puglisi: As part of the GTB restructuring, the organisation's centre of gravity moved towards the GTB secretariat, which has been strengthened with the introduction of a new full-time position as Secretary-General supported by some staff. This made it possible to relieve part of the workload and the duties on the GTB President and to move them under the direct responsibility of the Secretary-General. While the President remains a key figure in GTB, the role is mainly focussed on guiding and coördinating the activity of the association. As Secretary-General I have the function of managing all aspects of the administrative and technical work of GTB, including all financial- and personnel-associated activities of the association.

DVN: You have also since 2014 served as Secretary of the GRE Informal Working Group on Simplification of the Lighting and Light Signalling Regulations (SLR). What have you learned from this important role?

Davide Puglisi: When I embarked on this adventure, I never imagined the magnitude of work and the huge amount of time I would have to invest. I remember some “smart” people in the early days saying that the simplification of the regulations would be a simple cut-and-paste editorial exercise. It turned out to be one of the major regulatory works ever done within GRE, everything but a simple editorial exercise!

With hindsight I am glad that I accepted this position because it has been a unique educational experience for an in-depth dive into the complexity of the regulatory work. The SLR is a wonderful team made up of a few committed, and very knowledgeable, international experts. During the last six years (and 43 meetings, mostly face-to face) we have strengthened our professional and personal relationships. I believe that human relations are a key asset for any successful outcome in international cooperation. There is a limit to the value of web-meetings, but this is another subject.

DVN: You worked for over a decade with Geoff Draper and Vice President Bart Terburg. What do you retain about that?

Davide Puglisi: First of all, let me say that I feel myself honoured for having had the opportunity to work together with both of them. I have learnt a lot from Geoff Draper’s decades of experience and, most importantly, he passed down to me his interest in automotive lighting and his passion for the worldwide harmonisation of regulations. Besides, I have learnt from him many interesting English expressions which I have reciprocated with similar Italian sayings. Our meetings were never boring!

Bart Terburg and I were already working together as GTB Vice-Chair and GTB Secretary, but our professional relationship changed under Geoff’s presidency with the creation of the Administrative Committee where Geoff, Bart, and I worked closely to manage GTB. Based upon more than a decade of working together I can say that Bart represented a precious element to balance the discussions within the three of us and I have always appreciated his great coöperation and reciprocal support.

Since most of the time we were separated by water—Bart in the USA, Geoff in the UK, and me in Italy—the unexpected COVID-19 pandemic did not really change our way of working because we were used to having meetings via the internet.

There is no doubt I will miss working with Geoff, and I am glad to continue the coöperation with Bart and I am looking forward to start working with the new President, Valter Genone.

DVN: Will your mission change under the new GTB President?

Davide Puglisi: It is not easy to answer this question but I expect that my mission shall change according to the identified need for GTB to differentiate its focus to cover, in addition to the typical road illumination and light signalling matters, also those fields where vehicle lighting has an indirect impact. I am referring to camera-based systems, CO₂ reduction, and AV communications just to mention a few. In parallel, in order to increase the GTB authority worldwide, I intend to promote an enlargement of its global membership base.

DVN: You've made lectures and participated at DVN Workshops, as an artifact of the working relationship between GTB and DVN. What is your general feedback?

Davide Puglisi: Indeed, I have had the pleasure to make lectures in several workshops and the last one was the DVN in Munich in January 2020, just before the outbreak of the COVID-19 pandemic in Europe. The coöperation between GTB and DVN has demonstrated to be mutually beneficial and I believe it shall continue in the future. The DVN platform has enabled GTB to promote its activities to a different audience than its normal membership with the positive result to increase the awareness of GTB and the interest in its work. DVN benefits from regular updates and professional insights on regulatory matters provided by GTB. I also recall a joint GTB/DVN Forum in February 2019 in Turin which included a brainstorm session that has been useful to help defining the GTB roadmap for the next 10 years. There are many examples of this fruitful coöperation and I am convinced of its benefits.

DVN: What message you would like to transmit to the worldwide lighting community?

Davide Puglisi: There are big challenges in front of us such as the wide market uptake of electric vehicles, the development of autonomous vehicles, and the ageing of population. On the other hand, there are great opportunities offered by new technologies. GTB is ready to provide its structure and knowhow to develop and maintain high quality, globally harmonised technical requirements. However, GTB is not an abstract entity; it is made up of people. *We can only move as fast as the support we receive from industry.*

Lighting News

NAIAS canceled - Alternate Outdoor Event Planned

LIGHTING NEWS



AUTO SHOW

The Detroit auto show, rescheduled because of the pandemic, has been canceled altogether for 2021, organizers said Monday. The show will be replaced this year by an outdoor, enthusiast-focused event at a racetrack north of Detroit in Pontiac, Mich. While many details have yet to be worked out, organizers anticipate new and redesigned vehicle introductions and other events that typically take place at a traditional auto show at the racetrack, although on a smaller scale.

The Detroit Auto Dealers Association, which operates the show, said it would host a reimagined version of its "Motor Bella" concept at the M1 Concourse in Pontiac, Mich., from Sept. 21-26, featuring 1.6 million square feet of dynamic vehicle and technology display space. Organizers say the site also offers a 1.5-mile hot track for technology and vehicle demonstrations.

Although the switch to September was announced less than four months ago, officials said in recent months the prospect of safely hosting a large event grew bleak.

"As we continued to watch the world and watch a vaccine roll out well in some places and not well in other places and still having lockdowns in some areas, it really became clear to us that we were not going to have the kind of show we wanted to have," said Doug North, chairman of the show. "Many of our stakeholders who have to make significant investments are all feeling the pandemic crunch in their budgets. It became clear we'd be asking too much." North would not commit to staging a more traditional auto show in downtown Detroit if the coronavirus pandemic is no longer a concern in September 2022.

“No one’s been bigger supporters of the city than our show,” North said. “It’s had a dramatic impact on Southeast Michigan and we feel really good about that. We’re not abandoning anything and really trying to do what we can with the cards we’ve been dealt. We can’t speak to the future because auto shows are being canceled and postponed and terminated throughout the world. Not to mention they’re continuing to evolve in ways that aren’t traditional.”

HL from Premiums : The new Lighting Systems so Clever

LIGHTING NEWS



DIGITAL LIGHT USED BY AUDI, IN ITS TUNNEL

Synthesis of several magazine articles

Halogen headlights are dead. The old halogen bulbs are only still available in some inexpensive entry-level models. But not all LEDs are the same, and even full-LED headlights at the front and rear are by no means the end of developments.

In the top models, the LED headlights are networked with the navigation system, they prevents other road users from being dazzled, because oncoming vehicles are intelligently masked out and even with highly reflective traffic signs, the high-tech headlights from Audi, BMW and Mercedes turn down one level so that the driver himself is not dazzled.

The digitization of headlights at the front and rear offer completely new possibilities. The light of the future personalizes vehicle design and open up new possibilities for customization for customers. In the short term, the digital OLED will have an even larger number of segments, each of which can be individually controlled and activated in a targeted manner. In addition to the versatile design and personalization of lighting designs, the digital OLED can, for example, inform other road users early on of local dangers such as slippery roads or the end of a traffic jam. Looking even further into the future, For the first time, the light generated can shine in three dimensions. Flexible digital OLEDs make it easier to integrate the display surface right into the vehicle

All Premium brands and now also some Generalist brands are working with technology partners to develop headlights in which the light module becomes an HD projector. Up to a million micromirrors in the LED headlights ensure that films can even be played while standing in front of a wall. The HD projector of the near future will be linked to the driver assistance systems via the cameras and navigation data installed in the vehicle.

"For us, light is an important part of accident-free driving," explains Daimler lighting developer Gunter Fischer, "we not only bring more light forward, also precision in light distribution." In narrow construction site passages, for example, it is possible to project auxiliary lines onto the roadway. If there is a threat or if the winter bridge is as smooth as glass,

More information of thee technologies are described in the DVN Study called [**New Lighting Functions 2020-2030 - To improve Safety, Communication, Comfort, and Styling**](#):

Hella Animated Taillights for Polestar 2

LIGHTING NEWS



Hella have put together a rear light bar for the Polestar 2. It gives the electric performance hatchback its characteristic appearance, and software updates should eventually make new light animations possible in the future.

The linear taillight, C-shaped in the actual lamp units, extends across the entire width of the vehicle with a band of almost 300 LEDs in five modules. All light functions and animations, such as welcome and farewell sequences, are software-controlled. Hella Lighting Managing Director Frank Huber says "Combination rear lamps have long since ceased to be limited to safety-relevant functions (...) they also represent an important design element which car manufacturers can use to differentiate their vehicle models. This means that the demands on lighting technology and design language are increasing at the same time".

To realise customer-specific requirements for light animations flexibly and efficiently, Hella's GAIN (Graphical Animation Interpreter) software was used in the development process so the automaker could design light animations easily, starting with functions such as the sequential turn signal and progressing up through individual choreographies for headlamps, grille lighting, rear lamps, and the interior, as well as complex animations for autonomous driving functions.

The Polestar 2's combination rear lamps are made in Hella's lighting plant at Jiaying, China.

Grupo Antolin's Virtual Concept Car

LIGHTING NEWS



Grupo Antolin unveiled their Virtual Concept Car in a [Global Event](#) broadcast through the company's official social media channels. The car is designed and configured to show how Antolin imagine the car interior of the future and the company's main innovation solutions and areas. The company's Corporate Innovation Director Javier Villacampa said his company are carrying out research to develop innovative ways to efficiently integrate new technologies, lighting systems, decorative surfaces, and electronics in the cars of tomorrow: "We are working with the vehicle manufacturers to develop a more advanced, technological and sustainable interior that offers passengers a unique travel experience".

The first distinguishing feature of the concept car is its interior living space where people can work, relax, and communicate with others while on the move. It's a bubble of health, wellbeing and safety for the occupants thanks to advanced solutions. The smart interior interacts with passengers using state-of-the-art technologies such as dynamic lighting, virtual reality, monitoring systems, and smart touch surfaces. This allows passengers to use the car interior's systems to receive information on the condition of the vehicle, the road and their environment.

The main lighting innovations are technological breakthroughs that enhance vehicle safety, such as functional lighting solutions which assist driving and monitoring systems which warn about driver distraction or tiredness. Touch surfaces with haptic feedback are used in the virtual vehicle to activate the new functions in a more comfortable and safer manner than the previous ever-growing proliferation of actual switches.

More Pandemic Problems Ahead: Hella CEO

LIGHTING NEWS



Hella CEO Rolf Breidenbach sees ongoing turbulence and difficulty exacerbated by new rounds of stricter restrictions to try to tame the pandemic. The market environment for the lighting and electronics supplier is unstable and challenging. "A large-scale lockdown, such as in the spring in Germany, could have a massive impact on our business development, for example in the form of production downtimes or disruptions in the supply chain," he warned.

Hella had raised their forecast for the current 2020-21 financial year (ending in May) thanks to better business in December. Breidenbach had already pointed out further uncertainties and said that the recently better business figures were "just a snapshot". The company had already placed the raised outlook on the condition that there would be no further lockdowns due to the corona pandemic, which would have a significant impact on business.

Nevertheless, Breidenbach says "Due to the market development, we are now much more optimistic about the coming months." With their austerity program initiated in spring 2020, the company is well on schedule. He also said Hella are actively working to "strengthen ourselves through possible takeovers. We can envisage additions in particular in our Special Applications and electronics areas".

The Management Board is now assuming currency- and portfolio-adjusted sales of around €6.1bn to €6.6bn. So far, the company had promised €5.6 to €6.1bn. The EBIT should be around 6% to 8% (previously: 4% to 6%). However, the adjusted forecasts assume no further lockdowns due to the pandemic.

CES 2021 Technology Is This Week

LIGHTING NEWS



While the digital CES won't be able to replicate the Las Vegas tech extravaganza of past years, there should still be plenty to watch for at the online-only CES 2021 next week.

CES organization held a Tech Trends conference end of October, and several announcements since gave us some solid hints on what would be presented

The health crisis has accelerated preexisting uptrends such as Digital Health, Cloud, Work from Home technology, Robotics (Cleaning, Logistics,) and all Digital Transformation technology (Cloud, CPU/GPU, IoT, VR/AR, AI)

For vehicle and mobility technology, automated driving and smart cities would be the most important themes, including as well application of new/upgraded digital technology.

For automated driving, vision of fully self-driving robotaxis have given way to the more-immediate and pragmatic use of driver-assist technology.

Smart Cities will become the preferred test field of robo taxi, within an extended sensor network (air pollution, proximity, noise, traffic, vulnerable road users,). Contact tracking technology will accelerate where traffic and safety could almost become a by-product!

Back to office with smarter and safer buildings is also a post pandemic trends (clean air and surfaces, touchless voice and gesture technology, AR/VR,), where seamless transfer to the auto world is expected.

More information on CES will be published in next weeks.

Communication from Siemens

LIGHTING NEWS

Mentor®

A Siemens Business

«Following the acquisition of Mentor Graphics by Siemens in 2017, Mentor will now officially become Siemens EDA, Electronic Design Automation, a part of Siemens Digital Industries Software, effective January 2021.

«Our combined and integrated technologies now establish Siemens as the global leader in industrial software, positioning us to not only offer a comprehensive portfolio of EDA tools but also pioneer new technologies that we believe will redefine EDA to help you deliver IC and systems innovations to market faster.

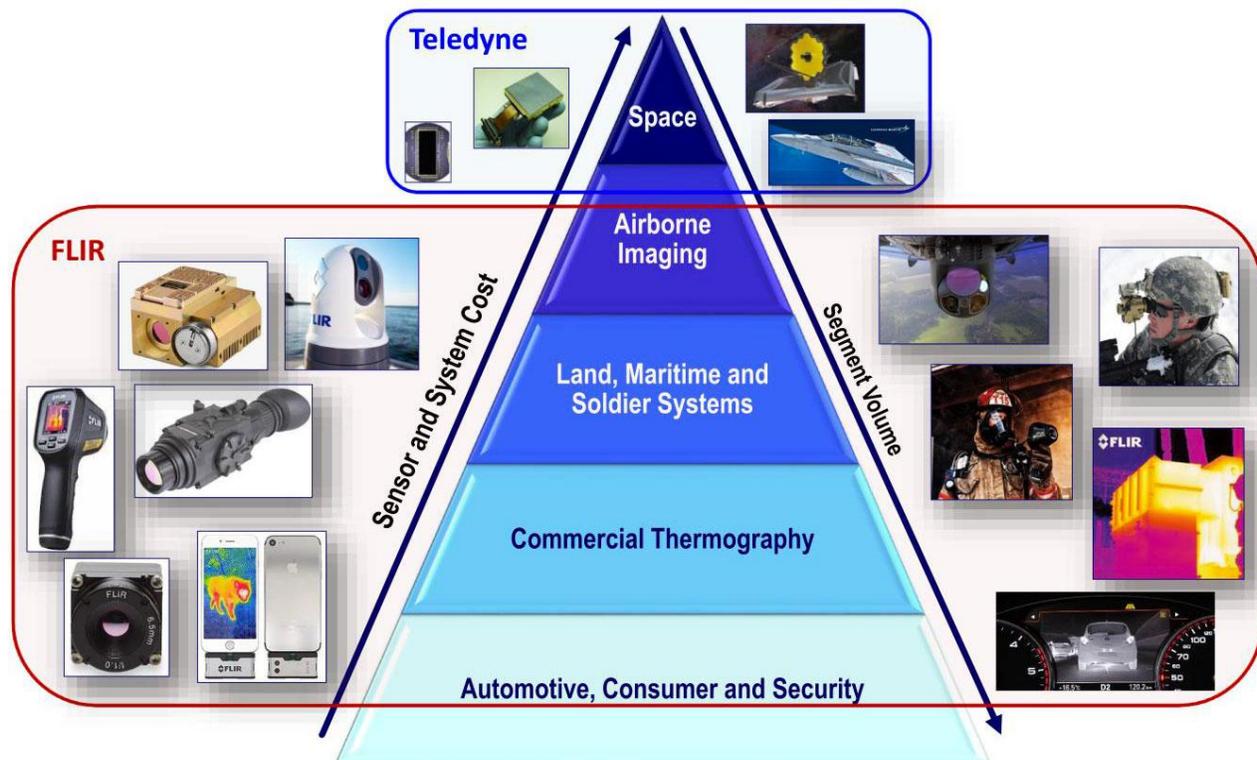
«Look for upcoming announcements with a new look and feel over the next few months as we transition our website and content from Mentor to Siemens EDA.

Thank you for your support and continued interest in our broad portfolio of EDA tools, now strengthened by Siemens' world-class products and services.

Driver Assistance News

Teledyne to Buy FLIR for \$8bn

DRIVER ASSISTANCE NEWS



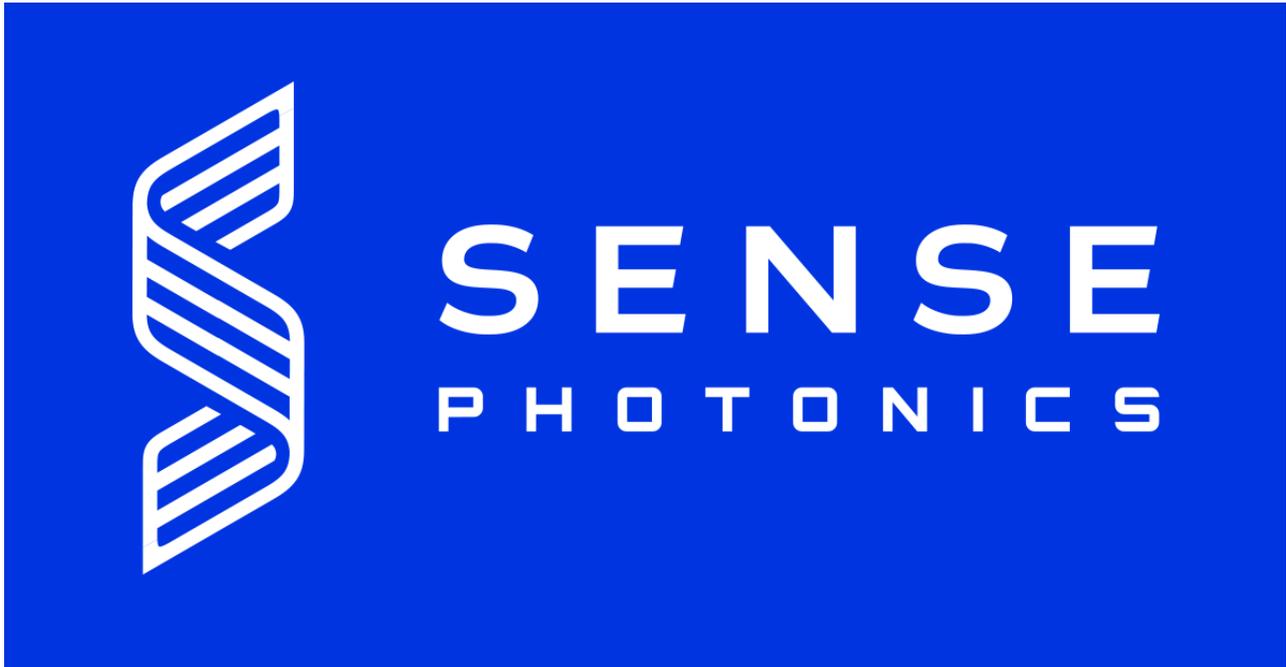
Teledyne Technologies will pick up a defence systems business by buying noted thermal sensor and camera maker FLIR in a deal worth USD \$8bn. The transaction, half in cash and half in shares, has the support of both companies and is expected to be completed in the middle of the year.

Teledyne's Executive Chairman Robert Mehrabian says "At the core of both our companies is proprietary sensor technologies. Our business models are also similar: we each provide sensors, cameras and sensor systems to our customers. However, our technologies and products are uniquely complementary with minimal overlap, having imaging sensors based on different semiconductor technologies for different wavelengths".

FLIR started expanding into full camera systems and more recently into defence systems. In 2016 they bought military drone maker Prox Dynamics to create the Unmanned Aerial Systems business line. This was followed in January 2019 with the acquisition of drone maker Aeryon Labs, and last month they bought defence drone maker Altavian. In February 2019, FLIR also bought Endeavor Robotics, the US-based defence spinoff from iRobot. Other acquisitions have included camera makers such as Point Grey.

Sense Photonics' Shutter Flash Lidar

DRIVER ASSISTANCE NEWS



Sense Photonics have demonstrated their new shutter flash lidar's industry-first 200-metre detection distance.

The Sense system leverages the company's proprietary emitter and SPAD sensor technologies. Sense Silicon, a backside illuminated CMOS SPAD device with more than 140 kilopixels, is designed to work seamlessly with the Sense Illuminator, a distributed 940-nm laser array of more than 15,000 VCSELs. Together, they are the core building blocks of Sense's camera-like architecture enabling the first high-resolution, eye-safe, global shutter flash lidar that can detect 10% reflective targets at 200 metres' range in full sunlight, outputting tens of millions of points per second. Global shutter acquisition sets a new standard in the long-range lidar industry by removing the need for complex motion blur correction while allowing pixel-level, frame-by-frame fusion with RGB camera data.

Geared specifically for mass-market automotive adoption, Sense uses mature manufacturing and cost-effective assembly processes used in today's consumer technology industries. And unlike legacy lidar technologies, Sense's flash architecture eliminates the need for fine alignment between emitter and receiver, maintaining sensor calibration and depth accuracy during shock and vibration. Additionally, the architecture is designed as a platform to allow for customer-specific product variations with a simple change in optics and the first to be able to provide both short- and long-range capabilities from the same architecture.

The innovative flash architecture from Sense Photonics is already capturing the interest of automakers, AV companies, and tier-1 suppliers. Customer evaluation systems are being finalised and will be available mid 2021 to meet current demand requirements, with start of production being planned for late 2024.

Sense Photonics offer high-performance, scalable 3D vision systems to enable mass-market adoption across a wide variety of applications including automotive, trucking, rail and industrial applications such as stationary security. Their core flash technology is protected by

over 200 patents and enables a simple, high-performance, solid-state solution with no moving parts.

Magna to Develop Driver-Assistance tech with Fisker

DRIVER ASSISTANCE NEWS



Canadian auto supplier Magna said last week, it would work with Fisker to develop ADAS for the EV maker's Ocean SUV, expected to launch in late 2022.

The ADAS technology will use digital imaging radar technology in addition to cameras and ultrasonic sensors, Magna said in a statement. The supplier said the ADAS package includes “a unique and first-to-market digital imaging radar technology.” Co-developed with Austin, Texas-based technology startup Uhnder, Icon Radar is being called by Magna “the first digital imaging, single-chip radar solution for the automotive marketplace.”

In December, Fisker said Magna would initially be the exclusive manufacturer of its Ocean SUV in Europe, finalizing a deal signed in October.

“One of our strategic goals is to pursue new business in areas where Magna’s unique strengths can be deployed with an advantage compared to our peers,” said Swamy Kotagiri, Magna CEO. “Our collaboration with Fisker is a great example - we can provide a new OEM like Fisker with a flexible and scalable EV platform, complete ADAS package, joint vehicle engineering and manufacturing.”

Fisker CEO Henrik Fisker said the collaboration with Magna is essential to develop systems for a vehicle that is due to go into production in less than two years.

"In normal supplier relations you can spend a year negotiating with everyone," Fisker told Reuters. "We don't have time."

Magna can purchase up to a 6% stake in Fisker as part of that agreement.

Veoneer expects growth to accelerate in 2021

DRIVER ASSISTANCE NEWS



Veoneer estimates its current total order book value for full year 2020 to be approximately \$14 billion. During 2020, Veoneer divested its brake control business with an estimated order book value of around \$4 billion, which is excluded from the current estimate. Reductions in the expectations for the global light vehicle production until 2025 further reduced the order book estimate by about \$1 billion compared to the estimate from one year ago.

Lifetime value of the new order intake for the full year 2020 is estimated to be approximately \$2.6 billion, corresponding to an average annual new order intake value of around \$530 million, of which around 65% is for Active Safety orders. Despite the generally lower order activity in the market resulting from the COVID-19 pandemic, this new order intake value represents an increase of around 10% compared to the 2019 new order intake.

As previously communicated, Veoneer expects to report a return to Organic sales growth in the fourth quarter of 2020 and a return to growth over the market for the second half of 2020. It also expects the organic sales growth to accelerate in 2021.

Valeo Test L4 AV Tech in Japan

DRIVER ASSISTANCE NEWS



In Japan, Valeo have been testing a self-driving system with a combination of three dimensional maps and information gained from communications between the vehicle and traffic lights. The tests got under way in 2019, and focus on lidar. Valeo seek to assess the capability and reliability of their own lidar technology as part of efforts to commercialise L⁴ autonomous vehicles.

This past November, Valeo demonstrated an L⁴ prototype equipped with their autonomous driving system in Tokyo's Odaiba, a hip shopping and entertainment district on a human-made island in Tokyo Bay. The car ran autonomously on a public road and stopped at red lights, although an engineer was in the driver's seat in case of emergency. The test was facilitated by a Japanese government program to promote self-driving technology. Valeo's system is for the first time using a technology to catch radio signals from traffic lights to indicate their colour status.

The self-driving prototype uses Valeo's Scala lidar scanner to detect static and moving obstacles and anticipate events. In 2017, Valeo became the first company in the world to start volume production of laser scanners for automobiles. The first-generation Scala system equipped Audi's A8, amongst other models.

Fully self-driving cars need a positioning system that can locate objects on the ground with a margin of error well under 20 cm. Valeo's system uses a combination of topographical

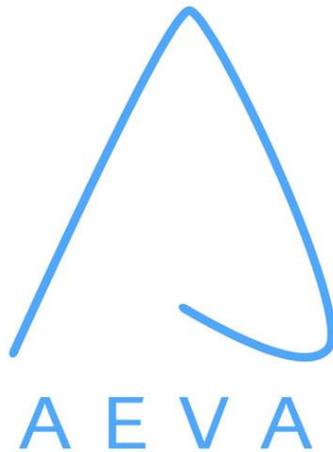
information obtained by Scala and highly precise 3D maps to identify the vehicle's location with a margin of error of around 12 cm, compared with GPS' accuracy of several metres.

The prototype being used in the current trials is outfitted with a second-generation Scala system installed in the front part of the car, three first-generation Salas in the front and rear parts of the vehicle, and a camera embedded in the windshield. The suite of sensors gives the car information about obstacles around it and its own location so that it can run without colliding.

The test car enters traffic and operates on a 6.7-km circuit. It also runs on urban streets to test the system's dependability and identify potential risks as it navigates through situations where there are pedestrians and many other cars that can disrupt operations. The car basically operates fully on its own during the trials except for emergency situations in which it could collide with people or other cars.

Aeva AV Sensor Startup Raises \$200M

DRIVER ASSISTANCE NEWS



Aeva, a laser sensor startup founded by two ex-Apple engineers, have got a USD \$200m investment boost from a Hong Kong-based hedge fund, ahead of their public listing via a reverse merger.

The funding, from Sylebra Capital Management, is expected to boost the total proceeds from Aeva's planned deal with InterPrivate Acquisition to \$563m. The deal is expected to close in the first quarter of 2021.

With commercialisation of robotaxis still years away, lidar companies are targeting limited self-driving features in passenger cars and consumer devices and industrial robots. Aeva join other lidar-focused companies that have planned or completed reverse mergers in recent months, including Luminar and Innoviz, by dint of special-purpose acquisition companies, or SPACs. These blank-check financing vehicles became a major source of initial public offerings in 2020, raising a record \$78bn in the U.S. alone.

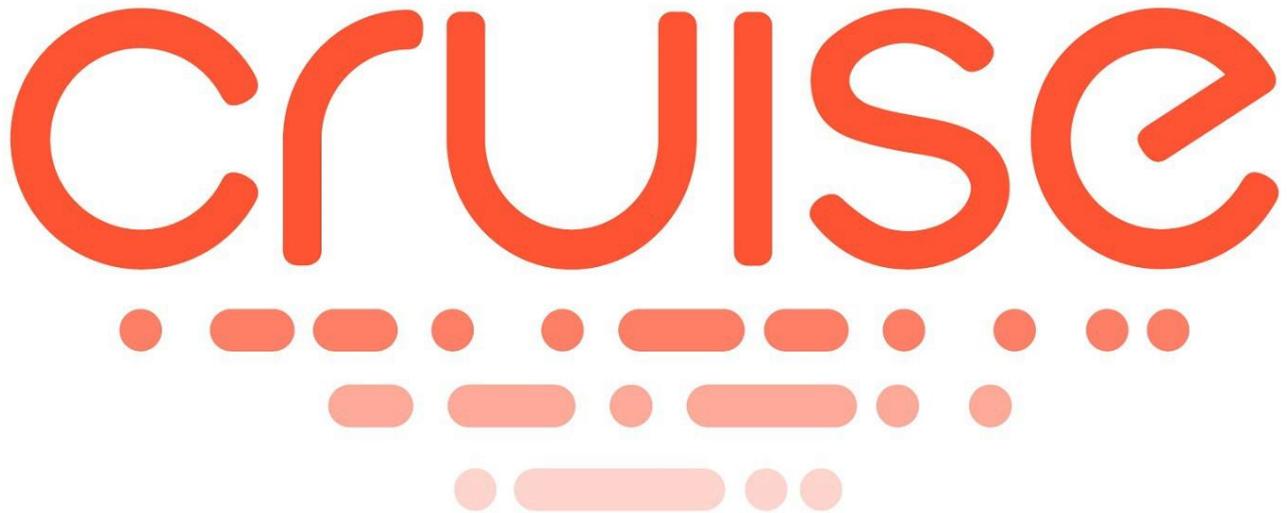


Soroush Salehian, who helped develop the Apple Watch during nearly five years as an Apple product manager, says Aeva have an edge in consumer devices because their technology fits on a chip small enough for tablets and smartphones, as well as the bulkier boxes used for automotive lidar. That applicability of the startup's technology beyond autos helped convince InterPrivate to join forces. Aeva has yet to turn a profit, but Salehian pegs

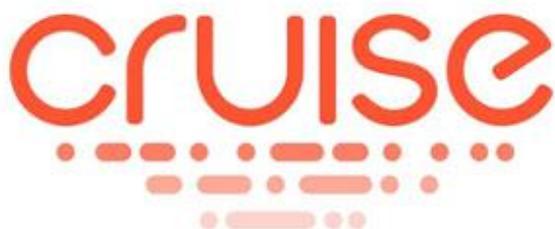
its valued at about \$3bn. They plan to use cash infusion to meet demand from consumer device companies and speed up achievement of technological milestones. They have received strategic investments from Porsche, are working with Audi and other customers in trucking and mobility, and partnering with German automotive supplier ZF Friedrichshafen to integrate Aeva tech into cars. Salehian expects to generate revenue from series production of a car starting in 2024.

SPAC IPOs Overvalue Lidar Companies: Cruise Prez

DRIVER ASSISTANCE NEWS



Kyle Vogt, the co-founder, CTO, and President of Cruise, General Motors' majority-owned AV subsidiary, is predicting consolidation of the lidar industry, especially amongst companies he considers over-valued, that have gone (or will go) public via deals with blank-check organisations known as SPACs (special purpose acquisition companies).



Vogt cited companies that have recently "SPAC'd" or have plans to do so soon, including Aeva, Innoviz, Luminar, Ouster, and Velodyne: "Their value is based on *projected* revenue that comes from *entirely overlapping* potential customers, with very little discount applied to future projections", he said, adding that some of these companies may be able to meet such high valuations, but not all of them.

"Of course, it's certainly not unusual for startups to be valued based on future revenue projections, even in a highly competitive space", Vogt said, "but I typically see private markets put a much larger discount on these future projections than what we see with these SPACs".

Luminar went public last month through a SPAC deal with an enterprise value of USD \$2.9bn; their current market cap is \$10.7bn. Velodyne's figures are similar; they went public in September with a \$1.8bn valuation despite recording a net loss of \$67.2m on revenue of \$101.4m in 2019; their market cap is \$4bn.

Vogt noted his admiration for all the companies he'd named, and said "Robotaxis will have an enormous positive impact on society, so it's critical to see progress here, but we saw a consolidation and collapse of the robotaxi space over the last 24 months, down to a handful of players, and lidar is next. This probably means lower market caps for most of these companies, which sucks for everyone involved, but may the best product win!".

Despite Tesla CEO Elon Musk's dismissive scorn, most experts consider lidar technology essential for self-driving vehicles. Cruise, who acquired a lidar startup called Strobe in 2017, are building their own self-driving sensor technology internally as well as keeping tabs on other companies' developments. A Cruise representative says "As we begin to commercialise, we're going to make our decision based entirely on making sure our customers and communities are safe, and that we get the price of the technology down to a point where it's accessible to everyone".

General News

New-vehicle market slid 1.9% in 2020, CAAM estimates

GENERAL NEWS



China's new-vehicle sales dipped 1.9% to 25.27 million last year, according to a preliminary tally the China Association of Automobile Manufacturer released Wednesday.

Demand for new commercial vehicles such as trucks and buses jumped 18%. But deliveries of new light vehicles including sedans, crossovers, SUVs, multipurpose vehicles and minibuses fell 6% percent, the group estimates.

CAAM's preliminary data also show that new-vehicle sales in December rose 5.4% to 2.8 million.

Sales of commercial vehicles turned south last month, dropping 4.4 percent from a year earlier. But new light-vehicle demand still gained 5.9 percent.

US: 2020 finishes down 14%

GENERAL NEWS



GM, THE 1ST GROUP IN US

Overall, car and light-truck volume fell 14% last year to 14.6 million, the lowest tally since 14.49 million in 2012, when the economy was still recovering from the 2008-09 financial crisis.

U.S. luxury sales fell 11% in 2020 at 2,03 million vehicles, accounting for a record 13.9% percent of total U.S. light-vehicle sales. BMW defended its sales crown as the bestselling luxury car brand in the U.S. for the second year in a row.

US light-vehicle sale x1,000

Group	2020	2019	Change %
General Motors	2,535	2,877	-11
Toyota Motor	2,112	2,383	-11
Ford	2,034	2,406	-15
FCA	1,826	2,213	-17
Honda	1,346	1,608	-16
Hyundai-Kia	1,224	1,325	-7
Nissan/Mitsubishi	986	1,466	-32
Subaru	611	700	-12
VW Group	574	654	-12
Mercedes-Benz	325	358	-9
BMW .	308	376	-18
Mazda	279	278	0
Mazda	279	278	0

Tesla Motors*	260	216	+ 20
Volvo Cars	110	108	1
JLR	101	125	-19
U.S. light vehicle	14,645	17,104	-14

U.S. light-vehicle sales totaled approximately 4.2 million in the fourth quarter – a drop of 2.4% as the industry continued to rebound from the pandemic, capping a year largely salvaged by a steady second-half rebound.

NHTSA Allows Compliance Exemptions for R&D

GENERAL NEWS



NHTSA has issued a final rule that will allow U.S. manufacturers of vehicles and equipment to seek an exemption from federal safety standards for purposes of vehicle research or demonstration.

The rule allows domestic manufacturers that produce nonconforming vehicles and equipment to operate them on public roads, potentially speeding the development of automated driving systems and other forward-looking technologies in the U.S. Bas du formulaire

The program is not limited to AVs, but NHTSA "anticipates that many of the benefits of the program will be derived from new manufacturers and technology companies engaging in domestic production for the developing and testing these advanced vehicle technologies."

NHTSA says the rule provides an "urgently needed means" for innovators and developers of new technologies to continue the momentum they had prior to the coronavirus pandemic and pursue technological breakthroughs in vehicle safety.

"For domestic developers of ADS technologies to realize the full promise of ADS, it is vital that they have opportunities to gain practical, on-road experience to validate the development and findings from laboratory and track testing and learn which approaches and combinations of hardware and software offer the greatest levels of safety and reliability," the agency said.