DVN
Lidar

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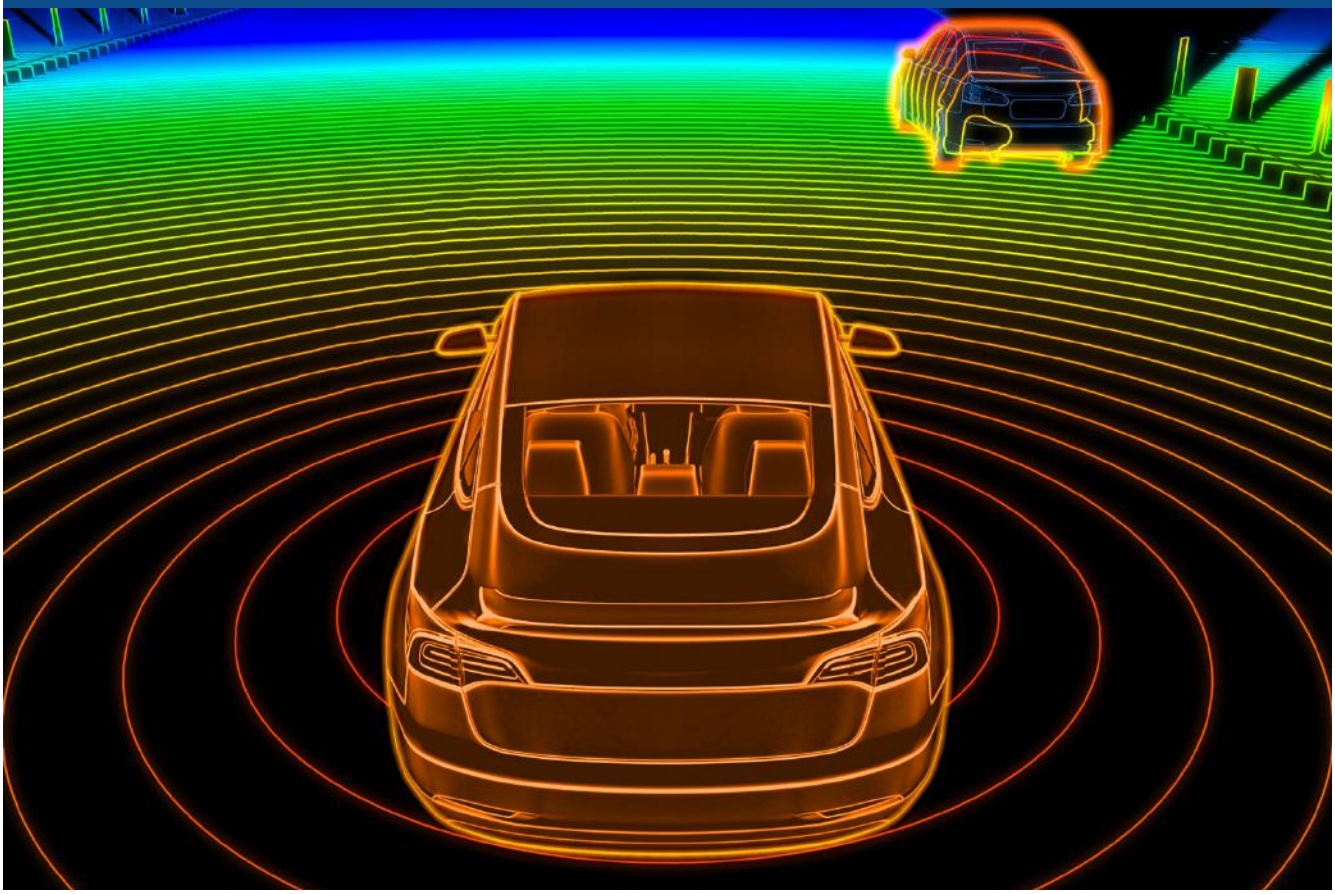


EDITORIAL

Lamp Lidar Integration: A Great Opportunity for Short Range Lidar?

At the Beijing Auto Show, Hesai and Marelli showed a concept with lidars in headlamps. This concept is not new, but so far is not a commonly-deployed strategy; so far, lidars are mounted in the grille or on the roof, above the windshield.

There might be a new opportunity with short range lidars for L^4 cars and trucks and for 360° surveillance. It might start with small short-range lidars—some flash lidars are close to 25 × 35 mm. Nio just announced , "Our next-generation platform will include side lidars on top of the sensors that we have today, to give users more information in very crowded, dense urban scenarios".

In this edition, you will see the result of the new *IIHS Partial Automation Rating Program*: nearly all 14 systems tested received a POOR rating. This shows the industry has work to do: the strategy of the Chinese Brands to focus on improved NOA features (Navigation On Autopilot) before launching L3,4 features is the right one.

Also in this edition, you will find a brief report on the DVN-Lidar Deep Dive I event

DVN-Lidar events 2024 – Save the dates!

- 21-22 June : EAC Lidar Tech Expo in Suzhou (DVN is co-host with Enmore)
- 12 September : Deep Dive III workshop in Detroit
- 18-19 Nov. : Lidar Conference in Wiesbaden

We're ever so glad you're here with us in the DVN-Lidar community. Enjoy this 26th newsletter!

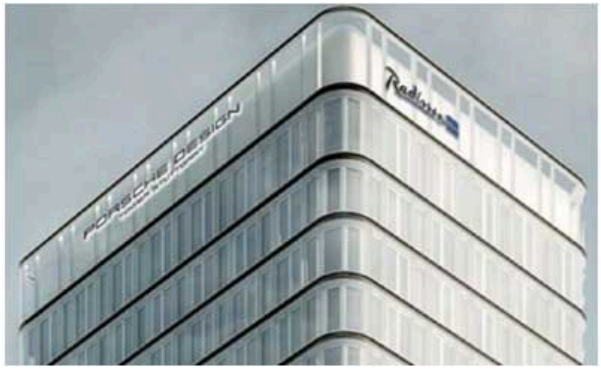
All best,

Alain Servel

DVN LIDAR ADVISOR

SPECIAL REPORT

Special Report: DVN Lidar Deep Dive I



More than 30 companies converged at the Porsche Tower Hotel in Stuttgart for the DVN-Lidar Deep Dive I workshop on 9 April. The event comprised four sessions, each focused on a key topic to be discussed by the community in break-out groups:

- Leading applications for Lidar: L^{2+} Navigation On Autopilot (NOA) then L^{3} Highway pilot?
- Is the regulation for the deployment of AVs ready in all countries?
- Maturity of the scanning technologies: mechanical scanning or solid state?
- Which sensors to achieve a robust data fusion for AVs: imaging radar, lidar, IR cameras?

Startup Pitch:

Ommatidia, a Spanish company, presented their CMM lidar-on-chip technology, already on the market for space, metrology, and robotics applications.

Companies registered:

Live		On-Line	
Porsche	Brightview-Technology	Renault	Ansys
Hesai	Renesas	Chinese OEM	Chasm
Continental	KSLD	Robosense	Dexerials EU
Valeo	Docter Optics	Tanway	Docter Optics
Innoviz	Scramblux	Vanjee	Warwick University
Microvision	AGC Wideye	Vertilite	
Cepton	DEKRA	Steerlight	
Scantinel	Fka GmbH	Koito	
Ommatidia	UNECE/GRVA		

Summary

(presentations and our detailed event report are available to all attendees and Gold Members)

- Leading applications for lidar:

Today NOA (L^{2+}, eyes-on/hands-on) is the leading application to support high-volume sales in China. The different NOA features available at the main Chinese automakers have been reported by Robosense.

The next key feature was discussed and should be Highway Pilot up to 100-130 kph (L^3, eyes-off). Highway Pilot deployment should happen over the 2027-'30 timeframe. One of the critical use cases is the detection of small objects on the road up to 130 km/h, which requires the new generation of Lidars with a 0.05° resolution.

- Regulation ready in all countries:

UNECE worldwide regulations are now possible with the 1998 Agreement signed by the USA and China. There is already a common initiative on AVs supported by EU, Japan, China, and USA.

- Maturity of scanning technologies:

Today the scanning mirror technology has the lead. MEMS is emerging, but still faces the challenge of reliability, so for now resonant mirrors is the best solution in that respect. The MMT & Magnosteer solution from Cepton are also an alternative to traditional MEMS or polygon mirrors. FMCW is the next technology step and is expected to offer reliable pure solid-state solutions based on silicon photonics integration (lidar on a chip with switching beams).

- Which sensors and robust data fusion for AVs:

Each sensor has limitations, and the automaker must consider the tradeoff between the ODD and system cost in case of L^{2+} applications, and the scalability to propose L^3 and L^4 applications where a high level of redundancy is necessary.

The benefits and limitations of the different technologies such as imaging radars, IR cameras, and lidar was presented by Valeo, who has all the technologies in their portfolio.

Lidar improves on camera performance in bad weather conditions and the radar performance for data fusion (resolution & classification) and offers a high accuracy mapping—also useful for multi-sensor calibration/alignment which can impact the quality of the data fusion.

Lidar is also required as a redundant sensor for L^{2+} and L^3- L^4 applications and contributes to increase the safety performance by covering some edge cases: a zero-accident policy is expected to secure the deployment of AVs.

Speakers

CHRIS LUO
ROBOSENSE

TILMAN GASCHE
HESAI

WOLFGANG SHULTZ
CONTINENTAL

FRANCOIS GUICHARD
UNECE-GRVA

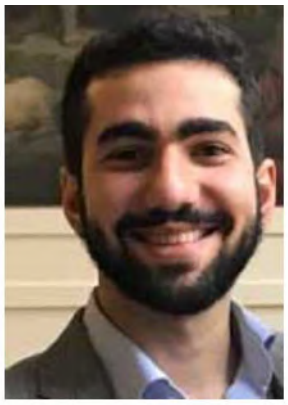
EDUARDO MARGALO
OMMATIDIA

HANNO HOLZHUETER
MICROVISION

OLIVER RAMOLI
SCANTINEL

HENRI HAEFNER
CEPTON

GUANJIE XU
TANWAY



AHMED AADAJ-EL-
OUDRHIRI
VALEO

ZHAI ZHAO
VANJEEA

LIDAR BUSINESS

Lidar Business Newsbites

	Mar., 2024	YTD, 2024
Outputs	**863**	**2,115**
BEV	546	1,317
PHEV	317	797
FCV	0.3	1
Sales	**883**	**2,090**
BEV	566	1,305
PHEV	317	784
FCV	0.2	1

In the first three months of 2024, China's NEV production and sales volumes were around 2.115 million and 2.09 million units, respectively jumping 28.2 and 31.8 per cent from the previous year. In this period, NEVs made up 31.1 per cent of China's total auto sales.

Hesai launched their new ATX ultrawide-field long-range lidar. With 300 meters' detection range, support for up to 256 lines, and angular resolution of 0.08° × 0.1°, the ATX surpasses the capabilities of the AT128. Its horizontal 140° FoV bests the 120° limit of competing products. The ATX has secured multiple production orders, and mass production is slated to start in the first quarter of 2025.

Hesai has announced a strategic partnership with Hyperview, a Chinese 'intelligent driving' company. The collaboration aims to leverage Hesai's lidar technology to develop autonomous driving solutions. The Hyperview full-stack autonomous driving solution has facilitated the mass production and deployment of 'intelligent driving' features in 30 vehicle models.

Hesai also has a partnership with the GAC Group. GAC's ADiGO Pilot was among the first to achieve seamless switching between L^{2++} and L^{3}. The group's L^{4} robotaxi continues to deepen its demonstration operations, portending an orderly commercial application of autonomous driving.

At the 2024 version of RoboSense's "Redefined" new product launch event, the new mid-to-long-range MX lidar was unveiled. Robosense says it is the industry's first full-stack SoC lidar with a sleek design, a thinness of 25 mm, and less than 10W ultra-low power consumption. It offers 200 meters' range, a 120° × 25° FoV, and 126 lines (ROI equivalent to 251 lines). Three new vehicle mass production projects will include the MX, with SOP slated for early 2025.

RoboSense also announced a deepened strategic partnership with autonomous driving tech firm Momenta. Leveraging data-driven insights and a two-pronged strategy approach combining a mass-produced autonomous driving solution (Mpilot) with a fully-unmanned driving solution (MSD), Momenta offers scalable autonomous driving solutions.

RoboSense has announced a partnership with Xpeng to explore the scale-production of ADAS based on RoboSense's newest mid-to-long-range lidar. As of the end of March 2024, RoboSense has sold over 400,000 units of their automotive lidar, with designated mass-production projects in 65 vehicle models from 22 automakers and tier-1 suppliers.

RoboSense revenues rose from C¥399m in 2022 to C¥963m in 2023. The sales of lidar products for ADAS applications reached C¥777m, with 259,600 units in 2023. Nevertheless, Robosense shows a net loss increasing from C¥2,086m in 2022 to C¥4,331m in 2023. But the gross margin is now positive, reaching a margin of 8.4 per cent in 2023, despite an R&D cost increase to C¥635.1m.

Luminar has sent out Volvo's order of lidar units for the EX90. Meanwhile, a new, lower-cost 'Halo' lidar is in the making. With Luminar's new Halo sensor, the company is shrinking the overall size of the unit so it adds less than one inch of height to the roof of cars, weighs under one kilogram, and uses only about 10 watts of power. It still uses the 1,550-nm wavelength, and the cost is expected to be cut by half.

Innoviz has successfully winter-tested their InnovizTwo lidar and AI-powered perception software. Innoviz uses winter tests to examine and improve the company's products over thousands of kilometers. The data and insights gathered are used to enhance Innoviz's software and hardware solutions. Before the drive, Innoviz obtained a TÜV SÜD certification mark for roof racks, setting an important industry standard, approving the lidar roof setup to operate on roads.

Aeva has announced a significant expansion in Europe with the establishment of a new automotive centre of excellence (COE) in Germany. This move is designed to bolster its connections with automaker customers. In a strategic addition to the team, Axel Gern, a seasoned expert in the autonomous vehicle industry, has been appointed as the Head of Engineering in Germany to spearhead the COE and the European engineering team.

LG Innotek CEO Moon Hyuksoo aims to be the top in ADAS sensing by using 'High Performance lidar'.Moon and his company want to develop a performant lidar product line with a detection range in bad weather 3 times better than the current lidars.

Nio has officially opened their Smart Driving Technology Centre in Schönefeld, Germany, near Berlin. Mirko Reuter, Nio's senior director of AD, will oversee the development and validation of all vehicle-specific systems, with a strong focus on European user needs and regulation. The company's European team has grown from 20 people in 2015 to 900 in 2024. Nio uses a Seyond Lidar. The parking assistant takes point clouds from the lidar to create an overview of the spaces available much more detailed than would be possible with just cameras.

Lidar supplier LiangDao Intelligence and unmanned vehicle developer GoFurther have signed a strategic coöperation agreement to promote the mass production and innovative application of lateral lidar in the autonomous driving field. GoFurther's Tengwu L^4 unmanned vehicle is designed for terminal logistics scenarios such as express delivery, factories, and parks. With four LiangDao LDSatellite lateral lidar units, it achieves 360° perception of its surroundings. Currently, the vehicle has been deployed in factories and parks.

Great Wall Motor-backed autonomous driving tech firm Haomo, in collaboration with Qualcomm, unveiled the Haomo HP370 intelligent driving solution built on Qualcomm's latest Snapdragon Ride platform, the SA8620P. With its high-performance, energy-efficient hardware, leading AI technology, and innovative intelligent driving software stack, the HP370 offers car manufacturers a performant, cost-effective, energy-efficient system solution.

Horizon Robotics, at their 2024 product launch event, introduced their SuperDrive full-stack AD solution to support intelligent driving solutions ranging from ADAS active safety to NOA (Navigate on Autopilot). Horizon also unveiled their Journey 6 series automotive-grade processing hardware, designed to offer a unified architecture and wide compatibility for efficient and cost-effective mass production. Horizon partnered with Sony to deliver a 17-megapixel front-view perception solution, with a 450-meter range for the front camera.

Hyundai has agreed to spend nearly $1 billion on Motional, an investment that will give the automaker a majority stake while providing the self-driving startup with the necessary capital to keep operating.
The Korean automaker invested $475 million directly into Motional as part of a broader deal that includes buying out joint venture partner Aptiv. As part of the deal, Hyundai will spend another $448 million to buy 11% of Aptiv's common equity interest in Motional, according to information revealed Thursday in Aptiv's first-quarter earnings report.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

New IIHS Partial-AD Ratings: Industry Has Work To Do

Partial driving automation is a convenience meant to make long drives easier, but humans are terrible at passively paying attention as required by these more-or-less L^2 systems. There's no evidence they make driving safer, and they can create new risks by setting up the perfect conditions for the driver's attention to wander. That's why it is essential that all partial driving automation systems incorporate robust safeguards.

But many of them don't, and so the U.S. Insurance Institute for Highway Safety has launched a new rating program to evaluate the safeguards built into partial driving automation systems. They evaluate driver monitoring, attention reminders, emergency procedures, and other aspects of system design. A system may be assigned a rating of Good, Acceptable, Marginal, or Poor for its safeguards.

There are still a lot of issues with driver monitoring, emergency procedures, and safety features. Of the first 14 systems tested—from BMW, Ford, General Motors, Genesis, Lexus, Mercedes-Benz, Nissan, Tesla and Volvo—11 earned a Poor rating. Two were found Marginal, and only one earned an Acceptable grade.

Whether whole systems like Tesla's so-called 'Autopilot' and 'Full Self Driving'; GM's Super Cruise, and Ford's Blue Cruise, or feature bundles providing similar capabilities, today's partial driving-automation technology uses cameras, radar, or other sensors to "see" the roadway and other vehicles. The setups in question include adaptive cruise control, lane centering, and various other driver-assist features. Adaptive cruise maintains a driver-selected speed, but will automatically slow to keep a set following distance from a slower vehicle ahead and then accelerate when the way is clear. Lane centering continuously adjusts the steering to help the driver keep the vehicle centered in the travel lane. Automated lane changing is also becoming more common. And driver monitoring is a crucial piece, to make sure the driver is always paying attention and ready to take control as soon as it's needed.

Rated systems

	Overall rating	Driver monitoring	Attention reminders	Emergency procedures	Driver involvement: Lane change	Driver involvement: ACC resume	Driver involvement: Cooperative steering	Safety features
Lexus Teammate with Advanced Drive 2022-24 Lexus LS	A	M	G	A	G	A	G	G
General Motors Super Cruise 2023-24 GMC Sierra	M	P	G	G	P	A	P	G
Nissan ProPILOT Assist with Navi-link 2023-24 Nissan Ariya	M	M	A	M	G	G	G	A
BMW Active Driving Assistant Pro 2023-24 BMW X1	P	M	P	A	G	P	G	A
Ford BlueCruise 2021-24 Ford Mustang Mach-E	P	A	G	M	G	M	G	P
Ford Adaptive Cruise Control with Stop & Go and Lane Centering Assist 2021-24 Ford Mustang Mach-E	P	A	G	M	G	G	G	P

	Overall rating	Driver monitoring	Attention reminders	Emergency procedures	Driver involvement: Lane change	Driver involvement: ACC resume	Driver involvement: Cooperative steering	Safety features
Genesis Smart Cruise Control/Lane Following Assist 2023-24 Genesis G90	P	P	P	P	G	G	G	P
Lexus Dynamic Radar Cruise Control with Lane Tracing Assist 2022-24 Lexus LS	P	P	P	P	G	G	G	M
Mercedes-Benz Active Distance Assist DISTRONIC with Active Steering Assist 2022-23 Mercedes-Benz C-Class	P	M	P	A	G	G	G	P
Nissan ProPILOT Assist 2.0 2023-24 Nissan Ariya	P	P	A	M	G	G	G	G
Tesla Autopilot, Version 2023.7.10 2021-23 Tesla Model 3	P	P	P	A	G	P	P	P
Tesla Full Self-Driving (Beta), Version 2023.7.10 2021-23 Tesla Model 3	P	P	A	A	P	P	P	P
Volvo Pilot Assist 2022-24 Volvo S90	P	P	P	M	G	G	G	P

Partial driving automation is a convenience feature that is meant to make long drives easier. There's no evidence that it makes driving safer, and, in fact, it can create new risks by making it easier for the driver's attention to wander. For this reason, it's essential that all partial driving automation systems incorporate robust safeguards.

For our partial automation safeguard ratings, we evaluate driver monitoring, attention reminders, emergency procedures and other aspects of system design. A system may be assigned a rating of good, acceptable, marginal or poor for its safeguards.

Requirements for a good partial automation safeguard rating

- Monitors both the driver's gaze and hand position

- Uses multiple types of rapidly escalating alerts to get driver's attention

- Fail-safe procedure slows vehicle, notifies manufacturer and keeps automation off limits for remainder of drive

- Automated lane changes must be initiated or confirmed by the driver

- Adaptive cruise control does not automatically resume after a lengthy stop or if the driver is not looking at the road

- Lane centering does not discourage steering by driver

- Automation features cannot be used with seat belt unfastened

- Automation features cannot be used with automatic emergency braking or lane departure prevention/warning disabled

Driver monitoring

Effective driver monitoring is essential to making partial automation safe. Systems should be able to detect if the driver's head or eyes are not directed at the road and whether the driver's hands are on the steering wheel or ready to grab it if necessary.

To evaluate this, IIHS engineers record what happens in the following cases: the driver monitoring camera lens is blocked, the driver's face is obscured, the driver is looking down, and the driver's hands are not on the steering wheel. For systems that allow hands-free driving, the engineers also record what happens when the driver's hands are holding a foam block the approximate size of a mobile phone. Systems should not activate under these conditions, and if they're already switched on, they should issue an alert.

None of the 14 tested systems met all these requirements, though the Ford systems came very close. Ford's BlueCruise and Adaptive Cruise Control with Stop & Go and Lane Centering Assist immediately issued alerts when the driver's face or the camera lens was covered, for example, but failed to detect when the driver's hands were occupied with another task. The BMW system didn't react when the camera lens or driver's face was covered, and the Mercedes-Benz system lacks a driver-monitoring camera altogether, though both vehicles were able to detect when the driver's hands were not on the steering wheel.

Attention reminders

Timely and persistent attention reminders are also key. When a partial automation system detects that the driver's eyes aren't directed at the road or their hands aren't ready to take over the steering, it should begin a dual-mode alert within 10 seconds, such as an audiovisual warning. Before the 20-second mark, it should add a third mode of alert or begin an emergency procedure to slow the vehicle.

Lexus Teammate, both Ford systems, and GM Super Cruise meet all these requirements. For example, when the test driver deliberately looked away from the road and held the foam block in both hands, Teammate began audiovisual alerts after four seconds, and began an emergency slowdown procedure after 16 seconds.

Both the hands-on Nissan Propilot Assist with Navi-link and the hands-free Propilot Assist 2.0 systems and Tesla 'Full Self-Driving' performed almost as well. The hands-on Nissan system, for example, provided audible and visual alerts about six seconds after driver disengagement, but didn't provide a third type of alert until around 21 seconds had passed, when it pulsed the brakes. Seven other systems didn't even provide dual-mode alerts within the first 15 seconds.

Emergency procedures

Partial automation systems need appropriate emergency escalation procedures to minimize the danger to occupants and other road users if the driver does not respond to those attention reminders. Regardless of how many different modes of alerts they issue, systems should begin a slowdown procedure within 35 seconds of driver disengagement. Drivers who ignore alerts for this long are either in distress or misusing the system. The system should send an SOS message to emergency responders or a 24-hour help center, and the driver should be prevented from restarting the automation for the remainder of the drive.

Of the 14 systems tested, only GM's met all these requirements. Five systems include two of the three emergency procedures, and five include one of them. Lexus' combination of Dynamic Radar Cruise Control with Lane Tracing Assist system and the two Genesis systems all fail to take any emergency action if the driver disengages from driving and does not respond to repeated warnings.

Driver involvement

Another group of requirements is aimed at ensuring drivers stay involved in decision-making. All lane changes should be initiated or confirmed by the driver. When traffic causes the adaptive cruise to bring the vehicle to a complete stop, it should not automatically resume unless the system can confirm the driver is looking at the road and no more than two minutes have passed. The lane-centering feature should *not* switch off automatically when the driver makes manual steering adjustments within the lane, as that can discourage drivers from being physically involved in the driving, and physical involvement can help prevent mental disengagement.

More systems performed well in these categories than any of the others. GM's Super Cruise and Tesla's 'Full Self-Driving' are the only ones that would make a lane change without any driver input. Super Cruise and both Tesla systems switched off lane centering when the driver does any manual steering.

Many systems allow ACC to resume automatically after a stop of more than two minutes or when the driver is not looking at the road. Both Tesla systems and BMW Active Driving Assist Pro will resume ACC in both scenarios, for example, while several others will restart in one of the two situations. Volvo Pilot Assist is one of seven systems that will not automatically resume in either scenario.

Safety features

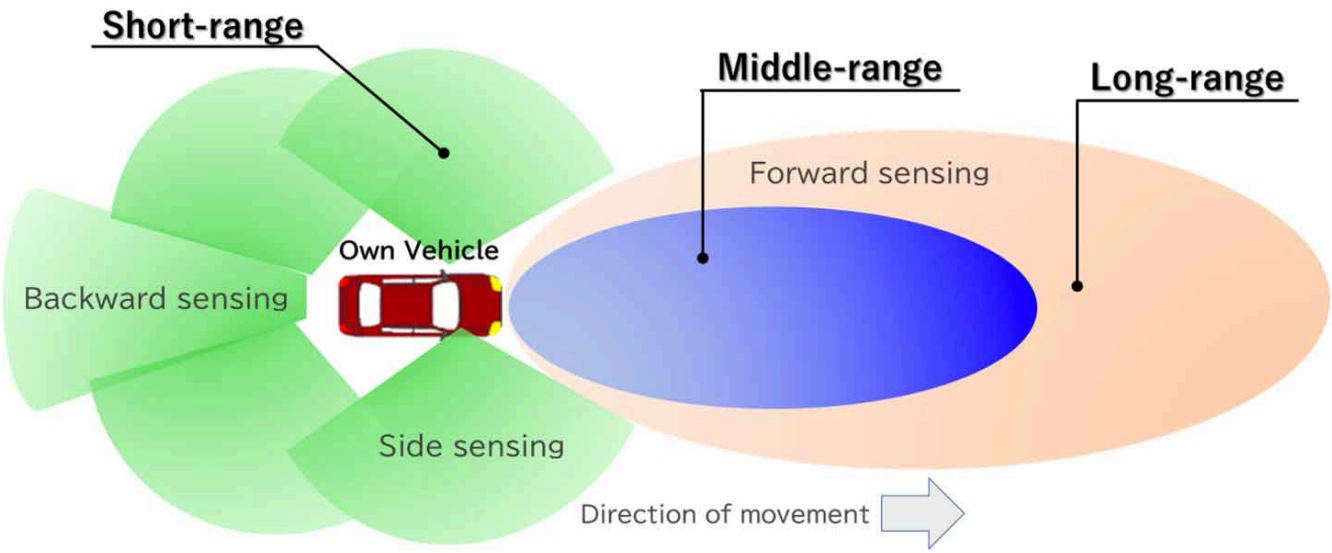
There is little evidence that partial automation has any safety benefits, so it’s essential that these systems can only be used when proven safety features are engaged. These include seat belts, AEB, and lane departure prevention. For a good rating in this category, a partial automation system should not switch on if the driver is unbelted or AEB or lane departure prevention is not active. If already in operation and the driver unfastens their seat belt, the system should immediately begin its multi-mode, driver-disengagement attention reminders. Finally, it must be impossible to switch off AEB or lane departure prevention if the automation is engaged.

The hands-free Nissan Propilot Assist 2.0, Lexus Teammate, and GM Super Cruise systems are the only ones that meet all these requirements. The hands-on Nisson Propilot Assist with Navi-link and the BMW system come close, but they deactivate without issuing an alert when a key safety feature is disengaged. This is dangerous, because the driver may not be aware that they need to resume full control of the vehicle.

Most of the systems fail multiple safety feature requirements. Volvo Pilot Assist, for example, deactivates without an alert when the driver unbuckles, can be activated with lane departure prevention turned off, and also remains active if that feature is switched off mid-drive. The two Genesis systems fail all safety feature requirements.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Koito-Cepton Short-Range Lidar Finds Favor



Koito has developed a short-range automobile lidar, and won a new order for it from an international automaker.

The new short-range lidar, co-developed with Cepton, has been chosen for use in monitoring the area around an L^4 vehicle. It uses Cepton's MMT (Micro Motion Technology), and has excellent features such as durable architecture that enables a frictionless and rotation-free lidar solution. Koito's production expertise accumulated as a lighting tier-1 has enabled a high level of QCD (Quality, Cost, Delivery), which eased the new lidar's selection.

In addition to the short-range lidar, Koito will offer a lineup of medium- and long-range lidars to meet the needs for all types of mobility.

DVN comment

It is gratifying and continually astonishing to see such acceleration in the quality, performance, compactness, versatility, and cost-reduction of automotive lidars, with ever-better units being launched one after another after another. Kudos to Koito and Cepton!

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Hesai's Ultrawide-Field Long-Range Lidar

Hesai's newest long-range, ultrawide-field lidar, the ATX, brings vehicles excellent 3D perception with big improvements in detection range, high resolution, and FoV width. It is smaller than the previous AT128, and uses Hesai's 4th-generation technology platform with major upgrades to its laser transceiver module.

The ATX uses the market-validated transceiver architecture from Hesai's AT series, greatly increasing module integration and simplifying the core optical scanning structure, while keeping a compact and lightweight form. Hesai has shipped over 300,000 AT128 units; the new ATX is 60 per cent smaller by volume, just over half the weight, features a surface window just 25 mm tall, and power consumption is a negligible 8W. That means it can easily be integrated into various positions on a vehicle: on the roof, behind the windshield, or inside the headlamps.

It boasts a 300-meter detection range and a 140° horizontal FoV, providing expansive visibility of complex road conditions such as surrounding vehicles or pedestrians. Its ultrawide FoV enables the provision of vehicle systems with comprehensive and accurate perception information. It can identify conditions such as rain, fog, exhaust fumes, and water droplets, and mark them in real-time at a pixel level, filtering over 99 per cent of environmental noise.

Hesai has already received design wins and nominations leading automakers, and large-scale mass production of ATX is expected to start in the first quarter of 2025.

DVN comment

Here again: better, smaller, more affordable, less power-hungry lidar. Every time a product like this is launched—which is quite often, nowadays—it further weakens Elon Musk's already-lame arguments against automotive lidar.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Marelli-Hesai Show Headlamps With Inbuilt Lidar

Marelli and Hesai have announced a collaboration to put Hesai's new ATX lidar technology into Marelli headlamps.
The goal is optimal object detection and enhancied overall vehicle safety, without impacting vehicle aesthetics or aerodynamics, all at affordable cost. The ATX lidar is a compact, highly customizable long-range sensor specifically designed for automotive applications. Compared to the previous generation product, the new ATX is almost 60 per cent smaller, which makes it much easier to integrate into the headlamp.

Marelli's headlamp design with Hesai lidar integration offers several key advantages.

- Enhanced safety: The precise positioning of the lidar within the headlamp ensures optimal coverage of the road and surrounding environment, enabling superior object detection and ranging for ADAS and AD functionalities. Marelli's new headlamp design is offered in two customized options to meet the diverse preferences of customers, accommodating both cost-effective and luxury car models.
- Seamless integration: The compact ATX lidar allows for effortless integration within the headlamp unit, maintaining the vehicle's sleek aesthetics and aerodynamic profile while also saving on material costs.
- Improved performance: The placement of the lidar within the headlamp provides a natural solution for keeping the sensor clean during operation, maximizing sensor performance in all weather conditions. Marelli's new headlamp design protects the lidar sensor and makes it easier to keep the lidar sensor clean, which helps ensure the lidar is in optimal working order to support intelligent driving functions.

DVN comment

The collaboration between Marelli and Hesai marks another integration response for lidar technology in automotive applications. After successful demonstrations of lidar integration behind windshields (collaboration with WideEye), Hesai shows with Marelli that headlamps can also host lidar technology without sacrificing vehicle design.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Benewake's New Lidar for Intelligent Transportation

Benewake's mass-produced, high-performance AD2-S-X3 lidar has been officially launched, and global sales have commenced. The maker says it is tailor-made for intelligent transportation scenarios, and that it can be widely applied and globally deployed in sectors such as roads, civil aviation, rail transit, shipping, and mining trucks.

Built on the Benewake Ying lidar platform, the AD2-S-X3 features high-resolution detection capabilities enabled by an ultrahigh resolution of 0.1° × 0.1° and an expansive 120°H × 25.6°V FoV, with 256 lines.

The AD2-S-X3 complies with the stringent requirements of automotive-grade testing and mass production, having endured multiple extreme tests such as high/low temperature, direct sunlight, strong vibration, and shock. Its innovative structure not only ensures exceptional performance but also minimizes weight, significantly reducing motor load, enhancing temperature adaptability, and improving electromagnetic compatibility. These features allow the AD2-S-X3 to perform stable and accurate detection continuously, ensuring safe operations across diverse scenarios.

Benewake's dedicated lidar production line has achieved automation across processes such as active alignment, adhesive dispensing, assembly, and delivery. Drawing on years of experience in mass production, Benewake has innovated a highly integrated, fully automated, intelligent testing line for lidar. A single testing line can calibrate and test 11 key parameters, including detection range, blind spots, precision/ accuracy of distance measurement, reflection rate, frame rate, FoV, and more. This innovative approach offers the benefits of full automation, diverse parameters, and multiple testing scenarios, significantly enhancing the comprehensiveness and overall efficiency of testing. Benewake can increase production capacity within three months to meet future demands by adding equipment in key processes.

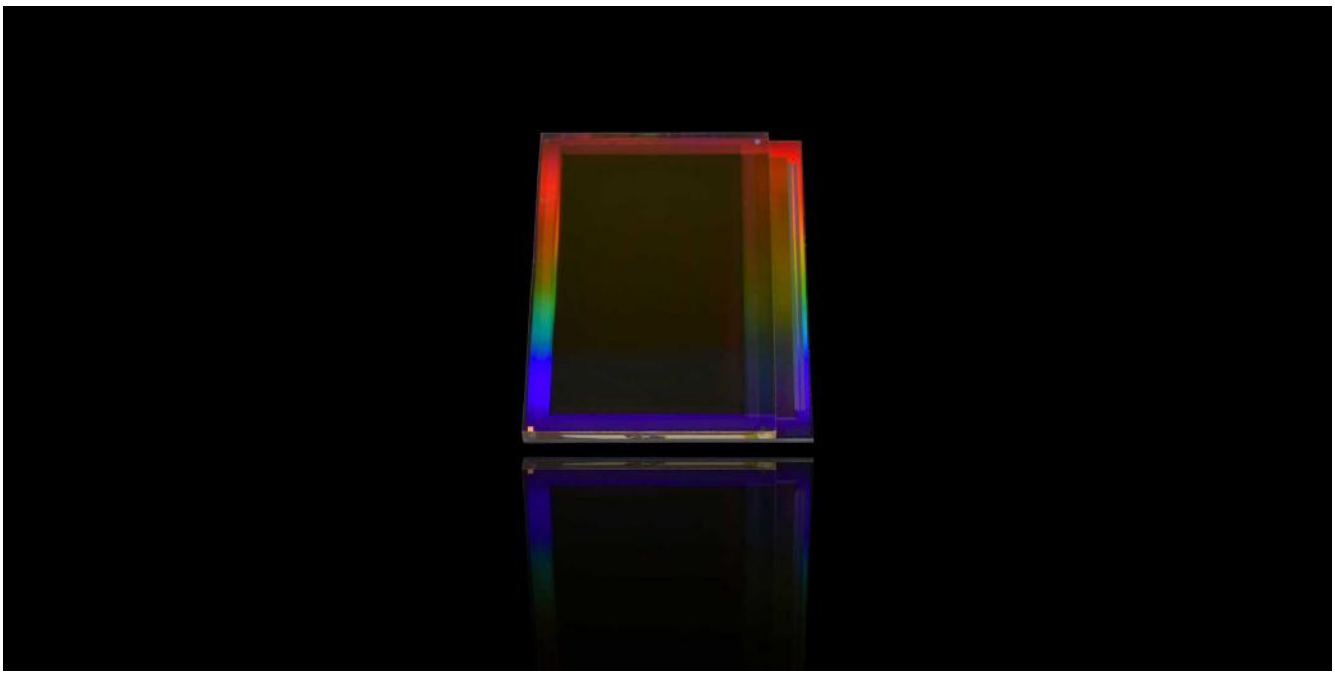
The AD2-S-X3 uses a 2D scanning system and a modular design of arrayed light sources and receivers, facilitating continuous performance upgrades and iterations to better meet client needs, such as enhanced sensing and digital twins. This design offers greater cost-effectiveness and effectively reduces client costs. It also simplifies deployment in complex scenarios and alleviates operational burdens for users.

DVN comment

The AD2-S-X3 responds to automotive grade requirements. It stands out with its high resolution and wide field of view and, being based on the Benewake Ying lidar platform, offers high reliability and opportunities for continuous improvement in different sectors like automotive applications.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Lumotive-Edom Collaboration for Solid-State Beam Steering Chips



Lumotive, experts in optical semiconductor technology for 3D sensing, has entered a strategic partnership with Edom Technology, an electronics distributor based in Taiwan. The pact aims to accelerate the deployment of Lumotive's Light Control Metasurface (LCM™) chips across the Taiwanese market, with a focus on automotive, robotics, drone, and security applications. Edom is the latest addition to Lumotive's expanding global partner network which consists of leading industry players, further strengthening their ability to make LCM products readily available to customers across diverse regions and sectors.

With their extensive network and deep expertise, Edom will help drive sales and provide comprehensive support as Lumotive's beam steering chips roll out in Taiwan, a region that accounts for more than 8 per cent of global electronics and computers production. The partnership will enable Lumotive to tap into Edom's strong relationships with major manufacturers, module makers, and electronics suppliers.

Lumotive's programmable optical beam steering technology enables the next generation of lidar with mass-producible, solid-state beam steering chips that enable 3D sensing systems to be dramatically more compact, reliable, and affordable. With a production-ready reference design model and a suite of products that satisfy a diverse range of performance specifications, Lumotive allows sensor makers to rapidly configure and deploy scalable, solid-state lidar systems that can be easily integrated into a wide selection of applications.

LCM-powered lidar facilitates the development of safer, more reliable vehicles and robots by enabling high-resolution, wide-angle sensing capabilities in a compact, solid-state package. In the robotics and drone sectors, Lumotive's LCMs allow for precise navigation and obstacle avoidance capabilities, enabling safer and more efficient operation in the same compact form factor as a camera. For security and monitoring applications, LCM-based lidar provides high-resolution 3D imaging and adaptive scanning and tracking capabilities, which work reliably in all lighting conditions.

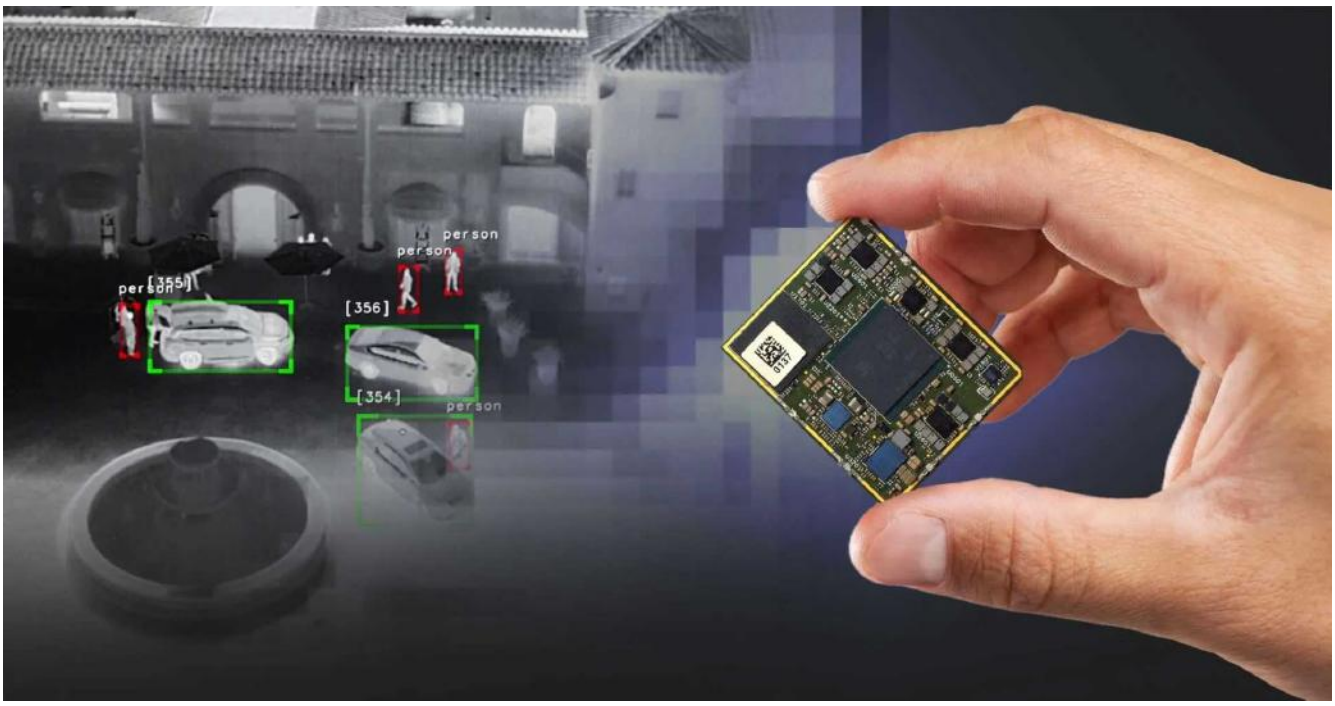
Founded in July 1996 and headquartered in Taipei, Edom Technology provides top-class distribution and solutions-based services to vendors, ODMs, and OEMs around Asia and the world. Edom has years of experience serving established markets and anticipating the requirements for leading edge products and applications, including portable and wearable devices, wireline and wireless communications, Internet of Things (IoT), automotive, robotics, medical, industrial control, computers and many other applications. With deep technical experience in opto-electronics, digital, analog and mixed-signal applications, and excellent logistics and operation, Edom bridges the gap between vendors, customers and partners to provide a full range of services and solutions.

DVN comment

Lumotive's programmable optical scanning technology certainly enables the next generation of lidar with its solid-state scanning chips that make 3D sensing systems more compact, reliable, and cost-effective. Through Edom's industrial capacities, Lumotive could enable sensor manufacturers to quickly configure and deploy solid-state, scalable lidar systems.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

FLIR Prism Video Processor With Qualcomm Chip Powers Edge AI



Teledyne FLIR has announced their new AVP advanced video processor to power their Prism™ AI and computational imaging at the edge.

The AVP incorporates the latest Qualcomm QCS8550, the most advanced mobile processor chip. The AVP provides best-in-class artificial intelligence performance within a small, lightweight, and low-power module for thermal and visible camera integration into unmanned aerial vehicles, robots, small gimbals, handheld devices, and fixed-mount security systems.

AVP runs the Teledyne FLIR Prism AI and ISP software libraries and interfaces with the Boson and Neutrino thermal infrared imaging cameras. These modules are equipped with a 12-µm uncooled detector offered in two resolutions—640 × 512 or 320 × 256—and multiple frame rate options. With multiple lens configurations also available, Boson offers the widest range of LWIR models from Teledyne FLIR and the most flexibility to integration programs.

Trained on the world's largest thermal image data lake of more than 5 million annotations, Prism AI is a powerful perception software designed to detect, classify, and track targets or objects for automotive autonomy, automotive automatic emergency braking, airborne camera payloads, counter-drone systems, ground intelligence, surveillance and reconnaissance (ISR), and perimeter security. Prism ISP is a comprehensive set of image processing algorithms that include super resolution, image fusion, atmospheric turbulence removal, electronic stabilization, local-contrast enhancement, and noise reduction.

The AVP is designed to empower integrators to build powerful, edge-intelligent products. It is supported by several tools to simplify and streamline development including a Qualcomm RB5 development kit. Software and board-support packages are also available to enable developers to design and fabricate custom interface boards that meet each product's specific form, fit, function, and input-output (IO) requirements.

DVN comment

The robust processing and perception industry is completing the jigsaw puzzle of advanced mobility, piece by excellent piece.

AUTOMATED DRIVING

AD Newsbites

Insurance Institute for Highway Safety
Highway Loss Data Institute

IIHS has released a new rating program that evaluates driving assistance systems offering partial automation. Nearly all systems tested (all US-market vehicles) received a poor rating. Ratings are considering how the system incorporate driver monitoring, attention reminders, system performance and features. This shows the maturity of these systems is still very limited.

XPENG has a new edition of their G6 car, the 580 Long-Range Plus, with a limited-time promotional price of C¥179,900. It is a cheap price for the full-domain 800V silicon carbide platform and advanced intelligent driving capabilities. the new car is equipped with lidar.

Volkswagen Group showcased 17 car models at the Beijing Auto Show, where the ID.Code concept car made its debut on the opening day. It is a design show car that Volkswagen will use as a concept for their future ID range in China. According to Volkswagen, the steering wheel can retract into the dashboard when L^4 autonomous driving mode is activated.

IM Motors officially launched their 'super smart sedan', the L6, and opened presales at the same time. The L6 comes standard with a suite of futuristic technologies, such as SAIC's innovative Lingxi Digital Chassis, an intelligent four-wheel steering system, ultralong-distance high-precision lidar from RoboSense, the Nvidia Orin X chip, and the Qualcomm Snapdragon 8295 chip, among others.

DiDi Autonomous Driving and GAC Aion jointly announced the approval of the business license for their JV, Guangzhou Andi Technology. This is the first JV in China between an L^4 AD tech company and an automaker, to develop robotaxi vehicles. Mass production is slated to begin in 2025. The inaugural autonomous vehicle, positioned as a crossover SUV, is built on Aion's AEP3.0 high-end all-electric vehicle platform and Xingling high-end E/E architecture.

WeRide, unveiled their second smart sanitation product, the unmanned Robosweeper S1. During the launch event, WeRide signed strategic cooperation agreements with several partners including the National Changxing Economic Development Zone, Guangdong-Hong Kong-Macao Greater Bay Area Robotics Industry Alliance, Zhengzhou Ourland Environmental, Guangzhou Kyin Development, and Dongguan Binhaiwan Holding Group, realizing a total order value of nearly ten million dollars on the first day of release.

Chinese unmanned delivery vehicle developer Neolix completed a C¥600m Series C financing round. Since receiving their first public road operation license in Yizhuang, Beijing, in 2021, Neolix has obtained licenses covering roads in over 30 cities and regions nationwide. The company has also completed technology and business efficiency verifications with multiple leading logistics and express delivery companies, achieving batch deliveries in over a dozen cities. They use a multimodal BEV space 4D temporal fusion perception technology, equipped with two 360-degree lidar units.

MAN has become the first commercial vehicle manufacturer to send an L^4 autonomous truck onto the Autobahn in Germany. The test truck drove around 10 km on the A9 between the Allershausen and Furholzen junctions, and is one of a series of tests on motorways as the manufacturer works towards series of production of autonomous trucks towards the end of the decade.

Detroit, in collaboration with Bedrock, Michigan Central, and the State Office of Future Mobility and Electrification (OFME), is set to deploy 'Connect,' an AV transit pilot aimed at advancing the city's commitment to zero-emission public transport. Scheduled for deployment this summer, the Connect pilot will feature four electric Ford E-Transit vehicles that are equipped with wheelchair accessibility. Perrone Robotics has been selected as the partner for the project.

NHTSA's Office of Defects Investigation has opened a preliminary evaluation to assess critical incidents involving the Ford Mustang Mach-E with the BlueCruise system. This inquiry follows reports of two severe collisions with stationary vehicles during nighttime on controlled-access highways, each leading to tragic fatalities.

NHTSA has announced the findings from their three-year investigation of Tesla vehicles. NHTSA found that Tesla's driver-assist features are ineffective at keeping drivers engaged in the driving task, with fatal results.

NHTSA investigated 956 crashes, in 489 of which the agency found either there was "insufficient data to make an assessment", the other vehicle was at fault, Autopilot was found not to be in use—though it must be remembered that Tesla has been credibly found to have programmed their L^2 Autopilot and 'Full Self-Driving' systems to disengage just before a crash so the systems can't be blamed—or the crash was otherwise unrelated to the probe.

NHTSA said the remaining 467 crashes fell into three classes: In 211, the Tesla "struck another vehicle or obstacle with adequate time for an attentive driver to respond to avoid or mitigate the crash". 145 crashes involved "roadway departures in low-traction conditions such as wet roadways", and 111 of the crashes involved "roadway departures where Autosteer was inadvertently disengaged by the driver's inputs".

In 59 crashes, the agency found that Tesla drivers had enough time—five or more seconds—in which to react before crashing into another object.

"Crashes with no or late evasive action attempted by the driver were found across all Tesla hardware versions and crash circumstances," NHTSA said.

EVENT

DVNL to Co-Host Suzhou EAC Lidar Tech Expo

DVN will co-host the 6th EAC Lidar Tech Expo 2024, in partnership with Enmore, who organize the EAC event each year. DVN's expertise will help build the program, and help Enmore recruiting speakers and exhibitors.

This is the biggest lidar exhibition in the world, and China is the biggest market for Lidar. Key suppliers in the lidar industry will promote their technologies and innovations.

This year, the theme is 'Sustainable Growth and Crafting the Future'. 1,500 attendees, over 50 speakers, and over 100 exhibitors are expected at the Suzhou International Expo Centre on 21-22 June.

The optics and lidar exhibition areas covers the likes of lidar modules, lasers, detectors, scanning components, amplifiers, ADC, DAC, main control chips, filters, collimating lens and other precision optical components, silicon photonic devices, simulation and testing, assembly patch equipment, packaging technology, heat dissipation materials, and adhesive materials.

See details on the **EAC website**, or the **DVN site**, where you can book your tickets—DVN Gold members can get two free tickets. You'll find the preliminary program of the conference, as well as registration and expo booth links. Or, if you prefer, you can also register by contacting DVN's **Eric Amiot** (Europe) or **Anne Ai** (Asia).