DVN
Lidar
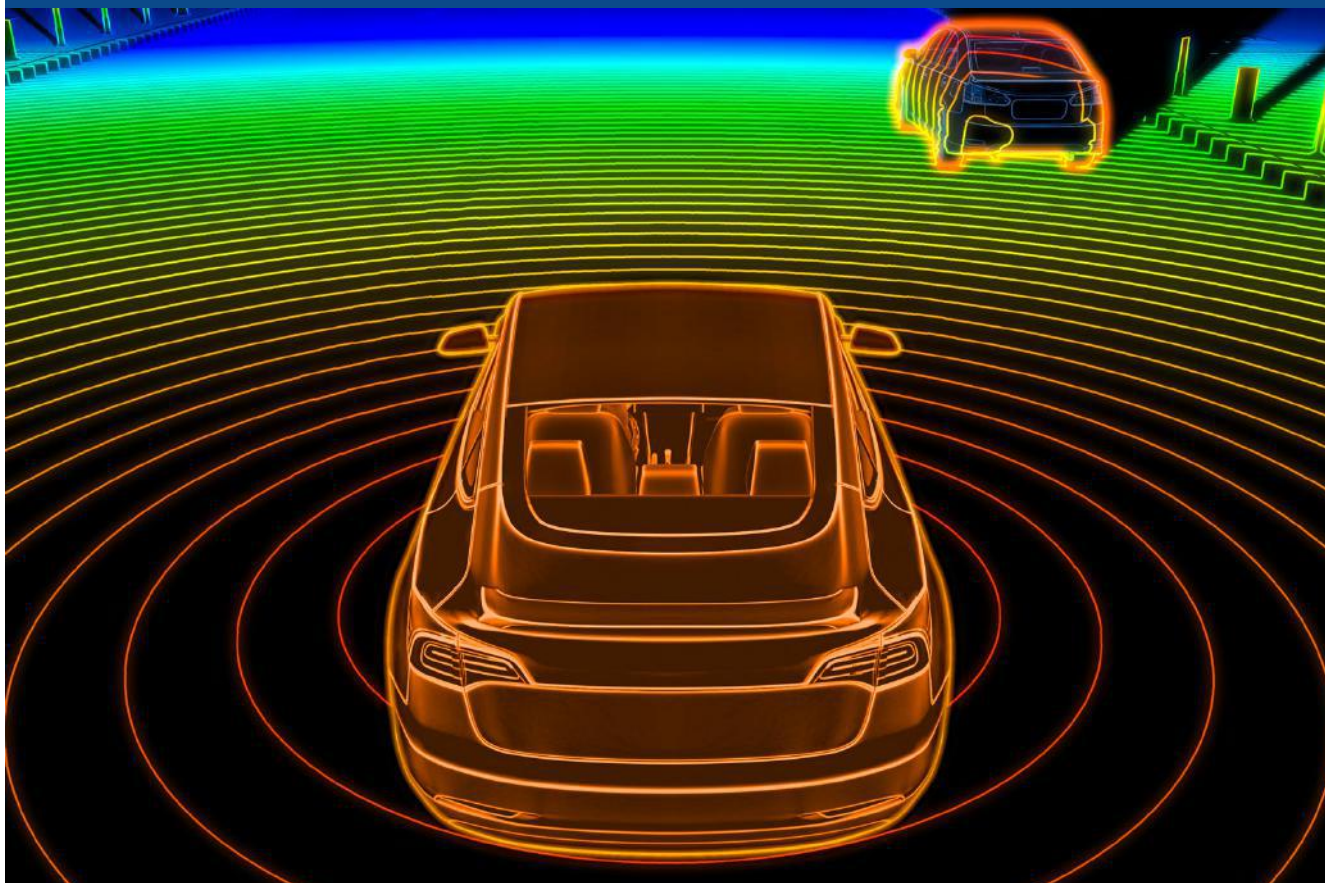
Monthly newsletter #27

Low-Cost Lidar Is Coming!

Low-cost lidars are soon to arrive. Robosense announced their new MX lidar platform will enter mass production in mid-2025 with a price of about USD $200. MX has an adjustable ROI (region of interest), with reach range of up to 200 meters, a 120° × 25° FoV, and resolution as fine as 0.1 × 0.1°. The ultimate target of leading lidar suppliers is to get the price down to C¥1,000 ($140) as soon as possible. These specifications cannot support L^3 or L^4, and we need to see the real added value compared to the next generations of cameras and 4D radars.

Low-cost lidars benefit from higher volumes—Robosense shipped 116,000 units in Q1-2024—lidar on chip designs, and intense competition among Chinese suppliers. Robosense and Hesai are still losing money, as described in this Newsletter.

Also in this edition, you will find a special report on the new NTHSA rule related to pedestrian AEB in night conditions up to 100 km/h. We will see if low-cost lidar can be a viable option for meeting the requirements.

And we bring you the preliminary program of the Lidar Deep Dive III in Detroit.

DVN-Lidar Events—save the dates:

- EAC Lidar Tech Expo in Suzhou (21-22 June,2024), DVN is co-host with Enmore
- Deep Dive 3 workshop in Detroit (12 September,2024)
- Lidar Conference in Wiesbaden (18-19 November,2024)

We're ever so glad you're here with us in the DVN-Lidar community. Enjoy this 27th newsletter!

All best,

Alain Servel

DVN LIDAR ADVISOR

Lidar Business Newsbites

	Apr., 2024	YTD, 2024
Outputs	870	2,985
BEV	535	1,853
PHEV	334	1,131
FCV	0.3	1
Sales	850	2,940
BEV	519	1,824
PHEV	331	1,115
FCV	0.3	1

In the first four months of 2024, China's production and sales increased by 8 and 10 per cent, respectively, at 9 million vehicles. NEV (new-energy vehicles) sales reached around 3 million units, up 32 per cent from the previous year. NEVs accounted for 32.4 per cent of China's auto sales in the period.

Hesai shipped 52,462 ADAS lidar units in Q1-2024, which is 86.1 per cent more than Q1-2023. Their total (automotive and all other) for Q1 2024 was 59,101 units. Net revenues were C¥ 359.1m (USD $49.7m), a 16.5 per cent drop from the Q1-2023 revenue of C¥ 429.9m. Gross margin stood at 38.8 per cent, up one percentage point from a year ago. The net loss for the first quarter was C¥ 106.9m ($14.8m), compared to a net loss of C¥ 118.9m in the same period last year. R&D expenses totalled C¥ 194.4m ($26.9m).

Robosense's Q1-2024 revenue from ADAS lidar products was C¥ 310m, compared to C¥ 70m in Q1-2023. In Q1 this year, RoboSense sold around 120,000 units total (up 457.4 per cent YoY), with approximately 116,000 units for ADAS (up 542 per cent). RoboSense reported an adjusted net loss of C¥ 84.1m for the quarter, compared to a net loss of C¥ 95m in Q1-2023. RoboSense's R&D expenses for the quarter were approximately C¥ 150m.

Aeye has announced a partnership with Accelight Technologies (ATI) and LighTekton. The collaboration aims to introduce AEye's 4Sight lidar platform to the Chinese market, to advance safety in autonomous trucking and railway systems. ATI brings experience and expertise in high-quality optoelectronic products. Based in China's Wuhan Optics Valley, LighTekton specializes in photoelectric perception technology, focusing on autonomous driving.

Aeye also announced partnership with Liteon Technology, who bring expertise in optoelectronics and power management, and will be the tier-1. Liteon supports automakers in Europe and North America, from design to manufacturing.

The Volvo EX90 has started production, equipped with Luminar's advanced lidar sensors. Luminar's extended partnership with TPK, renowned for manufacturing prowess, is intended to reduce costs and streamline production timelines. The collaboration underscores TPK's commitment to supporting Luminar's scale-up in response to growing product demand.

Valeohas secured their 17th Automotive News PACE Award for their Scala3 lidar. This recognition highlights the company's commitment to innovation, particularly in advanced driver-assistance systems (ADAS) and autonomous driving technologies. The SCALA™ 3 lidar is designed to support highway Pilot at speeds up to 80 mph (130 km/h).

Baidu is considering collaborating with Tesla for the beleagured automaker's announced future robotaxi service. The decision will reportedly be based on particulars of Tesla's application models and the timing of their robotaxi entry into the Chinese market.

Motional has announced a significant shift in their strategy, emphasizing the delay in the large-scale deployment of their autonomous vehicles. The recent injection of $475m from Hyundai Motor Group highlights continued belief in the long-term potential of autonomous technologies. However, it also underscores a realistic approach towards deployment.

NHTSA Finalizes Pedestrian AEB Requirement Rule

Starting with 2030 models, new passenger vehicles and light trucks in the United States will have to be equipped with pedestrian-sensitive automatic emergency braking. NHTSA's final rule sets forth Federal Motor Vehicle Safety Standard № 127, which requires AEB on new passenger cars and light trucks by September 2029.

NHTSA forecasts that FMVSS 127 will reduce rear-end and pedestrian crashes; they say it will prevent at least 360 deaths and 24,000 injuries annually. The standard requires AEB systems to effectively detect a pedestrian both in daylight and after dark.

Sophie Shulman, the agency's Deputy Administrator, says, "Automatic emergency braking is proven to save lives and reduce serious injuries from frontal crashes, and this technology is now mature enough to require it in all new cars and light trucks. In fact, this technology is now so advanced that we're requiring these systems to be even more effective at higher speeds and to detect pedestrians. Most new vehicles already come with AEB, and we expect that many cars and light trucks will be able to meet this standard ahead of the deadline, meaning even more lives will be saved thanks to this technology".

FMVSS 127 requires vehicles be able to stop and avoid contact with a vehicle in front of them up to 100 km/h, and to detect pedestrians in both daylight and darkness. The AEB system must also apply the brakes automatically at speeds of up to 144 km/h when a collision with a lead vehicle is imminent, and up to 72 km/h when a pedestrian is detected.

The standard fulfills a provision in the Bipartisan Infrastructure Law passed in 2022 to establish minimum performance standards requiring that all passenger vehicles be equipped with AEB. This standard also advances the Department of Transportation's National Roadway Safety Strategy, launched in January 2022 to address the national crisis in traffic fatalities and serious injuries.

This final rule applies to all vehicles with a gross weight rating of up to 10,000 pounds—nearly all U.S. light vehicles.

⬗ DVN comment

The main advantage of lidar is that data generated by the sensor represent its surroundings with high precision in terms of distance to the objects. Cameras estimate the distance to the object after a segmentation of images. In night conditions, the detection of pedestrian will depend on luminance contrast between the pedestrian and their immediate environment, especially when headlamps don't adequately illuminate the scene. This is one of the reasons why camera-based AEB fails when a pedestrian is on the vehicle's trajectory. It also further erodes the already-critically-thin-ice on which one—and only one—automaker CEO is standing on when he says lidar is "doomed", calls it a technology "for losers", and claims he can do everything better with just cameras.

Interview: Dr François Simoens, CEO and co-founder of SteerLight

Dr François Simoens is the CEO and the co-founder of SteerLight, a deeptech start-up founded in July 2022 with the ambition to provide smarter 3D vision with a new generation of miniaturized FMCW silicon-photonics based LiDAR sensors. He built this disruptive value proposition on his prior involvement in photonics developments for more than 25 years. After involvements R&D for accelerator physics, he joined CEA-Leti in 2003 to contribute to R&D institutional and industrial project before taking the position of program manager and expert in the imaging sensor field. During the 15 last years, he has been acting as Business Developer for industrial partnerships and Marketing Manager for the strategic imaging domain.

DVN: Steerlight was founded in 2022, what is the history of Steerlight and why did you create a start-up?

François Simoens: Founded in 2022 as a spin-off of the French CEA-Leti technology center, the deeptech start-up SteerLight develops a new generation of 3D vision sensor that is an on-chip FMCW LiDAR. The ambition is to bring to the market this disruptive LiDAR solution that meets the requirements of mass volume applications, and in priority for mobility and Industry4.0 markets.

This innovation draws upon a strong portfolio of patents and know-how that CEA-Leti has been developing for more than 10 years, combining expertise in photonics, microelectronics, and embedded algorithms. In addition, after an in-depth market study by the two co-founders, thaye have launched in 2019 and managed a multidisciplinary internal CEA 'LiDAR intégré' program in order to design and to manufacture Lab Proofs of Concept to validate the proposed solution. This program has brought SteerLight first major milestones that were in particular recognized by the awarding of the i-Lab 'grand' prize, a major French national innovation competition.

DVN: Which applications do you plan for your product: Robotics, Automotive, ...?

François Simoens: The core of the SteerLight innovation stands in silicon photonics technology that puts the system on a microchip and paves the way to cost-effective volume production. This non-mechanical system provides robustness and simultaneous depth and velocity data that are key features for mobile applications that SteerLight targets as first markets.

Our first objective is to address industrial markets, particularly for intralogistics and industry 4.0 applications. Typically, this first product will address the needs of the indoor robotics, AGVs and AMRs.

Then, a second generation with extended performance –such as the field of view and range- will serve customers in both the industry and the automotive sector, aiming for mass production at a competitive price.

DVN: Which product range do you target: Long Range & Short range Lidars?

François Simoens: Our first product will target the 50 m range that is sufficient for indoor industrial applications and possibly a few outdoor applications too. The long range version of our of Lidar will be targeted by the second generation of product.

DVN: Your Lidar is based on the FMCW technology, could you tell us more about your technology, and target specifications?

François Simoens: The core photonics chip of the LiDAR module integrates as a system in package –or SiP- the 3 functional blocks of FMCW LiDAR: a 1550n laser chip-on-carrier, Optical Phased Arrays –(OPAs) to shape and steer the laser beam electronically without moving parts and a heterodyne detection part. The FMCW feature enables the delivery of mixed signal that provides high sensitivity, Doppler velocity information and high immunity to sunlight and other LiDAR signals. The OPA and the heterodyne detection are integrated in a single Photonics Integrated Chip (PIC). The corresponding optical functions are driven by CMOS electronics ICs that were designed by SteerLight and CEA-Leti.

DVN: When will your first representative prototype be ready, when do you plan your first SOP?

François Simoens: Our next step is the release of functional demonstrator prototype by the end of Q4/2024. This module will demonstrate all the key functions of our 2D LiDAR provided by our SoC (System on Chip). In the meantime the SteerLight team designs the first product that specifications are given by the future customers. The manufacturing of the first prototype will be launched in 2025 with the target of the availability of a first product prototype ready for tests with customers by 2026. In the meantime the second generation of product will designed and first prototypes will be available for tests in 2027 before the qualification process.

DVN: How did you get your fundings, why did Stellantis invest in Steerlight?

François Simoens: In March 2024, SteerLight announced the closing of a €2 million funding round from a group of investors led by Stellantis Ventures, along with Quantonation and LIFTT, renowned major venture capitals in deep-tech investments. As published by SteerLight in our press-release, this funding comes on top of a €1.2 million loan granted by three banks, including Bpifrance.

As expressed in the Stellantis Press-release of March 2024, "Stellantis Ventures Invests in Breakthrough, Cost-effective LiDAR Technology for Advanced Driver Assistance Systems". As explained by Ned Curic, Stellantis Chief Engineering & Technology Officer, "A central aspect of our Dare Forward 2030 initiatives is identifying groundbreaking technologies that deliver substantial value to our customers on a large scale. Automated driving enhancements remain a top priority at Stellantis. The game-changing work at SteerLight can enable enhanced and widespread ADAS applications."

DVN: What is your business model : will you be Tier1 or Tier2, do you to use some facilities from the CEA?

François Simoens: With a B2B business model, the ambition of SteerLight is to serve a market of several millions units per year in the long run for a wide range of markets. Our ambition is to provide LiDAR modules as COTS for automotive and industry but also for smart cities, services, human assistance, etc... Our vision for Steerlight is to become the fabless supplier of standard modules that can benefit all integrators. Our business model in the automotive sector is under discussion and not yet arbitrated.

As part of our collaboration with the CEA, we have access to the Leti's 10 000 m2 clean rooms and tests facilities for our R&D works to feed the future product roadmap. The manufacturing of the commercial prototypes and final products are all manufactured in industrial semiconductor foundries, either for CMOS and Silicon Photonics chips. We are convinced that the fabrication and the assembly of the on-chip LiDAR sensors with silicon photonic technologies is the only way to enable modularity and ultra-miniaturization thanks to its compatibility to standard semiconductor industry. , and to pave the way to volume manufacturing and the associated price scalability. One of the topics we are currently working on is the qualification of foundries for the future manufacturing of our ICs.

DVN: We see announcement related to high volume Long Range Lidars for L2+ applications in China with a cost below 200$, will you be competitive with these lidars?

François Simoens: The SteerLight solution combines OPA-based non-mechanical beam steering and 1550nm FMCW architecture with manufacturing with this universal material that is silicon. We are convinced this this combination of photonics and electronics in a compact system-in-package brings all the assets to succeed in this challenge.

DVN: How do you see the market in 5 years from now for long & short range lidars in EU, US, China?

François Simoens: It is risky to comment on such timeline in the turbulent geopolitical and economical context. But for sure we are convinced that the market will push for the development of LiDARs that meet constraints for a mass-market adoption that are the strict size, weight, power, and cost (SWAP-c). These are the key features of the SteerLight solution. This future generation of LiDARs will fulfil the needs of countless applications, the most notable of which is assisting in partial or full autonomous driving.

DVN: Are lidar and imaging radar competing or complementary? Do you think the radar/lidar performance and cost gaps will narrow?

François Simoens: Since optical wavelengths are smaller that radiofrequency by three orders of magnitude, LiDARs provide intrinsically 3D vision with unrivalled accuracy and resolution in combination to the key asset that their volume is also naturally more compact. With Silicon photonics technology that paves the way to cost reduction with volume, the quest of safe mobility will come with the need for enhanced 3D environment perception by FMCW LiDARs with complementary sensors. This trend includes radars to help in security level under bad weather conditions.

Lidar Technology Newsbites

Lumotive, Hokuyo Release World's First 3D Lidar Sensor With Solid-State Beam Steering

Lumotive and Hokuyo Automatic, a company specializing in sensors and automation, have announced the commercial launch of the YLM-10LX 3D lidar sensor. Powered by Lumotive's Light Control Metasurface (LCM) optical beamforming technology, is a major advance in using solid-state, programmable optics to improve 3D sensing across industrial automation and service robotics applications.

 LCM uses the capability of dynamic meta surfaces to control and direct light in ways that were previously impossible, eliminating the need for large, costly, delicate mechanical moving parts found in traditional lidar systems. LCM chips enable unmatched stability and accuracy in 3D object recognition and distance measurement, and effectively deal with multi-path interference, which is essential for industrial environments where consistent performance and safety are vital.

Hokuyo's new sensor is the first of its kind in the lidar industry, and they say it achieves better range and view field than any other solid-state solution on the market by integrating beam steering with Lumotive's LM10 chip. The digital, software-defined scanning capabilities of LCM beam steering allow users to easily modify the sensor's resolution, detection range, and frame rate; multiple FOVs can be programmed and used at the same time, seamlessly adapting to application needs and changing conditions.

Hokuya Product and Marketing Lead Chiai Tabata says, "The YLM-10LX sensor marks a breakthrough in 3D lidar technology, unlocking new opportunities for automation and robotics. With the industrial sectors increasingly requiring high performance, reliable lidar systems that also have the flexibility to address multiple applications, our ongoing partnership with Lumotive allows us to leverage the amazing potential of LCM beam steering and to deliver innovative solutions that meet the changing needs of our customers".

And Lumotive's Bizdev VP Dr. Axel Fuchs says, "We are excited to see our LM10 chip at the core of Hokuyo's new YLM-10LX sensor, the first of our customers' products to start deploying our revolutionary beam steering technology into the market. This product launch highlights the tremendous potential of our programmable optics in industrial robotics and beyond. Together with Hokuyo, we look forward to continuing to redefine what's possible in 3D sensing".

Lumotive's LM10 LCM, a chip-scale solid-state beam steering solution for lidar, allows sensor makers like Hokuyo to quickly integrate compact, adaptive programmable optics into their products. LM10, like all LCMs, are manufactured using well-established and scalable silicon fabrication techniques, reducing costs through economies of scale, and making solid-state lidar available and economically feasible for widespread adoption in a broad spectrum of industries.

The commercial launch of the YLM-10LX sensor is another significant milestone of Hokuyo's continued investment in its long-term, strategic collaboration with Lumotive. The two companies will continue to combine Hokuyo's expertise with Lumotive's optical semiconductors to push the limits of 3D lidar technology and drive innovation across a wide range of applications.

🔖 DVN comment

The YLM-10LX sensor is the first product on the market to integrate beam scanning with Lumotive's LM10 chip. Due to the LM10's beamforming principle, this lidar has digital and software scanning capabilities that allow users to easily change sensor performance parameters, such as resolution, detection range, and refresh rate, and have multiple fields of view programmed and used simultaneously.

Lightwave Logic, AMF to Develop Photonics Modulators

Lightwave Logic, a technology platform company using their electro-optic (EO) polymers to transmit data faster with less power and smaller hardware, is collaborating with Advanced Micro Foundry (AMF), a silicon photonics volume foundry, to develop polymer slot modulators with AMF's silicon photonics platform.

These modulators can reach a record low drive voltage under 1V and data rates of 200 Gbps PAM4. They will allow new 800 Gb/s and 1.6T Gb/s pluggable transceivers for the fast growing demand for optical connectivity for large AI computing clusters.

Lightwave Logic and AMF have worked together for a year to make the electro optic polymer slot modulators using AMF's standard process flow on 200-mm wafers. This successful demonstration is a major achievement in integrated photonics, combining Silicon photonics with polymer materials. Both parties are working to improve the modulators to make them ready for product companies on a manufacturing scale.

Lightwave logic Chair and CEO Dr. Michael Lebby says, "AMF is a world class facility with mature and high-volume silicon photonics. With AMF, we not only moved to 200-mm wafers, but we also boosted silicon photonics with our polymer slot modulators to achieve world class performance. Engineers from both sides have done well to make a silicon photonics design that integrates well with polymer, a process that would have been harder with other next-generation modulator materials. This achievement puts our company in a strong position to increase volume for our polymers and 200-mm silicon wafers with AMF".

And AMF CEO C.V. Jagadish says, "Lightwave Logic's EO polymer modulators can support higher baud rates, low power consumption, and small size. These features, integrated with AMF Silicon Photonics platform, make them cost effective options for 800Gb/s and next-generation 1.6Tb/s pluggable transceivers applications. This demonstration opens up new opportunities to develop new solutions for EO polymer modulators integrated with AMF's standard processes. We are eager to continue to explore the benefits of EO polymer modulation on our foundry processes, to provide innovative and manufacturable technology solutions for data communication."

Singapore-based AMF is a silicon photonics foundry, specializing in manufacturing, prototyping, and testing. They have their own technology platforms, updated with in-house PDKs (process design kits) for applications in areas including telecoms, data centers, lidar, and sensors.

Lightwave Logic uses their own engineered electro-optic (EO) polymers to make a platform that can send data faster, use less power, and fit in a small space. The company's organic polymers are highly active and stable, and help Lightwave Logic make new photonic EO devices that change data from electrical signals to optical signals.

🔖 DVN comment

AMF provides a solid-state lidar PDK—a promising approach to help lidar suppliers design accurate, compact, fast FMCW and ToF lidars. AMF's lidar PDK is available in different SOI (silicon on insulator) structural versions. The cooperation with Lightwave could especially focus on production of lidar modules dedicated to light modulation and beamforming by silicon-organic optical phase arrays.

Aeye, LiteOn in Partnership Pact

AEye has announced that the non-binding letter of intent announced in March is with LiteOn Technology Corporation, and is intended to offer AEye a customer channel and industrialization partnership. The two companies will work together to deliver AEye's 4Sight-based lidar products to automakers for their ADAS offerings. This collaboration fits well with AEye's unique capital-light business model, which relies on automotive tier-1 partnerships to provide AEye's lidar solutions to automakers.

Aeye CEO Matt Fisch says, "LiteOn is a great partner for us. Their innovative mindset, vast experience in providing solutions to the automotive ADAS market, along with their advanced industrialization capability will enable us to offer the industry's leading long-range lidar solutions at a very competitive cost to our customers. We are already working together on the OEM RFI/RFQ pipeline and I'm optimistic about our combined ability to capture a significant portion of the market".

LiteOn is a global provider of electronic solutions for automakers, with over four decades' expertise in the automotive electronics industry—notably in optoelectronics and power management. Using their own manufacturing facilities, LiteOn offers services from design to manufacturing to most of the top tier-1s and automakers in Europe and North America.

🔖 DVN comment

AEye will benefit from LiteOn's experience in optical sensors mass production industrial processes. LiteOn is a global leader in optoelectronics, information technology and storage devices components. Founded in 1975, they aim to be the "best partner in opto-electronic, eco-friendly, and intelligent technologies" for applications such as computers, communications, consumer electronics, automotive electronics, LED lighting, cloud computing, and healthcare.

Cepton Launches StudioViz Lidar Simulator

Cepton has launched their StudioViz advanced lidar simulation platform, intended to hasten the development and deployment of ADAS and AVs by offering significant cost efficiencies for automotive customers. Cepton says StudioViz simulation offers significant advantages, including:

- Easy lidar integration—StudioViz helps the automotive industry adopt lidar technology quickly and affordably by reducing installation costs and speeding up development.

- Sophisticated simulation features: the platform lets users build virtual scenarios, fine-tune sensor location, and combine simulated lidar data with other sensor kinds to evaluate system functionality.

- Productive R&D tool: StudioViz is a vital tool for advanced research, allowing data creation for perception solution development without requiring a lot of physical infrastructure.

With StudioViz, Cepton's wide range of lidar sensors (including the long-range Ultra and medium-range Vista-X series) are used to create realistic 3D point clouds that simulate real-world scenarios. This allows automotive OEMs to evaluate different sensor positions and perception algorithms in a virtual environment, significantly reducing the need for expensive physical prototypes.

The platform also offers powerful simulation tools for sensor fusion evaluation and perception solution development. Users can produce detailed lidar data that is labeled with ground truth information for accurate vehicle and pedestrian detection and tracking. This helps in improving algorithms for lane and curb detection, path planning, and ego-motion estimation.

Cepton Product Owner Christian Nickolaou says, "StudioViz speeds up the testing, development, and deployment of Cepton's lidar technology by offering an efficient and cost-conscious solution... [it] lowers financial investment in data creation and collection for the development of perception solutions".

🔖 DVN comment

Generally, simulation can provide benefits such as reduced costs, speedy development, the ability to test complex scenarios, and reduced risk. It allows designers and engineers to test and evaluate systems in a virtual environment before deploying them in the real world. Sensor-to-environment simulation is a key point element in the AD simulation loop. In the particular case of scanning lidars, raytracing methods are a realistic approach that can dramatically accelerate matters.

AD Newsbites
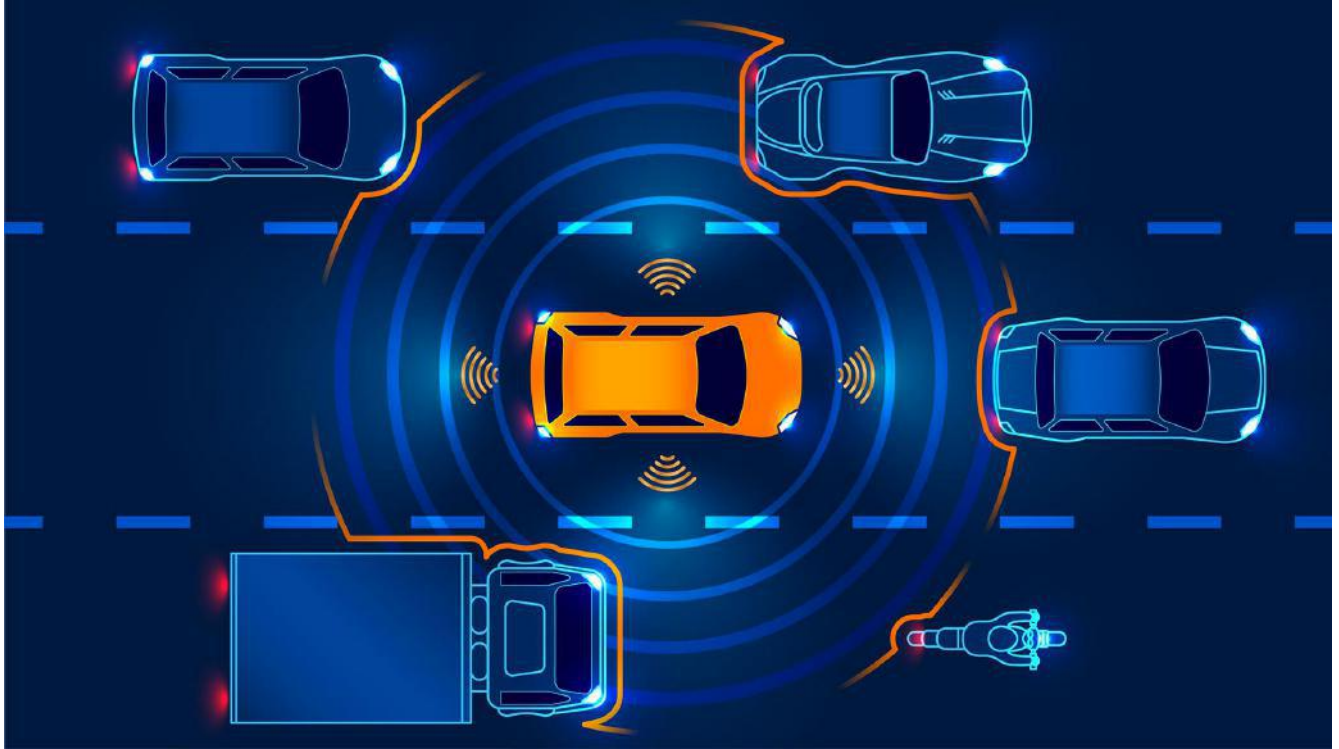
In November 2024, Tier IV will launch their robotaxi service in Tokyo. Targeting areas and times underserved by traditional taxicabs, the service will start with proof-of-concept tests in Odaiba, a district in Tokyo Bay. Tier IV aims to gradually expand the service to cover Tokyo's

Cruise will restart supervised autonomous driving in Phoenix, Arizona. Over recent weeks, the GM affiliate has been mapping and collecting road data. Now, the company will validate their AVs' performance against strict safety and operational standards. During this phase, safety drivers will be present in the vehicles to monitor and intervene as needed.

Renault Group unveiled their autonomous driving strategy, highlighting a collaboration with Chinese AD developer WeRide. The two companies have launched an autonomous shuttle service during the French Open (26 May to 9 June), providing transport between the event venues and parking areas.

WeRide received remote driverless testing and cargo testing licenses from Guangzhou's municipal authorities. The permits mean WeRide's Robovan autonomous cargo vehicle can conduct fully driverless testing and cargo testing in Guangzhou city. The testing area covers six administrative districts, encompassing a total of 797 test roads and 3,247 kilometers of two-way distance. This is the first license in China for L^4 driverless cargo vehicle remote testing in an urban open-road scenario, and the first to support 24/7 autonomous cargo vehicle testing.

Volvo Autonomous Solutions introduced their new VNL Autonomous truck at the ACT Expo in Las Vegas. It is built with advanced autonomous driving technology from Aurora Innovation. The truck incorporates Aurora Driver, an L^4 AD system with AI software, dual computers, lidar, cameras, radar, and sensors. The VNL Autonomous is designed to offer a fully-integrated autonomous solution for the hub-to-hub segment.

Inceptio Technology, a developer in autonomous driving technologies for heavy-duty trucks, has loged over 100 million kilometers in safe commercial operations with their advanced trucks. This accomplishment highlights Inceptio's role in advancing the commercial use of autonomous heavy-duty trucks globally, using their Truck Navigate-on-Autopilot (T-NOA) system. Logistics firms in China use these autonomous trucks, including ZTO Express and JD Logistics.

Xpeng says they have achieved full map-free operation for their XNGP urban intelligent driving system, significantly increasing its coverage. The usable distance has more than doubled in in Shanghai; Guangzhou, and Shenzhen, and grown by 31 per cent in Foshan cities. These cities now support map-free intelligent driving capabilities. In addition, Xpeng has added over 30,000 kilometers of XNGP urban intelligent driving coverage in Shandong Province, and more than 11,000 in Jiangxi Province.

The XNGP system can handle complex and cross-scenario routes in major cities, especially on key roads used frequently by local Xpeng owners. In smaller cities and counties, the maker focuses on opening core routes common for users to ensure a relatively continuous and complete driving experience. There are also specialized functions for lower-tier roads. The XNGP system uses navigation maps, 'XNet perception', and driving strategies to achieve performance in map-free areas comparable to that of HD-mapped areas. At their recent intelligent driving spring launch event, Xpeng set new targets to achieve full coverage of XNGP functions in major urban road networks across China by the end of 2024, and to start development of highway NGP in 2025. The carmaker will also begin developing XNGP functionalities for global markets in 2025.

KargoBot, the autonomous truck solution developer backed by DiDi, received a permit for L^4 autonomous truck platooning tests on public roads in Beijing. KargoBot currently operates in North and Northwest China, conducting routine tests and operations, offering end-to-end intelligent transportation for short-, medium-, and long-distance routes. As of this May, KargoBot's L^4 trucks have transported over 32 million tonne-kilometers of bulk goods, with total demonstration operation distance exceeding 6 million kilometers.

Pony.ai has obtained Guangzhou city's first intelligent connected vehicle (ICV) expressway test permit, with one robotaxi and one autonomous truck model selected for testing. As of this May, Pony had accumulated over 33 million kilometers of autonomous driving tests, with more than 3 million kilometers in fully driverless testing. In autonomous trucking specifically, at the end of this past March they had logged nearly 5 million kilometers of testing distance, over 1.5 million of which in commercial logistics operations

Hyundai Motor and autonomous driving software provider Plus unveiled the first L^4 autonomous Class-8 hydrogen fuel cell electric truck in the U.S. at the Advanced Clean Transportation Expo. The Xcient truck is undergoing initial autonomous driving assessments, making it the first-ever L^4 self-driving test on a class-8 fuel cell electric truck ever in the country. The collaboration seeks to show that autonomous hydrogen fuel cell trucks can help make trucking safer, more efficient, and more sustainable. Plus' SuperDrive solution, being deployed in the U.S., Europe, and Australia, uses sensors including lidar, radar, and cameras to provide surround perception, planning, prediction, and self-driving capabilities.

Baidu Apollo has introduced the Apollo ADFM (L^4 autonomous driving foundation model). They also launched their sixth-generation unmanned Apollo Go robotaxi, priced at around C¥ 200,000 (USD $27,700) and equipped with Baidu's latest intelligent system. Leveraging this model, Baidu's Apollo Go Robotaxi service has successfully navigated Wuhan's road conditions, providing nearly half of the city's residents with convenient autonomous mobility service. By April, Baidu Apollo had accumulated over 100 million kilometers of autonomous driving distance without major accidents.

NHTSA's Office of Defects Investigation has reported 22 incidents involving Waymo vehicles equipped with the 5th-generation ADS. Along with collisions with stationary objects, parked vehicles, and potential violations of traffic laws, some incidents involved the ADS-equipped vehicles driving on the wrong side of the road with nearby oncoming traffic, or entering construction zones.NHTSA now is investigating these occurrences to determine the performance and safety of Waymo's ADS.


The Office of Defects Investigation is also examining incidents involving Zoox vehicles which unexpectedly braked suddenly, resulting in rear-end collisions. The investigations focus on the Zoox ADS in Toyota Highlander vehicles. These events, have raised concerns over the system's performance in real-world driving conditions. The incidents took place in clear daytime conditions. Both collisions involved motorcyclists who were unable to avoid the abruptly stopping vehicles, leading to minor injuries.

And that same Office of Defects Investigation is assessing incidents involving Ford Mustang Mach-Es equipped with the BlueCruise system. This inquiry follows reports of two severe collisions with stationary vehicles during nighttime on controlled-access highways, each leading to fatalities. There are

DVN-Lidar Deep Dive III: Preliminary Docket
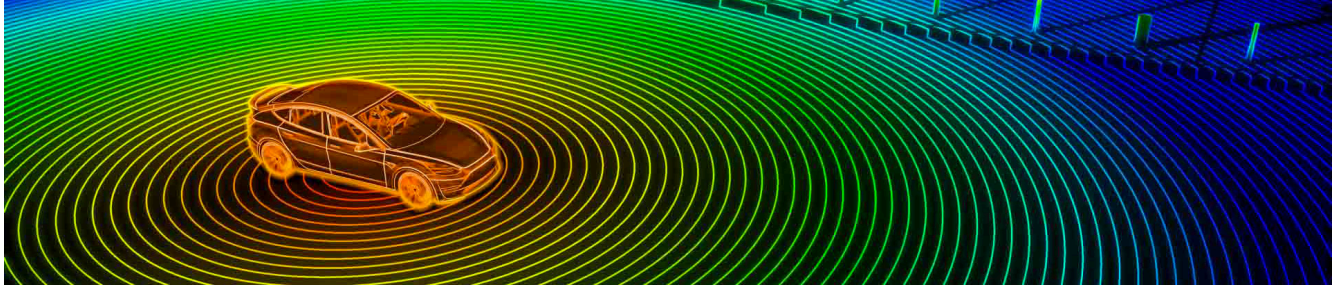
The event will be on 12 September. The agenda is under development; there will be a maximum of eight speakers, and online participation will be possible.

11 September

19:20   Cocktail
20:15   Dinner

12 September

8:30   Opening and introduction of participants

Session 1: Lidar Applications & Technology, FMCW Lidars

9:00 **GM**: Lidar for L^{2+}/L^3 applications (title & speaker tbc)
9:20 **Luminar:** New generations of Lidars (title & speaker tbc)
9.40 **Robosense**: Low-cost Lidars for L2+ Applications (title & speaker tbc)
10:00 Conclusion: Four Questions to Consider

10:05   Coffee Break
10:30   Two breakout groups, each discussing four questions from the speakers
12:05   Lunch Break

Session 2: Lidar Integration & Cleaning, Sensors Performance & Fusion for AVs

13:30   **Monentive (tbc):** Weathering resistant coating for Lidars
13:50   **Virginia Tech**: Interference Study with NHTSA (title tbc)
14:10   **Valeo**: Sensors for AVs: Lidar, 4D Radar, IR cameras (title tbc)
14:30   Two breakout groups, each discussing four questions from the speakers.

15:30   Coffee Break

16:00   Breakout group reporting and discussion
16:30   What did we learn together?

17:00   Closure

Contacts: **Martin Booth EricAmiot**