DVN
Lidar

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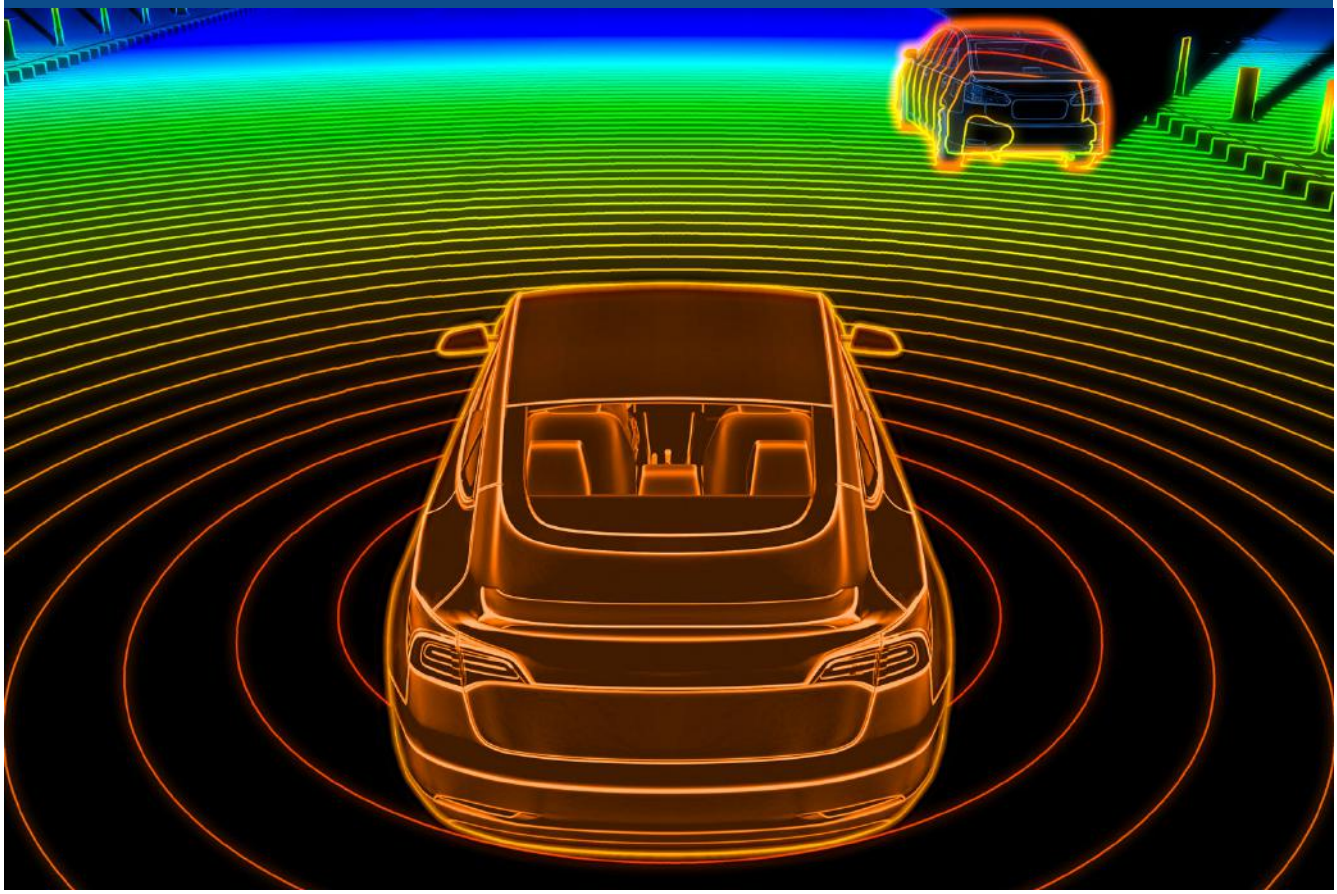
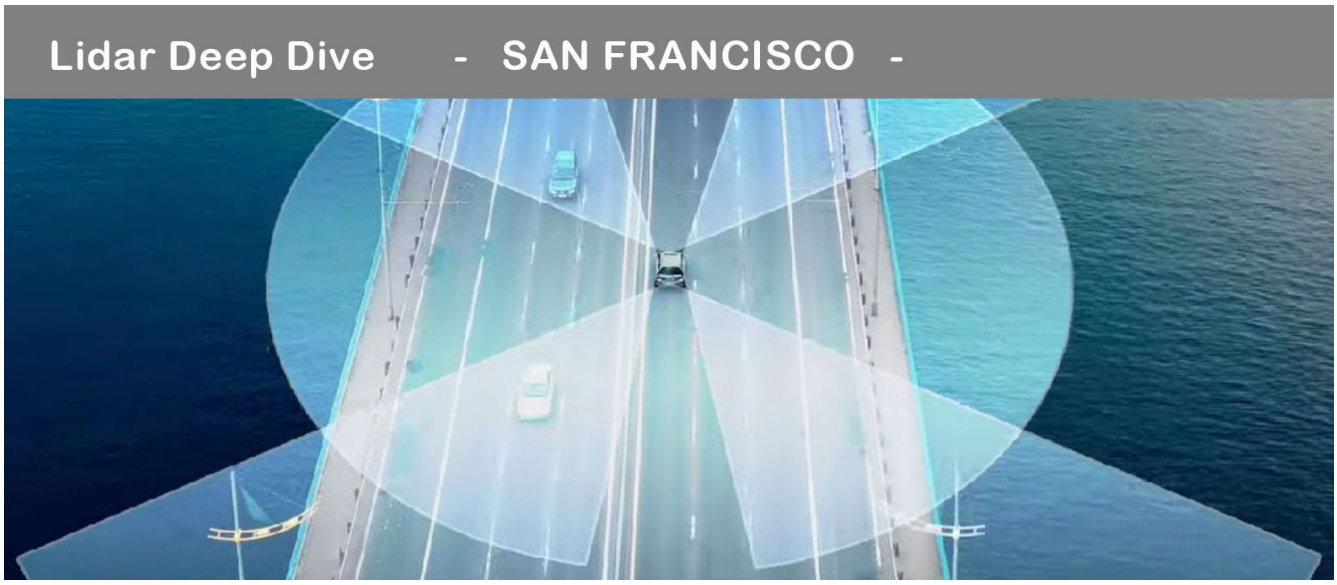
SEPTEMBER 5, 2023



EDITORIAL

Ready for large-scale deployment robotaxis



This month's DVN-Lidar Newsletter brings focus on robotaxis. They're sprouting all over—in China (Toyota + Pony; Didi + Xpeng, Baidu + Geely), and in the USA, where Waymo and Cruise autonomous taxicabs in San Francisco may now operate 24/7 and charge commercial fares. But the same week that came true, Cruise was asked to halve their fleet after another new accident with an emergency vehicle.

In this edition you will also find a special report on the DVN-Lidar Deep Dive 3 in San Francisco, with a focus on FMCW Lidar technology. We bring you coverage of our visit to Koito's lab in Sunnyvale in context of their Cepton investment and cooperation.

In our lidar tech articles you will find an overview of FMCW lidar's applications (Aeva), Lidar's simulation (Robosense / dSpace), software developments (Aeye), and system integration (Hesai / Nvidia and SiLC / Indie).

And we've got the first preliminary docket for the DVN-Lidar conference (29-30 August in Wiesbaden) for you to look over.

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

All best,

Alain Servel

DVN LIDAR ADVISOR

LIDAR BUSINESS

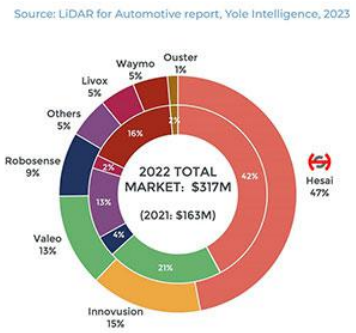
Lidar Business News

China's vehicle outputs and sales in July 2023 (thousand units)

	Jul., 2023	YTD, 2023	MoM change	YoY change	YTD YoY cha
Outputs	2,401	15,650	-6.2%	-2.2%	7.4%
PV	2,115	13,397	-4.7%	-4.3%	6.0%
CV	286	2,253	-16.4%	17.0%	16.9%
Sales	2,387	15,626	-9.0%	-1.4%	7.9%
PV	2,100	13,368	-7.4%	-3.4%	6.7%
CV	287	2,258	-19.0%	16.8%	15.9%

Data source: China Association of Automobile Manufacturers (CAAM)

China's new energy vehicle market remains strong despite the relatively slow sales performance in July. With about 805,000 NEVs made and 780,000 sold in China in the past month, the market jumped 30.6 and 31.6 per cent, year on year. That's a 32.7-per-cent share of the country's total auto sales last month.



Hesai's Q2 2023 revenue reached C¥440.3m (US $60.7m), and they shipped 52,106 lidar units in that period—of which 45,694 units for ADAS. Total ADAS lidar shipments in H1-2023: 73,889 units, more than the whole-year 2022 figure. Hesai has achieved a second consecutive quarter of positive operating cash flow around C¥58.3m (US$8m).

Hesaialso announced their official integration into the Nvidia Omniverse ecosystem. This allows automotive manufacturers and autonomous driving companies to directly access Hesai's high-precision lidar models via Nvidia Drive Sim. They can now obtain physically realistic and highly-simulated sensor data in digital twin environments for research, testing, and validation purposes. DriveWorks SDK offers a comprehensive suite of modules, developer tools, and reference application libraries, serving as the foundation for software development in AVs.

Innoviz Technologies has announced collaboration with BMW Group to develop B-samples of a new lidar platform aimed at the next generation of BMW's automated vehicles. The two companies have started a first phase to develop a lidar-based Minimal Risk Maneuver (MRM) system.

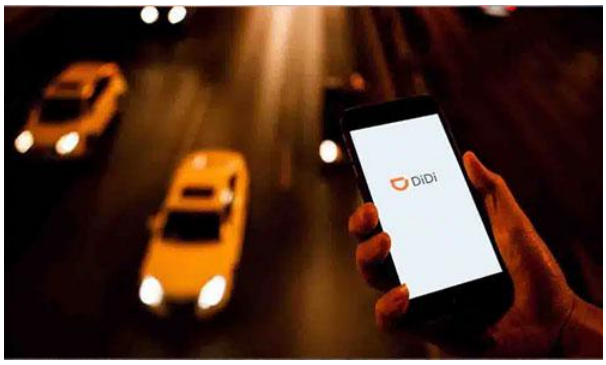
Geely and **Baidu** have launched a premium intelligent automotive technology brand, **Ji Yue**, and launched at top-of-the-line model first. It's called the 01, will be manufactured by Geely, and is set to launch by the end of this year. Baidu will provide smart cockpit expertise and autonomous driving and artificial intelligence technologies. Ji Yue will also build and develop a charging network in China to meet consumer demand. Previously, Geely co-funded the EV joint venture Jidu with Baidu. In June 2022, the brand launched a robot concept car, the first vehicle co-developed by the companies.

Pony.ai, Toyota Motor China, and **GAC Toyota Motor** have established a joint venture to support future mass production and large-scale deployment of autonomous driving taxis (robotaxis). The JV plans for an investment exceeding C¥1bn, and will provide a platform of Toyota's pure electric vehicles, produced by GAC Toyota, for Robotaxi use. These vehicles will be equipped with Toyota's redundant systems capable of fully autonomous driving and integrated with Pony.ai's autonomous driving system.

Mercedes-Benz has unveiled their L^4 Intelligent Park Pilot technology, introducing driverless parking capabilities for the EQE Saloon. This advanced parking feature is operational at Stuttgart Airport's P6 parking garage. This feature has been extended to already-delivered EQS and S-Class models, and there are plans to include it in the upcoming E-Class.

Polestar will introduce **Mobileye**'s Chauffeur™ AV platform-driven autonomous driving technology into the Polestar 4. The 4, equipped with Mobileye SuperVision, is slated for global release in 2024. The vehicle has integrated the Mobileye SuperVision-based advanced driver assistance system from its inception, laying a robust foundation for the progressive evolution of autonomous driving technology within the Polestar 4, when adding additional sensors such as radars and lidar. This will allow Polestar models featuring the Chauffeur system to achieve hands-free and eyes-off autonomous driving capabilities on highways.

Aurora Innovation expects to raise $820m to continue developing and commercializing their autonomous trucks. Aurora plans to use their latest funding to continue developing their self-driving technology toward commercialization. CEO and cofounder Chris Urmson says the new funding "gives us the runway through next year's expected commercial launch and well into 2025". Aurora has partnered with Volvo Trucks, Paccar, and Toyota, as well as hardware-as-a-service provider Continental, Urmson said; he cited FedEx, Uber Freight, Werner, Schneider, and Hirschbach are pilot customers.



XPeng and **DiDi** jointly announced a strategic partnership in smart electric vehicles and related technologies—centered around an A-segment smart electric vehicle, codenamed 'Mona', which will debut as XPeng's flagship product under a new brand, with production planned for 2024. Both companies stand to explore opportunities across various domains, including XPeng's vehicle operations on DiDi's platform, brand marketing, financial insurance services, charging infrastructure development, and Robotaxi deployment.

VW's recent JV with **Xpeng** to build new EVs sets an example for future collaboration between Western and Chinese automakers. The partnership will involve VW sharing their MEB electrical vehicle platform with Xpeng, who will contribute their expertise in autonomous driving and electric motor systems.

Startup **Altos Radar** has raised US $3.5m during a seed funding round. The funding round will enable Altos to mass produce and market their latest 4D imaging radar, the V1. It provides a point cloud with up to 3,000 points per frame at 10 fps, and has a detection capacity of 500 m for cars and 180 m for pedestrians. Altos calls it the world's first production-ready non-FPGA-based, 4-chip cascaded (12TX, 16RX) 4D imaging radar.

DVN-LIDAR DEEP DIVE

Special Report: DVN-Lidar Deep Dive 3

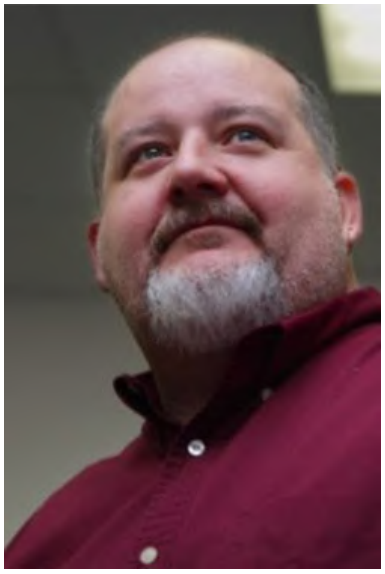
The DVN-Lidar Deep Dive III was held in San Francisco on 30 Aug, with a strong focus on the FMCW technology.

With 26 participants registered, we had a large group of experts from automakers (Ford); lidar suppliers (Valeo, Aeva, Opsys, Moblieye, Koito, Red Creamery); chip makers. All had the opportunity to discuss in small groups, before sharing arguments in the plenary meeting.

Here we bring you a summary of the presentations:

Valeo / Waqas Malik
"Making Autonomous Driving a Reality"

- Lidar enables a wider ODD than traditional L^2 systems
- Point cloud density is a key feature for high performance lidars.
- The 3rd generation of Scala achieves 12.5 million points/s
- The extension of the ODD is the next challenge for L^3 systems including vehicle speed and adverse weather conditions
- Extending the ODD requires multiple sensor technologies (camera, radar, lidar), and redundancy to achieve the safety goal.



Virginia Tech Transportation Institute / Matthew Palmer
"Advanced Research Project about Lidar Congestion"

- The research project is funded by NTHSA, conclusions are expected end of 2024
- The goal is to examine the physics behind Lidar congestion interference and the state of understanding of the automotive industry of lidar congestion, interference, system impact, and mitigation strategies

Siemens / Tom Witsenboer
"Physics Based Raw sensor Simulation"

- Simulation is necessary to develop safe functions for AVs, to validate all the scenarios, including the edge cases that you cannot test with a real car
- Lidar Simulation requires a proper sensor model from the supplier and a good simulation of the environment (a database is necessary to store the reflectivity of the materials)
- Simcenter Prescan enables modelling of the entire pipeline, dynamics of the environment, sensor outputs, technology specific sensor effects, and material properties.

Hamamatsu / Slawomir Piatek
"FMCW – a closer look at the principles of operation and challenges"

- Introduction to the FMCW concept
- Current Automotive Lidar technologies
- Closer look at FMCW
- Examples of Photonic integration
- Expectations for FMCA Lidars

SILC / Ralf Munster
"Enabling Mass Market of FMCW Lidar through Chip Integration"

- FMCW allows a direct detection of moving objects
- FMCW has a longer range than TOF Lidars
- FMCW is not impacted by the sun, has a very low interference risk, and has improved performance in bad weather conditions
- Photonics integration and a SoC approach allows to be cost competitive despite a higher complexity than TOF

Indie semi / Setu Mohta
"Purpose-Build Signal SoC Platforms to Catalyse the Deployment of Coherent Lidars"

- Indie is an automotive fabless semiconductor company supporting all kind of sensor technologies (cameras, radars, lidars)
- FMCW requires 4 to 16 ADC converters and a Purpose-build Silicon that understands Lidar natively and can scale
- Indie SoC integrates Lidar ADC/DACs for Lidar Tx/Rx, 4x Hardware DSP (FFTs), 4 software DSPs, a 32-bits MCU (Arm), CAN-FD, Ethernet
- Indie SoC allows the deployment of competitive FMCW Lidars

Conclusions: the technical discussions between multiple experts and suppliers allowed to have a clear view on the FMCW technology, the pros and cons, and its maturity level. A-Samples are ready at SILC which means the technology could be in 2027-2028 on the market. Test results are required to validate the pros and cons of the technology (benefit of a direct detection of moving objects, but a somewhat lower point density)

INTERVIEW

Interview: DVN-Lidar Visits Koito Lab in Sunnyvale

Viren Merchant
General Manager – New Technology

Ryosuke “Ro” Hara
Project Director of the Research Lab

DVN had the opportunity to visit Koito's laboratory in Sunnyvale, California—a centroid of Silicon Valley. We met with Viren Merchant, General Manager for New Technology and with Ryosuke “Ro” Hara, Project Director in charge of the Silicon Valley Lab.

DVN: Where does Koito stand in the lighting business, as a supplier?

Koito: Koito is a Japanese company, the worldwide leader for Headlamps (20-per-cent market share), with a revenue in 2022 of ¥864bn. The group company of Koito has also a significant activity in Japan for lighting systems related to infrastructure like streetlights, traffic lights, and traffic management systems.

DVN: What are the interest areas for Koito and NAL in Silicon Valley?

Koito: Our focus is the technology contributing to the future mobility society. In particular, we are investigating technologies related to sensing support and communication support. Regarding sensing technologies, it includes radar, lidar and cameras (visible, IR, thermal). Regarding communication, it includes V2X, Lighting and display technologies.

DVN: What does the relationship look like these days among Koito Japan, NAL, and Koito lab?

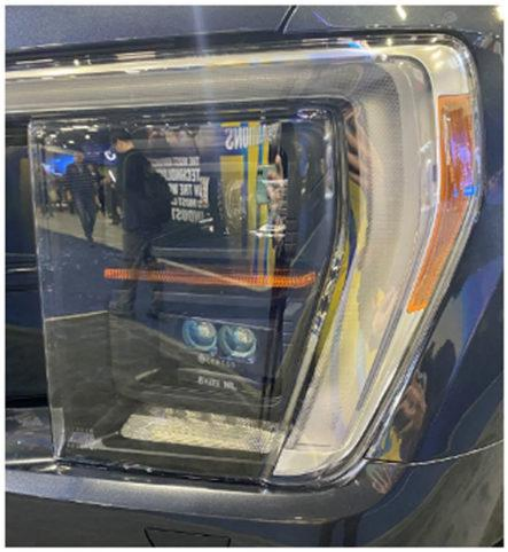
Koito: NAL is a subsidiary of Koito (Japan) and has a lab in the Silicon Valley that researches new technologies.

DVN: What's your approach to startup companies?

Koito: Since 2017 we have aimed to collaborate with startups, including a joint development with Cepton and have done some demonstrations at CES.

DVN: Koito has done several presentations at DVN-Lidar workshops about lidar integration in the headlamp. What's the state of that thinking?

Koito: Automakers and ADAS system suppliers would like to expand the ODD (operational driving domain) using multiple sensing technologies. This will increase the variety of sensors, including lidar, and we assume that mounting locations will become an issue. The integration into lighting systems can be one of the solutions. Also, by integrating sensors with lamps, the risk to spoil the vehicle design can be minimized, and the lamp cleaner can be used to remove dirt. Koito has been doing cleaning systems since the 1970s and has demonstrated a few concepts. The headlight already has cleaning, and the real-estate is already there.



DVN: What can you tell us about Koito's Cepton investment?

Koito: Koito has invested $200m in Cepton so far. Joint development started in 2018, and we are currently providing development support for the market launch and mass production. For mass production Koito is responsible for the final assembly and system validation including functional safety. Koito is the Tier1 dealing with the customer. Tier-1s play a big role in alignment and calibration; many of the smaller lidar players do not have experience doing this.

DVN: Which applications are the most suitable for sensor integration in lamps?

Koito: Our focus is not only passenger cars, but also trucks and robotaxis. Right now, truck and robotaxis are further along for autonomous drive, and are more flexible for sensing integration in lamps.

DVN: What are the challenges faced when putting lidar components into lamps?

Koito: Mounting into the lamps is attractive from a real-estate perspective, but the headlight design is different for each vehicle, so the lidar design has to be optimized for each vehicle. Heat is also a challenge for integration. Alignment for lidar is also more of a challenge than with headlights.

DVN: Do you stick to one technology in your lidar developments?

Koito: We are looking at FMCW and Flash technologies for the future.

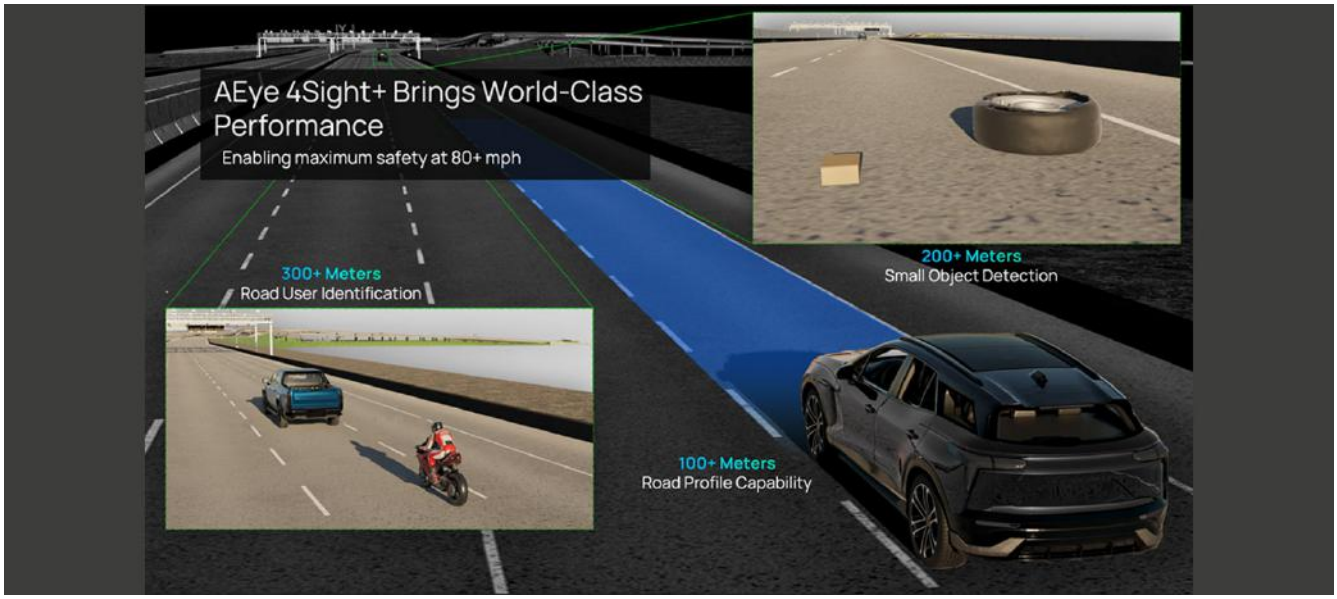
DVN: How do you see lidar technology compared to the other sensing technologies?

Koito: Koito has been working on advanced vision systems e.g. with Bright Way Vision on gated camera systems in bad weather. Lidar is competitive with gated cameras. Nevertheless, we see a need for redundancy between the different sensing technologies to achieve robust applications for autonomous vehicles. We are also looking at sensor fusion technology between lidar, cameras, and other sensors.

DVN: Stephen and Hara-san, thanks so much for talking with us! We hope to see you and your Koito colleagues at our upcoming DVN-Lidar events.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Aeye Tech Expected to Improve Path-Planning, AV Behavior in Traffic



For AEye, software-definable means their lidar settings—object revisit rate, instantaneous (angular) resolution, and classification range—can be tuned or reconfigured on the fly to optimize performance and power consumption, depending on the use case.

AEye's lidar capabilities can be updated or reprogrammed in the field, over the air (OTA), allowing for faster deployment of new features and a quicker path to SaaS (software-as-a-service) revenues. Compared to passive lidar systems that scan with fixed patterns at fixed distances, software definable lidars allow automakers to reconfigure it to their specific and evolving requirements without costly hardware changes.

CEO Matt Fisch says the ability to update the sensor in real-time and over the air will make a difference for automakers designing new electric and software-defined vehicles, saying it allows automakers to "install AEye lidar across a vehicle fleet to enhance basic ADAS (L^1-L^2) functionality, like automatic emergency braking, while refining the algorithms needed to introduce L^3-L^5 features and functionality across all vehicle models over the air, in the future, [reducing] hardware validation costs for OEMs, dramatically reducing time-to-market to introduce new features to consumers".

High-Speed Object Detection

Increasing spatial resolution by 400 per cent is the equivalent of higher-quality image capture, making it easier for vehicles to see smaller objects at high speeds. Similarly, AEye's 20-per-cent range improvement means vehicles can receive more information about the road for path planning, including better prediction capabilities at longer distances.

More resolution and greater range, made possible by new algorithms and calibration techniques, allow for safer driving because the vehicle can see things like bricks and tires from a farther distance (up to 200 meters), allowing more time for decision-making and alleviating the need to "slam on the brakes," Fisch explained. "This is a critical capability for high-speed, hands-free highway driving," he said. "4Sight+ detects road surfaces (asphalt and cement) up to 100 meters at highway speeds, even in direct sunlight and low-light conditions. It also allows vehicles to track vulnerable road users – pedestrians, motorcycles, and other vehicles – up to 300 meters."

Phantom Braking

With 4Sight+, the company aims to help automakers eliminate dangerous nuisances like phantom braking, which is what NHTSA calls it when an AV activates the automatic emergency braking system (AEB) without an actual roadway obstacle. "The problem is that cameras alone and even cameras and radar are not enough to prevent this issue, as shadows, road curvatures, faint lane markings, parked vehicles, and metallic structures can create misleading sensing data with increased false positives and negatives, resulting in unintended braking," Fisch said.

Phantom braking or false positives may be triggered by a variety of conditions depending on the sensor systems employed by the vehicle, explained a NHTSA spokesperson over email. "As driver assistance systems continue to evolve to employ more effective software filtering, multi-sensor designs, and mitigation strategies, false positives have decreased," they wrote.

Addressing Hazardous Vehicle Cut-Ins

Dangerous vehicle cut ins are among the most studied areas in ADAS and autonomous vehicle development and assessment. The landmark 1994 University of Indiana study on traffic safety found that human error was the cause of all lane change or merge crashes. The Indiana researchers concluded that 89 percent of these crashes were due to drivers failing to recognize the hazard. As technologists set about to mitigate cut-in risk with driver-assist applications, researchers in a 2019 SAE technical paper cast doubt on the ability of ADAS and automated vehicle systems to behave as well as humans in cut-in scenarios. Those and other researchers have defined and prioritized normal and dangerous cut-in scenarios to assist in designing and assessing predictive safety applications.

More recently, a 2022 NCAP report revealed that vehicle cut-ins account for 12 per cent of potentially dangerous situations that an autonomous vehicle may encounter during lane keeping on a freeway and ranked the most dangerous scenario as when an automated vehicle's lane is clear, but a vehicle suddenly cuts in from a congested lane—a scenario that requires quick and precise reactions to prevent a collision.

It seems clear that any improvement in predictive safety applications focused on cut-ins can positively affect crash statistics.

DVN comment

Improving the capabilities of a lidar without the need to change the hardware is a key advantage as it avoids the high cost and time related to new hardware development. The driving scenarios in real road situations require punctually different evolution of sensor's performances. The lidar sensor can show its advantages if it could adapt automatically its physical performances (range, resolution, accuracy) to the road context.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Aeva to Provide Autonomous-Train FMCW Lidar for Major European Freight Carrier

Railergy, specialist suppliers of railway system automation technology, has chosen Aeva's Frequency Modulated Continuous Wave (FMCW) 4D Lidar for their automatic train operation suite. Aeva's Aeries II sensors provide critical instant velocity data and high-resolution sensing to identify obstacles preventing the safe passage of autonomous locomotives.

"Aeva's 4D lidar technology has been transformative in enabling safety for our automatic train operation solution," said Jakob Gärtner, Founder at Railergy. "Aeva's technology helps ensure that our solutions are on track to deliver a greener, more efficient rail industry through automation."

Railergy's solution automates trains for shunting applications, where trains are separated, moved, and linked together with new cars, allowing the locomotive to safely operate without a driver or remote control. Additional uses for the solution include main line and last-mile applications, for example in seaports and with freight and mining operations.

Railergy selected Aeva 4D lidar for its unique ability to simultaneously detect precise range and the velocity of small obstacles on and around the rails. Aeva's instant velocity data enables the real-time segmentation of moving and non-moving objects. Velocity data also powers Aeva's Ultra Resolution perception capabilities which provide higher resolution than conventional time of flight lidar sensors. Together, these features enable Railergy to meet use case requirements that could not be achieved using conventional lidar.

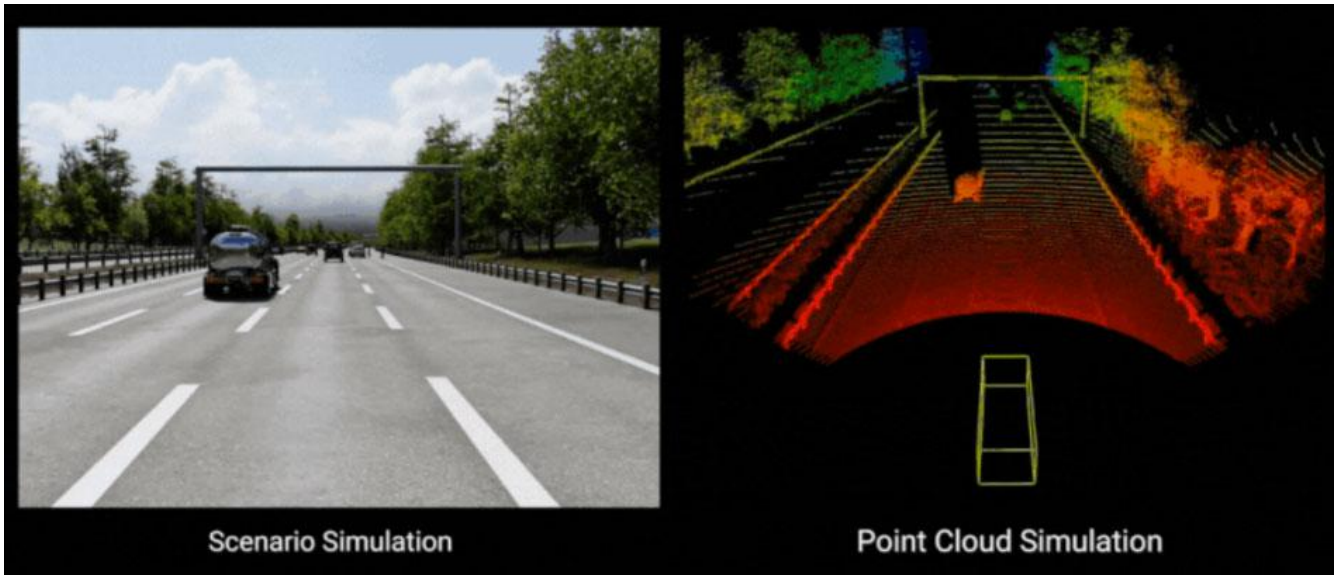
“Railergy is an innovator in the transportation industry, and we are excited to support the development of their automatic train operation solution for customers, starting with one of Europe’s largest cargo train operators,” said Barrs Lang, Vice President of Global Sales at Aeva. “We look forward to working closely with them to scale their solution using our commercially available Aeries II lidar technology to deliver safer and more efficient automated trains.”

DVN comments

The automated management of fret trains in marshalling yards, requires the equipment of locomotives for the peripheral perception of such type of environment. It is particularly required to have an accurate detection of distances and speed between this locomotive and wagons during the docking manoeuvres. FMCW lidars can demonstrate here their advantages through a fast clustering of received point cloud.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Hesai Furthers AV Lidar Integration with Nvidia Drive, Omniverse



Hesai Technology has announced collaboration with Nvidia to integrate Hesai's lidar sensors within the Nvidia Drive and Nvidia Omniverse ecosystems. DriveWorks is the foundation for autonomous vehicle software development and a trusted solution for creating and deploying autonomous driving applications. Developers building on DriveWorks will be able to effectively integrate Hesai's lidar sensors into their vehicles, leading to more efficient and reliable autonomous driving systems. Simulation is a critical component to the sensor integration pipeline. Built on Omniverse, Nvidia Drive Sim is a powerful simulation platform that enables developers to test and validate autonomous driving systems in a physically based virtual environment. With the ability to access Hesai lidar sensor models in Drive Sim, developers can take advantage of enhanced capabilities for simulating real-world lidar data, enabling more robust and accurate testing of autonomous vehicle algorithms.

Hesai's AT128 is an automotive-grade, ultra-high resolution long-range lidar. With 128 independent VCSEL laser transmitters, AT128 is able to achieve 1.53 million data points per second and a detection range of 200 meters. Its ultra-high resolution point cloud is at the forefront of the industry. As of today, Hesai is collaborating with 11 leading automakers on multi-year ADAS contracts, including China's largest NEV manufacturer and leading auto companies. Six makers will start mass production and delivery before the end of this year.

"By combining our expertise in lidar technology with Nvidia's world-class simulation and software development platforms, we can provide developers with invaluable insights and resources for unlocking the full potential of lidar in autonomous driving applications. This announcement marks a significant step forward in advancing the autonomous driving industry," said Bob in den Bosch, SVP of Global Sales at Hesai Technology.

"This collaboration will provide autonomous vehicle developers with seamless tools and flexibility along the AV pipeline," said Glenn Schuster, Senior Director of Sensor Ecosystems at Nvidia. "Together, we aim to push the boundaries of lidar technology and accelerate the deployment of safe and efficient autonomous driving."

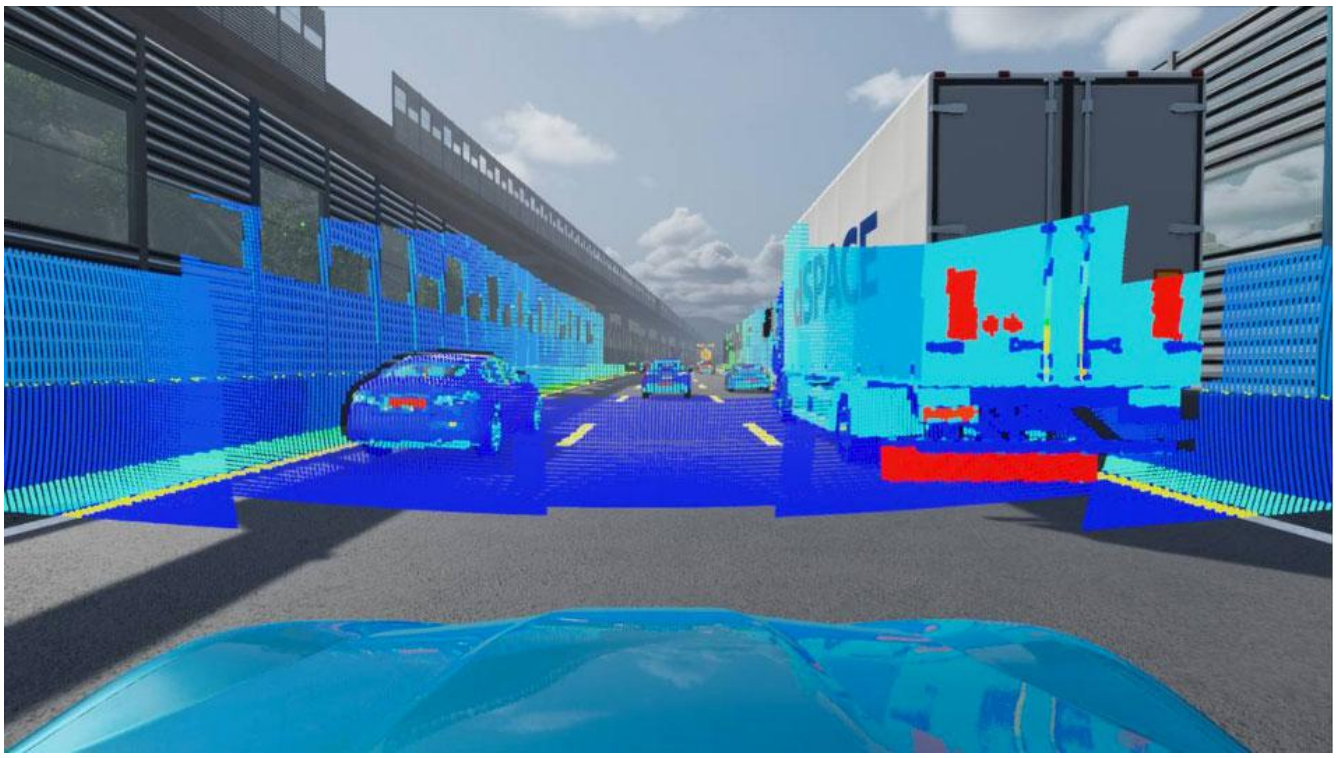
The Nvidia Drive and Omniverse collaboration expands on Hesai's participation in the Nvidia partner ecosystem, which has been ongoing since 2019. The companies will continue to work together to help end-users and OEMs more easily integrate GPU and lidar technology into self-driving vehicles.

DVN comments

Other lidar makers Baraja, Innoviz, Magna and Ouster have still developed their offerings to run on the NVIDIA DRIVE platform to deliver robust performance and flexibility to customers.

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Dspace Puts RoboSense Models in Sensor-Sim, Speeds Lidar Tech Development



Dspace has integrated sensor models from RoboSense into Aurelion, which is Dspace's sensor-simulation solution. The objective of both companies is to accelerate the development, testing, and validation of lidar functions in ADAS and AD applications.

“Sensor models for the most frequently used RoboSense sensors are now already integrated in the Dspace Aurelion sensor simulation solution. The scenarios that can be simulated using this combination extend the testing options and thus reduce costs from the development phase to validation,” explains Dspace Sensor Simulation Product Manager Caius Seiger.

Aurelion can be operated either in the cloud or locally at the user’s premises and generates photo-realistic images for camera simulation in real time. Using ray tracing, realistic raw data is also calculated for radar and lidar. The solution can be implemented in all phases of the development process—for example, software-in-the-loop (SIL) testing, hardware-in-the-loop (HIL) testing, or in parallel validation in the cloud.

After undergoing extensive and rigorous validation of its reliability system, RoboSense's M-Series lidar has gained widespread market adoption worldwide. The M-Series lidar is the first intelligent automotive-grade solid-state lidar to achieve mass production and is also the lidar with the most design wins worldwide. The M-Series lidar, employing MEMS chips and two-dimensional scanning technology, combines high performance, maturity, and reliability advantages, while providing excellent quality perception point clouds. This enables vehicles to enhance their perception capabilities in various complex scenarios and better address corner cases in autonomous driving perception.

By integrating the M-Series lidar, developers of autonomous vehicles can flexibly use high-quality lidar models through the Aurelion platform, which provides synthetic data for perception development, testing, and validation of autonomous driving systems and solutions. As a result, it reduces the training cost for corner cases and accelerates the development, testing, and validation of autonomous vehicles.

Sean Wang, Senior Director of Product at RoboSense, stated, "Through cooperation with Dspace, RoboSense will effectively assist industry partners in deploying and applying lidar-equipped vehicles. We look forward to deepening our collaboration with Dspace, fully leveraging the advantages of lidar technology products, and providing strong support for the development of powerful and safe ADAS and autonomous driving systems in the automotive industry, thereby jointly promoting development in the global automotive and autonomous driving industries."

DVN comments

As was shown by Siemens at the Lidar Deep Dive last week, the integration of simulation tools in the development process, can be essential to avoid thousands of hours on tests tracks or open roads. The challenge is to integrate in the simulated system, an extremely representative model of lidar sensing stages (transmitter and receiver) and road elements (reflectivity).

LIDAR AND IMAGING RADAR TECHNOLOGY NEWS

Indie, SiLC Form Strategic Technology Partnership

Indie Semiconductor, an Autotech solutions innovator, and SiLC Technologies, a leader in silicon photonics innovation, have entered into a lidar partnership that enables coherent detection-based lidar platforms for next-generation sensing applications, including driver assistance, autonomous mobility, robotics and industrial automation. This partnership will deliver fully integrated vision system platforms deploying frequency modulated continuous wave (FMCW) detection, redefining benchmarks for rapidly emerging lidar applications.

FMCW-based lidar delivers multiple real-world benefits compared to direct detection-based Time of Flight (ToF) solutions, including long-range with high precision, interference immunity, per-point instantaneous velocity and motion measurement. This ground-breaking partnership combines award-winning products from Indie and SiLC into reference platforms that enable an order of magnitude improvement in sensing performance, manufacturability, power consumption, form factor and cost relative to competing systems.

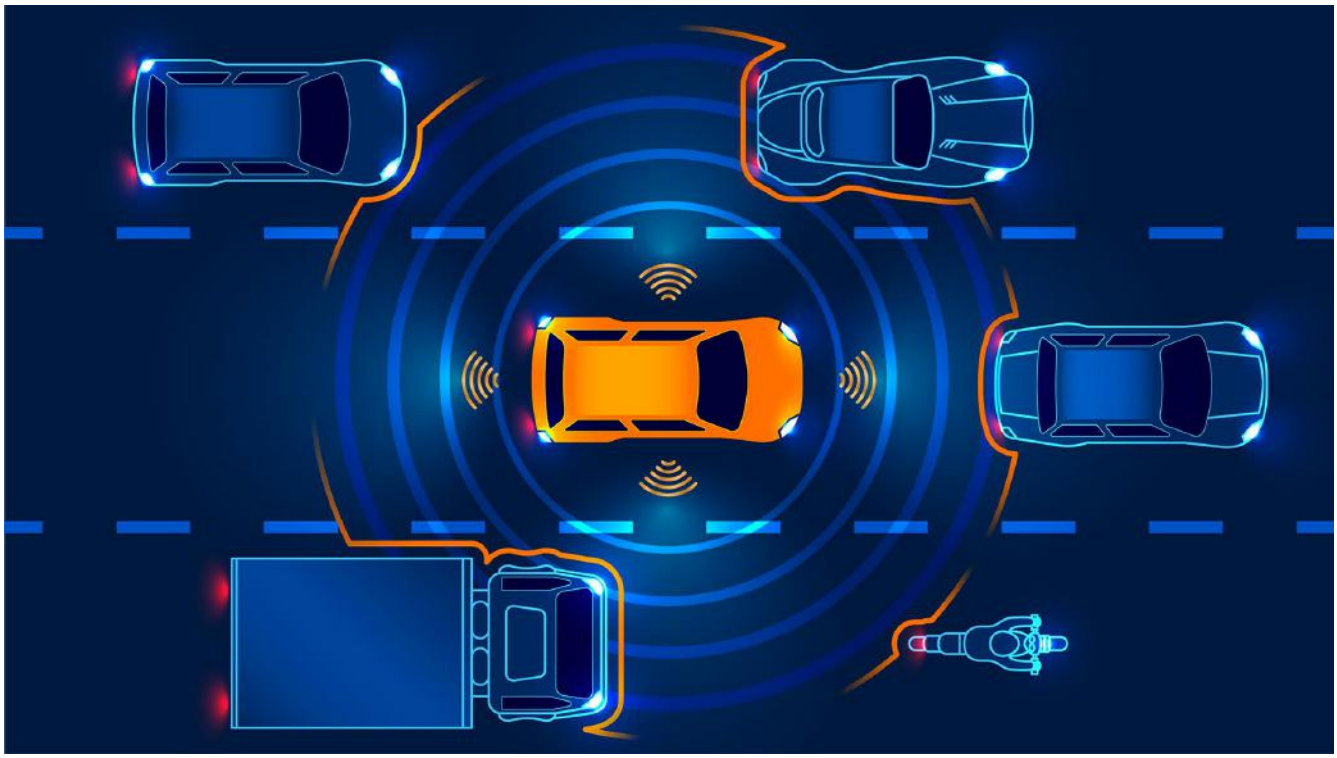
“Indie is excited to partner with SiLC to bring the processing innovation from Surya to FMCW lidar, offering a breakthrough reference design,” said Chet Babla, senior vice president, strategic marketing at indie Semiconductor. “By combining the software-defined high-performance – but low power – analog and digital processing and system control capabilities of Surya™, coupled with SiLC’s Eyeonic™".

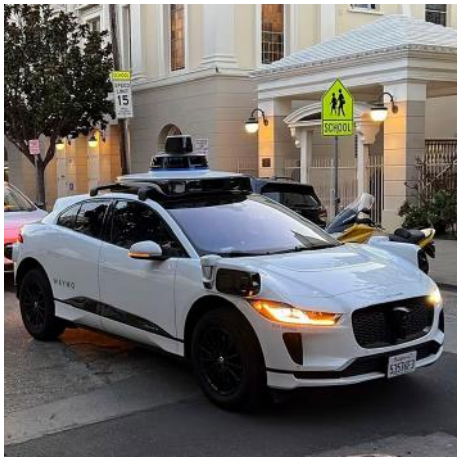
DVN comments

SiLC and Indie participated in the Deep Dive with respective presentations of FMCW on Chip integration and FMCW SoC design.

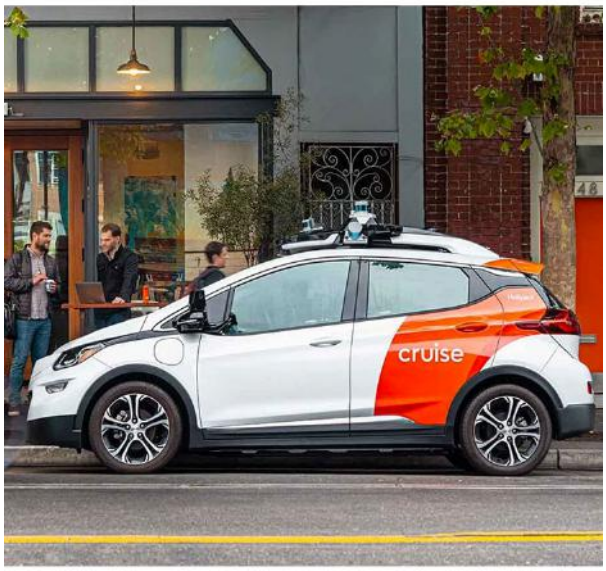
AUTOMATED DRIVING

AD-News





California regulators have loosened robotaxi regulations; **Waymo** and **Cruise** robotaxi services now can operate throughout San Francisco at all hours, despite safety worries spurred by recurring problems with unexpected stops and other erratic behavior that resulted in unmanned vehicles blocking traffic, including emergency vehicles. The state's Public Utilities Commission voted to approve rival services from Cruise and Waymo to operate around-the-clock service.



A fleet of self-driving cars from **Cruise** became stuck in the middle of three San Francisco streets, causing a massive traffic jam. At least several self-driving cars stopped in the middle of the street with their hazard lights blinking. Cruise responded by claiming that a large nearby festival consumed so much network bandwidth that it interrupted the vehicle connectivity. If true, the incident could expose network conditions as a potentially significant weakness for self-driving cars.

The **California** state department of motor vehicles has asked **Cruise** to halve the size of their AV fleet after one of them collided with an emergency vehicle. Cruise has agreed to a 50% reduction and will have no more than 50 driverless vehicles in operation during the day and 150 driverless vehicles in operation at night.
Still in California, San Francisco has started testing an autonomous shuttle service, **Beep**. The free shuttle will run daily (with a human attendant) in a fixed route called the Loop around Treasure Island in the middle of San Francisco Bay. The shuttles are operated by Beep, Florida-based company that has run similar pilot programs in more than a dozen US communities, including service at the Miami Zoo, Mayo Clinic and Yellowstone National Park.

Volkswagen Commercial Vehicles has begun testing a self-driving version of the ID.Buzz electric vehicle with Mobileye Drive technology on two continents. In Munich, Germany, and Austin, Texas, Volkswagen will validate the Mobileye Drive-equipped ID. Buzz vehicles with safety drivers on public roads, towards a goal of series production.

General Motors China has recently obtained an intelligent connected vehicle (ICV) road testing qualification permit in Shanghai, which allows the company to conduct L^4 autonomous road testing within the designated demonstration areas. This road test will be conducted with mass-produced vehicles, which represents a significant milestone in the partnership between GM China and Chinese autonomous driving startup **Momenta**. The initial phase of this road testing is planned for one year.

IM Motors, a JV joining SAIC, Alibaba, and Zhangjiang High Tech, unveiled their 3- to 5-year roadmap for its intelligent driving products, including initiation of the "IM AD City NOA (Navigate on Autopilot)" public beta test, scheduled for this October. The internal testing of the City NOA feature began in April this year and has progressed smoothly, with public testing scheduled to start in October. Besides, the company said the Commuter Mode of the IM AD is expected to rapidly cover over 100 cities nationwide by 2024. By 2025, the IM AD will transition into the Door-to-Door era, which is characterized by all kinds of commuting scenarios. the upcoming LS6, which will debut at the Chengdu Auto Show, will be equipped with the HD-map-free NOA capability across its lineup. It will also introduce an industry-first "one-click scene valet driving" feature, addressing high-frequency pain points in user city commuting scenarios through the IM AD technology.

Hongqi, the premium brand under FAW Group, announced the success of its third-generation L^4 Robotaxi in the autonomous driving road test license examination conducted within the Beijing High-level Automated Driving Demonstration Area (BJHAD). The examination encompassed a comprehensive range of 26 scenarios, including intersection navigation, pedestrian interaction, and vehicle conflict resolution. Impressively, Hongqi's third generation L^4 Robotaxi excelled across all examination domains. The vehicle is installed with 7 solid-state lidar units, 7 cameras, and 5 millimeter-wave radars.

6th Lidar Conference (29-30 November in Wiesbaden): Preliminary Docket

DAY 1 - Wednesday, 29 November (Applications; Ecosystem)

Following speakers are planned & partly tbc.

11:30 Registration and light welcome lunch

13:00 Opening of conference by DVN CEO

Keynote / Day 1:
Innovize / Elaf Hostetter (VP-products & marketing)

13:30-14:45 Session 1: Lidar Applications I
Hyundai Motor, Stellantis, EasyMile, Continental, Valeo

14:45-16:00 Session 2: Lidar Applications II
Torc robotics, Volvo Trucks, EU Commission, ZKW

16:00-16:30 Coffee Break

16:30-17:30 Session 3: Lidar Ecosystem
ACG Wideye, Canatu, Chasm, Fraunhofer

17:30-18:15 Discussion Panel I

18:45-20:00 Social Cocktail

20:00 Welcome Dinner

DAY 2 - Thursday, 30 November (Technology; Use-cases & Testing; Perception SW & Simulation)

Following speakers are planned & partly tbc.

07:30 Breakfast

08:30 Opening of conference.

Keynote/ Day 2:
Hesai / Bob in den Bosch (Sales VP of Global Sales)

09:00-10:15 Session 4: Lidar Technology I
Microvision, Innovusion, Cepton, Opsys

10:15-10:45 Coffee Break

10:45-12:00 Session 5: Lidar Technology II
Hamamatsu, AMS Osram, Vertilite, Elmos, SILC

12:00-14:00 Lunch

14:00-15:15 Session 6: Lidar Use Cases & Testing
Trioptics, Dekra, TÜV, fka GmbH

15:15-16:30 Session 7: Lidar Perception Software & Simulation
Ansys, Siemens, Actasys,

16:30-17:00 Plenary Discussion Panel II

17:00 Closure