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THIRD DVN LIDAR EVENT

CONFERENCE & EXPO

VIRTUAL EVENT ► | 17 NOV. 2020
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Editorial

This DVNewsletter Is Dedicated To Our Lidar Online Exhibitors

In conjunction with the DVN Lidar Conference being held today, we're focussing this Newsletter on the systems, products, components, and findings exhibited in the virtual booths.

This DVNewsletter, exceptionally sent Monday evening/night, presents the benefits for an exhibitor to book a virtual booth, and invites you to visit the lidar exhibitors' booths during the conference on November 17, 2020, and all the entire week after the conference, with a simple click HERE.

At in-person workshops, the kind we all got accustomed to over many years, exhibitions represent a great part of the workshop; attendees physically visit the booths, talk with

exhibitors presenting their products, and leave with a lot of information to be used in later meetings. That's not safe right now in the middle of a pandemic, so we've devised virtual booths to provide almost the same opportunities: visitors can chat, plan F2F meetings with suppliers and customers while getting five benefits:

• The virtual booths offer easily-accessible video and photo galleries, downloadable brochures, and key company contacts;
• The company logo is displayed during conference breaks;
• Every virtual booth is visible for a full week after the day of the event—for attendees and also by the greater DVN audience—thousands of lighting and ADAS professionals;
• Exhibitors' info and highlights are published in the DVNews (today's, for example!).

We have 13 expo booths at the Lidar Conference today. In accord with DVN's core mission, we're making them shown and known. That's why this week's entire DVNewsletter will be exceptionally broadcast to over 3,500 lighting and ADAS experts.

Sincerely yours,

DVN CEO

In Depth Lighting Technology

13 Lidar Exhibitors at DVN e-Conference

As this DVNewsletter is devoted to boosting DVN Lidar Conference exhibitors' showcase efforts, their products, we're bringing you a look at their systems, products, components, software, and capabilities. This signal boost is crucial because lidar activity, while promising, is very young and many lidar community members aren't yet well known—that needs to change, and so here we are.

Valeo's Head of Global Lidar and ADAS R&D Dr. Hassan Moussa says "After the recent announcement of Honda to be officially the first to launch a level-3 autonomous car, and the earlier announcement of Mercedes to target conditional level 3 in the future S-Class, the DVN Lidar Conference is an important occasion to exchange with tier-1s and technology suppliers about the demonstrated importance of lidar as a key enabler of L^3 and above automation, and to share Valeo's view and experience as the main automotive lidar on the automotive market".

Among the exhibitors are a wide array of companies involved in lidar, including:
• Dioptic for development, testing, and validation;
• Insrument Systems for light measurement;
• Lumentum for 3D sensing and lidar application;
• Cepton for lidar solutions;
• Oqmented for MEMs and display solutions;
• Ansys for simulation and validation;
• Ibeo for auto graded lidar systems;
• Ouster for solid state lidar systems;
• LiangDao for testing and validation;

- Xenomatix for miniaturised lidar systems;
- Covestro for innovative materials;
- Auer for optical components;
- IMS for assembly machines and
- System Plus Consulting for their lidar and ADAS teardowns

We don't know when the pandemic will end and allow us once again to make live, face-to-face workshops. But we're not letting that slow us down or stop us; DVN adapts for you.

Driver Assistance News

Cepton's Advanced Lidar and Imaging Technologies

Cepton provide state-of-the-art, intelligent, lidar-based solutions for markets such as autonomous driving, ADAS, intelligent transport systems, smart spaces, and industrial robotics.

Cepton's patented MMT®-based lidar technology enables reliable, scalable, cost-effective solutions that deliver long range, high resolution 3D perception for smart applications.

Founded in 2016 and led by industry veterans with over two decades' collective experience across a wide range of advanced lidar and imaging technologies, Cepton focus on the mass market commercialisation of high performance, high quality lidar solutions. Headquarters is in

San Jose, California, with additional presence in North America, Europe, Japan, and India to serve a fast-growing global customer base.

Dioptic Designs, Develops for Autonomous Driving

Dioptic work to smash the challenges of lidar manufacturing and development across the whole development and supply chain. Their expertise portfolio includes conceptual and optical design of new systems, alignment systems for manufacturing, inspection systems for individual components, and end-of-line inspections. Dioptic are presently developing beam-forming optics and fast lenses with a large field of view to meet customers emerging needs.
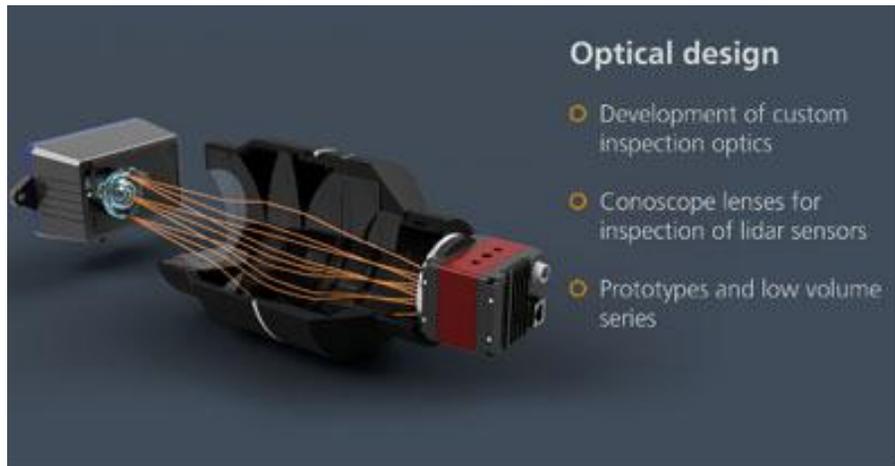
Lidar component and system testing

The quality of lidar systems is the key issue for the successful launch into mass production. In this field, quality comprises factors such as:

• Sensor design, which significantly influences susceptibility to manufacturing tolerances;

• Component consistency; each and every component must meet the given specifications;

• Precise alignment of the individual parts must be guaranteed during sensor assembly, and

• The end of line test ensures that only those systems satisfying the strict requirements are released to market.

Dioptic develop inspection and alignment systems for the latest generation of lidar sensors with high inspection reliability, a large production yield, and product quality boosting the reliability of sensor systems—which will pave the way for more driving comfort and more safety in public transport.

The manufacturing of sensors generally requires a controlled alignment of individual optical components with respect to each other. Dioptic's broad and deep expertise lets them implement assembly systems with optimal coöperation of sensor technology and actuating elements for automated assembly.

Instrument Systems: A Key Component for AV

Instrument Systems

KONICA MINOLTA Group

For over 30 years, Instrument Systems' premium German quality and profound application-oriented expertise in light measurement has been the foundation of the company's speciality in high-quality spectroradiometers, imaging colourimeters, and innovative display measurement systems.

To meet customer and safety requirements for lidar systems, a variety of highly precise, highly accurate optical tests have to be performed at several stages along the production value chain.

Instrument Systems, who specialise in light measurement technology, offer customised solutions for absolutely factory-calibrated and traceable optical measurement results for all lidar production stages. This includes wafer level or chip package characterisation as well as testing of driver modules and integrated lidar.

Testing scenarios range from nanosecond pulse testing of individual laser diodes or VCSEL arrays up to comprehensive far-field radiation pattern analysis of integrated devices. The Instrument Systems VTC 4000 is a camera-based system specially designed for near-field analysis of VCSELs; it enables fast and accurate 2D characterisation of a VCSEL array at wafer or chip level with respect to radiant power, positions, divergence, and peak wavelength for each individual emitter.

And their screen-based VTC 2400 far-field camera analyses the 3D radiant intensity distribution as well as the emission characteristics of a VCSEL array or laser chip. In addition, the far-field emission characteristics of chips or lidar systems can be investigated with LGS- and AMS-series high-performance goniometers. Driving and testing of VCSEL packages with pulse durations down to a single nanosecond is possible with their PVT, which can quantify absolute power, optical spectrum, and LIV (light-current-voltage) characteristics for a large range of pulse durations and duty cycles.

Lumentum: Laser Diodes for 3D Sensing

Laser diodes are a cost-effective way to implement ADAS including long- and short-range lidar, as well as close-range, in-cabin sensing.With standard housing dimensions, high reliability, and excellent performance over extended operating temperatures, Lumentum's VCSEL arrays are ideal for a variety of 3D sensing applications in the consumer, industrial, and automotive industries.

They're available in a broad range of wavelengths, output powers, and architectures custom-tailored to customer requirements. In automotive applications, VCSEL arrays are ideal for short-, medium-, and long-range lidars in ADAS and AD systems.

Next-generation driver monitoring systems and gestural controls for in-cabin applications are made possible by Lumentum's high-power, very reliable 940-nm VCSEL arrays. Other key applications include biometric security and augmented reality, and more.

Oqmented's Advanced MEMS Mirrors

Oqmented are a deep-tech startup with a remarkably advanced product range of secure, reliable, and scalable 1D and 2D MEMS mirror and laser scanning technologies, such as their unique Bubble MEMS.
By combining their sophisticated MEMS mirror with proprietary electronics and software, they offer a steerable chip, completely adaptable to customer needs.

Oqmented MEMS scanners achieve the highest performance in terms of field of view, device size, durability, energy consumption, sensing, and resolution. Customers include technology, automotive and optics companies who choose Oqmented to power their AR, robotics, and 3D camera applications.

Ansys: Comprehensive ADAS Simulation and Software

Autonomous technology mustn't be deployed on land, at sea or in air without having proven safe, which could require massive, costly testing if ADAS, AD systems, or urban air mobility vehicle were to be tested under millions of possible operating scenarios. A prototype autonomous vehicle would have to be driven billions of kilometres while keeping ahead of the competition. That's just not practicable; simulation is the only realistic answer and Ansys Autonomy is the industry's most comprehensive simulation solution for ensuring the safety of autonomous technology.

Ansys Autonomy can simulate all sensor types—lidars, cameras, and radars—to accurately predict installed-on-vehicle performance. It can perform hazard and operability analysis; fault tree analysis; failure modes and effects analysis; failure modes, effects and diagnostic analysis for functional safety assessment and target of evaluation modeling; threat assessment and remediation analysis, and attack tree analysis for cybersecurity evaluation. Thus, it is a powerful tool to slash time-to-certification and halve embedded software development costs, with simulation and automatic generation of ISO 26262-qualified code.

Scenario validation:
Rapidly test vehicles under millions of driving scenarios, spanning complex real-world traffic, pedestrian, weather, and lighting conditions.

Systems integration:
Simulate control algorithms, human-machine interfaces, vehicle dynamics, etc, from chip to system level to ensure the reliability and safety of the vehicle.

Ibeo's Solid State Lidar—Now Available

IbeoNEXT is Ibeo's new 4D sensor system, and its modular design is unique on the lidar market: depending on the application, different lenses can be selected. By using several sensors and fusing the data in a software package running on the ECU, 360-degree detection can be achieved of the environment around the vehicle. The ibeoNEXT Generic Solid State lidar can be used for automotive applications from traffic jam assistants to autonomous driving. There are also possible applications in the industrial sector.

The production site in Brest, France was set up in collaboration with partner ZF Autocruise. This has already resulted in a very high degree of readiness for serial production (70% - 90%).

Ibeo have always been a pioneer; on foundation in 1998, they were one of the first companies worldwide to take up development of lidar sensors for automotive applications. Today, there are more than 400 Ibeo employees at locations in Hamburg (Germany), Eindhoven (Netherlands), and Detroit (USA); establishment of a subsidiary in China is under way. Since 2016, automotive supplier ZF Friedrichshafen have held a 40 per cent share in Ibeo. In 2018, Ibeo celebrated their 20th anniversary. In 2020, Ibeo became the world's first series supplier of solid-state lidar for China's largest SUV and pick-up truck manufacturer, Great Wall Motor.

Ouster: Highest Resolution Sensors

Ouster make high-resolution lidar sensors for autonomous vehicles, robotics, heavy industry, and smart infrastructure—and they have the highest resolution sensor for nearly every use case, from long range to wide field of view.

This is a digital lidar. It dramatically simplifies lidar from thousands of analog components to two silicon CMOS chips, two lenses, and a handful of other components. This simpler architecture makes Ouster sensors more reliable, less expensive, and ultimately a better fit for commercial scale applications.

OUSTER OS2—A CES 2020 INNOVATION AWARD WINNER

The OS1 family of sensors provides a field of view up to 45 degrees vertically and medium range of up to 120 metres. For long range, the OS2 (photo) has a range over 200 metres and a narrower field of view—22.5 degrees—to give more beam density on targets at range. And the new OS0 sensor has a 90-degree field of view for an ultra-wide view without multiple sensors.

LiangDao: Better and More Reliable Performance

LiangDao are a global company with locations in Beijing and Munich, an R&D centre in Berlin, a business centre in Shanghai, and an engineering centre in Hebei Province. Most of the members of the technical team and the management board have rich experience in German automakers, tier-1s, or well-known frontier R&D institutions. The company have established in-depth coöperation with companies with core autonomous driving technologies such as Great Wall Motor, Volkswagen Group, Ibeo, Ouster, Paravan, Innovusion, Nvidia, and more.

With LiangDao's roadside sensing solution, the new solid-state lidar can be adapted with better and more reliable performance to achieve uninterrupted operation of roadside units. Installations can be customised according to the needs of any particular commercial application, with quick response service of professional engineering, algorithm, and software teams and the support of the in-depth application development of coöperative onboard perception systems. In addition, LiangDao can provide testing and validation services for mass production projects of ADAS and autonomous driving products. They offer prompt testing of sensor algorithms to ensure the timely progress and release of products.

Xenomatix: Performant Solid-State Lidar

Xenomatix have developed performant and reliable true solid state lidar sensors suitable for highly demanding ADAS and AD applications from L^3 up to L^5. They use artificial intelligence to generate highly accurate and high resolution measurements.

Xenomatix sensors features include:

• A built-in camera generating high-density 3D data and 2D images;
• Multi-beam approach;
• Solid state (no moving parts), and
• Excellent scalability and affordability on strength of clever chip technology

Designed to satisfy a range of automotive and industrial applications, including safety and comfort, robotaxis and AGVs, Xenomatix's lidars are also suitable for road construction, maintenance, and surveying applications.

Xenomatix have employees in Belgium, Germany, USA, and China, as well as a solid distribution network in Asia. Other partners and customers include AGC, Marelli-Automotive Lighting, Siemens, Cosworth, Septentrio, Belgian Road Research Centre.
In 2020, Xenomatix has obtained ISO 9001:2015 certification, demonstrating their commitment to safety, quality management, and rigourous validation processes.

Covestro: Polycarbonate Specialists Par Excellence

Covestro are the world's largest supplier of polycarbonate, addressing pressing challenges and developing high-tech solutions used in many areas of daily life. Covestro serve a range of applications in the automotive industry including interior and exterior elements, lighting, seating, ePowertrain and electric vehicle battery (EVB) packaging, using dedicated raw materials for coatings and adhesives, thermoplastics, foams, films, composites and more.

Polycarbonates reduce weight while enabling greater design freedom in front grilles. In roof spoilers, polycarbonates enable good signal reception and transmission for integrated sensors, cameras, and antennas. Polycarbonate materials provide dimensional stability and durability over a wide temperature range.

EVs are creating new design possibilities for front grilles, such as the transformation from open grilles to closed grilles and the integration of signature light, 3D patterns and colour effects using transparent and impact-resistant polycarbonate.

Dynamic light and display integration come together in Covestro front grille demo: a seamless polycarbonate grille with a metallised 3D rear structure and rear projection technology. A second prototype utilizes Makrolon® AG2677 ST polycarbonate for seamless lidar integration into exterior parts with silver-printed black Makrofol® film. To incorporate functionalised films into the design, Covestro developed 5D film insert moulding technology, which combines rear 3D structures with colour and decoration.

Emerging automotive technologies also create a demand for new ways to incorporate styling and connectivity into traditional body components. Covestro delivered the ultimate combination of look and function with their next-generation roof spoiler concept, which integrates sensors, cameras and lighting elements for enhanced safety and unlimited design opportunities.

Auer: Overall Efficiency of the System

Auer Lighting are an IATF 16949 certified global supplier of optical components for the automotive industry, also providing highly complex coatings for lidar systems.

Auer's metallic and dichroic thin film designs are widely used in the automotive and optoelectronics industry. Coatings on inner and outer surfaces of glass and polymer substrates in flat or 3D shape, e.g. glass tubes, are Auer's daily business; their customers value these solutions for their reliability, consistency, and affordability over large quantities and cost efficiency.

To minimise high scattering losses in the light path, Auer Lighting's optical components are enhanced with an anti-reflective coating optimised for laser wavelengths. Multilayer coatings from Auer Lighting are designed for high incidence angles and achieve a residual reflection less than 0.5%. This significantly increases the overall efficiency of the system and thus the safety for collision avoidance.

As an extra plus to the optical advantages, lidar AR-thin films from Auer Lighting offer the components additional protection against accelerated aging due to chemical and thermal environmental influences.

System Plus Consulting : ADAS teardowns

System Plus Consulting's Teardowns uncover innovative design features and new semiconductor components to guide enterprises toward more streamlined solutions in future designs. S+C provide clients unmatched intelligence into ADAS sensors, camera, radar, and lidar, as well as infotainment equipments. Teardown reports include pinpoint power measurements, detailed parts lists, BOM, block diagrams, x-rays, and high-resolutions photos. Each step of the teardown process is carefully documented by S+C experts to present detailed insights into component parts and costs, as well as chip system functionality. And, System Plus Consulting web-based format allows clients to access immediate updates of Teardowns, as analysis progresses.

System Plus Consulting is a Yole Developpement company. Yole have developed a unique understanding of technologies covering Photonics, Imaging, Lighting, Power Electronics, Compound Semiconductors & Emerging Materials, Display, Semiconductor Manufacturing, Compound Semiconductors & Substrates: SiC, sapphire, GaN, AlN, ZnO, SOI, GaAs…, RF Devices & Technologies, Sensing & Actuating, Semiconductor Packaging and Substrates, Batteries & Energy Management, Memory, Software & Computing

IMS : High-accuracy production systems

IMS (Integrated Mechanization Solutions), based in Almelo, Netherlands, develop and supply high-accuracy production systems. They wield particular expertise in building automated assembly lines and process automation for small, complex products and assemblies; IMS feel comfortable in the sub-micron range. The typical customer is an automaker or a tier-1 supplier in automotive, medical, photonics, and smart devices.

IMS serve with 20 years' experience in processes like gluing, cleaning, curing, active alignment, testing, laser processing (welding, cutting, engraving…), and pressing. Customers' production facilities worldwide can be readily served by IMS.

Application: Lidar
Automated manufacturing of lidar great expertise in active alignment of products including optics. The quality of the assembly, based on this active alignment, contributes to the quality of the complete lidar system.

Application: Light Modules
The newest headlamps need the newest light modules, so the industry needs the newest assembly technology. IMS develops and builds automated assembly lines for matrix, microLED, and DMD light modules.

Application: Camera
IMS developed their own 6 Degrees Of Freedom Active Aligning station (6DOF - AA). This is not meant as a standalone station, but forms a key station in their balanced assembly line concept called AION for true one-stop shopping. Furthermore, IMS have a new patent-pending way to split the alignment step from the curing step—this allows for much shorter cycle times and can widen the options in glue types, for example.

Application: Camera Lenses
Hundreds of million of camera lenses are already assembled on assembly machines from IMS; they know how to assemble lenses in high volume. Their core technology in this application is based on optical alignment or active alignment, with quality checks based on (p.e.) MTF per lens or per objective.