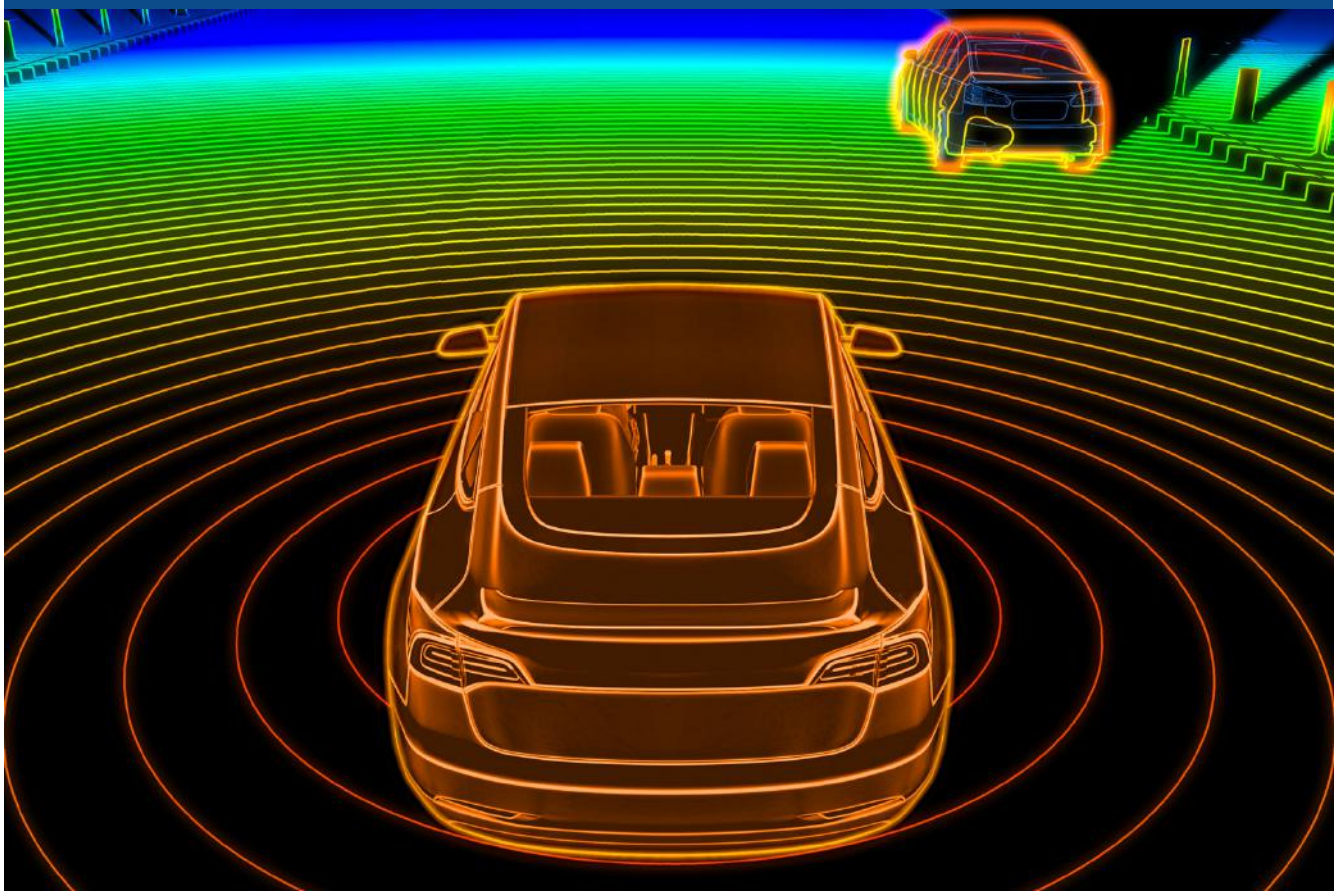
DVN
Lidar

Monthly newsletter #2

MAY 4, 2022



The DVN Lidar Community is evolving further

Editorial May 2022

In this second newsletter we will continue our trip among members of the DVN Lidar community by a view in one of the major car manufacturers in the world. This new automotive actor named Stellantis is the result of FCA and PSA groups merging in January 2021. Now Stellantis produces 14 brands worldwide. Stellantis announced end of 2021 that it will roll out hands-free Level 3 autonomous driving capability within its cars starting in 2024. Like other car manufacturers, the two founding groups of Stellantis have a long experience on prototyping Automated Driving vehicles. Therefore we are proud to have arranged an interview with Vincent Abadie, VP and Senior Expert at Stellantis.

Please read the interview carefully and with pleasure, and in my point of view a clear message is irradiated :

“Without Lidar no L3/L4/L5 autonomous driving will happen !! “

Of course, still a number of hurdles for lidar sensors to reach real automotive mass application have to be overcome. Therefore DVN within our Lidar Community is engaged to facilitate this process by our workshops and think tanks.

As already announced partly and in line with our ambition to create a broad lidar community, we are launching our second DVN Think Tank on May 30/31 in Frankfurt-Sulzbach again. Please find more information and the agenda in the section about DVN events, if you do not have them received already about other DVN – Mailings.

So, again, welcome in this Lidar community and enjoy the May newsletter edition.

Alain Servel

DVN LIDAR ADVISOR
FORMERLY WITH PSA GROUP

Interview with Vincent Abadie, VP & Senior Expert at Stellantis

Most OEMs expect the need for using lidar systems as additional ADAS sensors in their next generations of automated driving vehicles. DVN Lidar had the opportunity to talk to Vincent Abadie, Vice President and Senior Expert ADAS and Autonomous Driving at Stellantis(see photo). The interview comprises general questions on lidar sensors as well as diving into specific experiences at Stellantis as well as future plans on ADAS and AV vehicles.

DVN: The lidar is known to provide driver assistance systems with a finer perception of the vehicle environment. Did you acquire such feedback along your phase advance and developments?

Vincent Abadie: We use lidar for a long time for innovation & advanced Eng. Purposes. We have several prototypes for autonomous driving which are equipped with Lidar such as Valeo Scala, IBEO, Velodyne, Sick or Ouster. Lidar is planned to be applied in future L3 program in next years.

DVN: For what type of ADAS function would you prefer lidar over other technologies?

Vincent Abadie: Lidar is fundamental for L3 and L4 features. It provides redundancies to radar and cameras, for obstacle detection, free space evaluation and also for mapping allowing localisation.

DVN: What are the advantages of Lidars for you?

V.A.: The advantage is the high accuracy of obstacles perception, and false positive rate which is very low especially for free space and driveable space. Also, Lidar can provide high accuracy for mapping. Lidar is sensitive to bad weather condition but can self-diagnose.

DVN: What are their limitations and constraints?

V.A.: Bad weather, and some difficulties to manage classification and segmentation in complex situations = boundaries and classification of objects are not an easy task!

DVN: In terms of physical integration, do you have defined favourite solutions and locations in the vehicle?

V.A.: Lidar integration is not easy especially on the front of the vehicle. With electric vehicle constrains are less important because air cooling of engine is not required anymore. Anyway, lidar cannot be hidden which is a constraint for design of vehicles. Integration in lighting or behind the windshield must be explored.

DVN: Is this sensor in your ADAS / AD roadmap for the next five years?

V.A.: Yes, definitely for L3/L4 applications

DVN: What sort of Lidar, Long range or short range?

V.A.: At first, 100/150 m range is sufficient. For 2030 SOP long range will have to be considered

DVN: DVN has created a new Lidar community, what would you expect from this community?

V.A.: To give some highlight on future lidar technologies = performances, physical principles (solid states etc…) and cost.

DVN: Elon Musk is in opposition against lidar and even plans to remove some radar from Tesla vehicles. What is your opinion?

V.A.: I will not comment competitors' point of view which we respect. As Stellantis, we consider that technology complementarity is a significant pillar for ADAS & AD to guarantee safety for improving false positive / negative management which is key for safety.

DVN: Do you have preferences in tems of LiDAR technologies (905nm vs 1,550nm, solid state) and what is your view on Valeo SCALA technology?

V.A.: Solid state seems to be not mature enough at short term. 1550nm has some advantages, but tehcnology needs also to be proven. At this time technologies with moving mirrors such as Scala are the most mature ones.

DVN: Thank you Vincent to have outlined your opinion about status of automotive lidar sensor applications in general and you also have given a glance on lidar developments at Stellantis. We are honoured to have had this interesting interview with you and we make an appointment with you for the release of the first L3 AD vehicle produced by Stellantis.

DVN Take-Aways from this interview

Stellantis as a leading carmaker considers lidar as a fundamental sensor for L3/L4 autonomous driving applications. Lidar system applications are clearly in the roadmap for L3/L4 vehicles at Stellantis in the next five years.

A key technology element of lidar systems is the superior low failure rate of false-positive and false-negative detections compared to other sensors. Also the self-diagnosis of lidar sensors and accuracy of vehicle location are an advantage. Therefore lidar, camera and radar are complemental technologies necessary for L3/L4.

A critical point under investigation is the location of lidar sensors, especially if we expect several sensors in future vehicles. Integration behind the windshield and integration into lighting devices are viable options.

Nissan ProPilot with Lidar Sensors will enable high speed AVs in the mid 2020s

Nissan announces a next generation lidar based system that will let vehicles execute high-speed emergency manoeuvres without any intervention of the driver. This ADAS will be proposed in the mid-2020s and is designed to host lidar safety technology by the end of the decade.

Nissan engineers have demonstrated a prototype in April. A Skyline sedan equipped with the new system has successfully avoided other vehicles, rolling tires, road debris and has stopped for mannequins darting into the road. The speeding Skyline was able to perform the safety manoeuvres all while cruising at clip of up to 100 km/h, even with no human driver controlling the car (see picture)

The system also has a lidar function that enables the car to self-navigate in areas where there are no clearly defined maps or road markings. This uses a Dynamic SLAM, short for Simultaneous Localization and Mapping.

Tetsuya Iijima the general manager in charge of driver-assist technologies at Nissan, said that no other manufacturer had developed such lidar-based technology capable of such high-speed reactivity. Current competitors provide systems that cover only routine driving under predictable conditions, said Mr Iijima.

The technology, which builds on Nissan's ProPilot autonomous driving technology, is key to achieving a "secure autonomous driving" that can stop a car in any situation, Iijima said.

Nissan demonstrated the technology at speeds ranging between 60 and 100 km/h. But the technology is ready to handle vehicles going as fast as 130 km/h, Iijima said.

The lidar system is being developed with Luminar Technologies, which Nissan touted for its advanced laser sensor know-how and rapid development plans.

The lidar sensor increases the vertical field of view to above 25°, from around 10° in today's lidar. It increases the detection range to 300m ahead of the vehicle, compared with around 100m to 150m in current systems. And it delivers higher resolutions, to a level as detailed as 0.05°, from around 0.1° of resolution.

Nissan has sold more than 1 million vehicles with ProPilot globally. And the company wants to expand ProPilot technology to more than 2.5 million Nissan and Infiniti vehicles by around 2026.

Lidar integration is still expensive today, one sensor can run as high as $1,000, Iijima said. To go mainstream, the price tag must come down less than $300, he reckoned. But costs will drop fast, he predicted, noting that radar systems cost more than $1,000 when they debuted 25 years ago and now go for less than $100.

But Nissan says that lidar is a must-have technology. "Nissan aims for Level 3, but to do that, we want to perfect these emergency maneuvers first," Iijima said. "Secure and safe autonomous driving must have this technology."

Note from DVN

Propilot technology is provided in Europe by Nissan / Infinity since 2017, this Level 2 Automated Driving system will evolute towards Level 3 with the next Propilot 2, thanks to the integration of a high-resolution Lidar. This decision reinforces the fact that OEMs think that a Level 3 AD vehicle cannot be reasonably proposed without any frontal Lidar. This technology is indeed the only one capable of detecting small potentially dangerous objects on the road, when other sensors could ignore it.

In view of this challenging news, DVN Lidar is targeting an interview with Tetsuya Iijima about his vision on autonomous driving technology development and market implementation for our next newsletter.

AEye announced the opening of its European office in Munich, Germany

This new location allows AEye to support locally its current and potential customers in Europe on different markets like automotive, mobility, trucks, logistics and smart infrastructure.

“We’ve experienced strong demand and traction in Europe across application segments, necessitating an on-the-ground physical presence to support AEye’s growing customer base,” said Bernd Reichert, senior vice president of Automotive for AEye. Simultaneously he introduced Andreas Prinz (see photo) as responsible for the new activity : “The new office will be led by Andreas Prinz, who has not only deep industry experience, but a long track record of successfully building and optimizing the performance of teams in various markets.”

Andreas Prinz comes to AEye with more than two decades of experience in automotive software. In the past, he held director roles at both Magna Electronics and Harman, as well as various engineering roles at companies such as Continental Automotive Systems and Motorola and just before this nomination he was director of customer programs for TTTech Auto in Munich.

AEye is distinguished by the fact that it offers software-defined lidar solution for advanced driver-assistance, vehicle autonomy, smart infrastructure, logistics and off-highway applications. AEye's 4Sight™ Intelligent Sensing Platform, with its adaptive sensor-based operating system delivers faster, more accurate, and reliable information. AEye's 4Sight™ products, built on this platform, are ideal for dynamic applications which require precise measurement imaging to ensure safety and performance.

AEye will have now a global presence through its offices in Germany, Japan, Korea and the United States. The AEye Germany office is located now at 88 North Riesstrasse 16, in Munich.

Interview with Bernd Reichert, Senior Vice President of Automotive for AEye

On the occasion of AEye opening the European office in Munich recently, DVN Lidar had the opportunity to interview Bernd Reichert, Senior Vice President of Automotive at AEye. Due to the intensive discussion and insights from the interview, DVN Lidar decided to split it into two sections. The first part of the interview is published in this newsletter, a next section will follow in the DVN Lidar June newsletter.

DVN: Bernd, thank you for making yourself available for this interview. First of all, congratulations on opening your new European office in Munich in combination with hiring experienced staff. Also, in 2021 AEye opened offices in Korea and Japan, supporting its global ambition. How important is the European automotive market for AEye compared to the North American and the Asian markets?

BR: Opening AEye's Munich office is an important milestone for us and demonstrates our commitment to growth and our clients in Europe.

There are major differences in the different markets we serve. In North America, we see a much higher number of start-ups, new mobility players, and EV/AV makers coming up beside the traditional "Big 3" in automotive. Technology hubs on the West Coast of the United States heavily fuel North America's contributions to the self-driving industry. Without a doubt, California is the American center of gravity for AV technology. Waymo and Cruise have long been testing their versions of AVs in California. OEMs such as Ford and GM have also been present on the self-driving scene. Arizona is another key player in the AV industry, especially for commercial vehicles.

The challenge in North America is that there is a patchwork of different approaches across states and regions. In contrast, the European Union has recognized the benefits that AVs can provide. The EU is leading the way to ensure cooperation at a regional level among all stakeholders, creating a favorable environment for AV development. The European Union, with its strongly centralized regulations, is an attractive market for AV development. While consistent regulations may not be in place in North America, American technology companies have been innovating in this space since the very beginning. AVs are already in Europe, promising a wave of efficiency that will transform the transportation industry.

Asia is expected to have the largest market share by 2030. We see an increasing request for efficient, convenient and safe driving, enabled by growing income in emerging countries and safety regulations. China is at the forefront, where companies like Baidu have already collected millions of kilometers of real road experience in megacities.

China is the biggest automotive market for industrialization and infrastructure, creating massive revenue opportunities for car manufacturers. Technical competencies in hardware and software have developed quickly in China and are driving this fast development from ADAS Level 2+ toward self-driving cars.

AEye's new location in Munich supports our current and prospective customers in the region across all addressable markets. This includes automotive, mobility, trucking, logistics, and smart infrastructure. We've experienced strong demand and traction in Europe across application segments, necessitating an on-the-ground physical presence to support our growing customer base.

DVN: With respect to the European automotive lidar ecosystem, will AEye focus on OEMs or Tier 1 suppliers as your main customer base or both? How do you plan to manage sometimes occurring contradictory interests and requirements?

BR: AEye has a unique business model that is not capital intensive. We license our design to our Tier 1 partners, who are responsible for the final product, its industrialization, and the commercial relationship with the customers. We don't see ourselves as a classical Tier 2 but as a "Tier 1.5" because we promote our technology directly to the OEMs. The conflict you mention might come up in the case of Tier 1 suppliers following a systematic approach where a lidar sensor might compete with other sensor technologies. However, we see that very rarely because the industry understands that lidar not only provides advantages for L3/L4 Autonomous Driving (where lidar is mandatory) but also for improved L2+ ADAS performance.

As you may know, we have a very close relationship with Continental, which uses AEye's technology. Continental has a long history in this industry, utilizing 20M lidar sensors and 150M radar sensors throughout almost all of its vehicle manufacturers and brands. Together, we have a profound understanding of the autonomous mobility industry. Many key players in the industry recognize the uniqueness of our technology. We have a strong sales and business development network with people knowledgeable about OEMs and Tier 1 suppliers.

DVN: What does the relationship look like between AEye and some of the more interesting European Tier 2/3 suppliers in the marketplace, and how do you evaluate the EU's progress in autonomy and mobility?

BR: AEye views the EU supplier ecosystem as extremely valuable and naturally synergistic with the core functionality of our software-defined sensor. To reap the benefits of integrating any given technology supplier, AEye's sensor can be configured to be triggered by a third-party sensor modality, in turn positively influencing our sensor's selection of the correct deterministic scanning mode for a given scenario - whether that's in city environments, at highway speeds, in inclement weather, and so on.

Europe’s ecosystem of suppliers is full of strong technical expertise that is growing, which is apparent when you consider, for instance, Germany’s commitment to leadership and autonomous and connected driving through research and development programs. Its new Act on Autonomous Driving established the regulatory framework for autonomous vehicles (L4) to operate regularly on public roads in determined operational areas. Some examples include shuttle services from point A to point B, buses operating on an established route, hub-to-hub services (e.g., between two distribution centers), automated valet parking, and the transport of people or goods.

Note from DVN

The news and even more the interview reveal and reiterate in our view four important key messages about autonomous driving and thus also lidar :

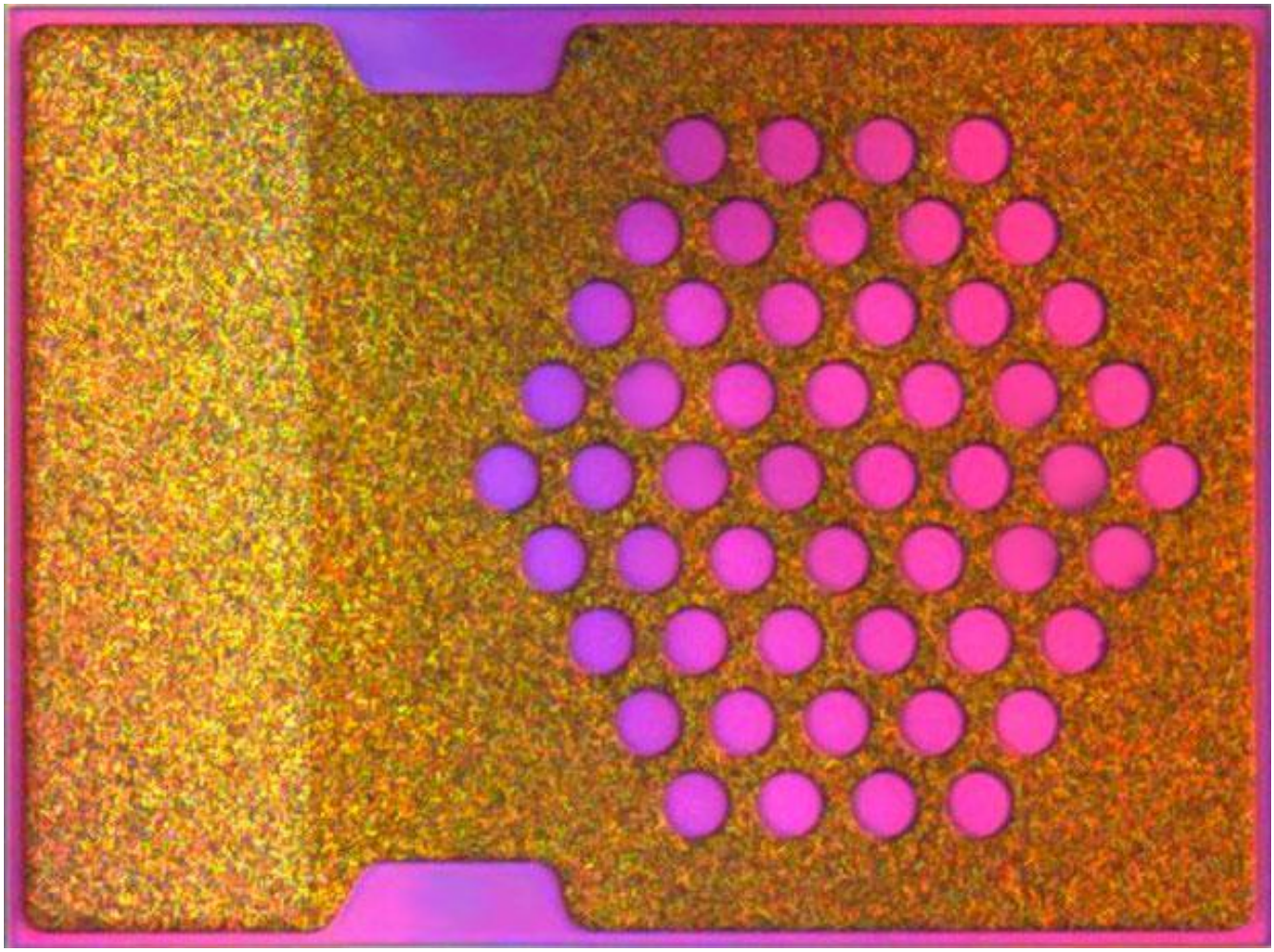
North America has a big and powerful ecosystem with respect to developing and introducing AVs. California is a hub for passenger cars and Arizona for heavy trucks. An obstacle for broad implementation are contradicting state laws, “ a patchwork”.

Europe has a more unified approach about regulations, but is lagging behind in the push from industry to make AVs happen. On the other hand Europe has on T1/2/3 level a lot of competencies to offer especially with respect to hardware.

Asia and especially China are most advanced in AV technology and due to their traffic conditions the drivers can benefit most. Therefore Asia is expected to enjoy the biggest market share of AVs in 2030.

In view of the different regional conditions, lidar suppliers have an interest to be located and closely in touch with the regional/local representatives of customers as well as suppliers.

Lumentum Announces New Series of High-Performance VCSEL Arrays



Lumentum Holdings Inc., a leading provider of vertical-cavity surface-emitting laser (VCSEL) arrays for light detection and ranging (LiDAR) and 3D sensing applications, announced the 7th of April the first M Series multi-junction VCSEL arrays for next-generation automotive, industrial LiDAR, and 3D sensing applications, the M51-100 905 nm 70 W multi-junction VCSEL array (see picture)

Lumentum's automotive qualified, high-performance M Series features peak powers suited for short- and long-range advanced mobility and industrial LiDAR applications. In addition to higher available power densities, extensive accelerated life testing of the multi-junction M Series has shown the same high reliability as single junction VCSEL devices already in volume production. The M Series is easily integrated into customer platforms and can replace edge-emitting lasers in existing mechanically scanned systems or arrayed into configurable illumination sources for addressable, solid-state electronic scanning LiDAR systems. VCSELs provide advantages in efficiency, scalability, and reliability that are essential to the accelerating rate of innovation in automotive and industrial LiDAR and 3D sensing applications.

Further M Series product releases are expected later in Q2, calendar 2022. The M52-100 is a 100 W multi-junction VCSEL array designed for line-scanning LiDAR solutions, and the M53-100 is a 400 W device tailored for flash LiDAR systems with unprecedented power from a VCSEL product.

Note from DVN

Laser sources arrays must be designed to be adaptable to the different modulations and scanning strategies that Lidar providers can imagine. Lumentum demonstrates here its reactivity to be quickly adapted to the variety of Lidars concepts like MEMs scanning as well as flash emitting structures.

German Railway Working with Lidar Sensors from Blickfeld

A daughter company of the German Railway is working with a consortium of project partners to realize an autonomous shuttlebus with teleoperation. The goal is to integrate rural areas better into the public transportation network. Bavaria has started a pilot project with the name “Bavarian Autonomous Remote Controlled Shuttle (BARCS) to promote such initiatives. The first project step is to develop a demonstrator and afterwards evaluate technical parameters and user requirements. A sketch of the vehicle is shown in the picture.

Partners of the project are among others German Railway Bus, some research institutions and most important Blickfeld as responsible for the functioning of the lidar sensors.

The term “teleoperation” means that at a central location an operator still supervises by camera several vehicles and can interfere in case of critical situations or emergencies.

To realize reliable detection of the 360 degree surrounding of the vehicle, the consortium relies on Blickfeld lidar sensors in combination with Stereocameras. For purpose of this project, Blickfeld has adapted hardware as well as software interfaces to enable 360 degree perception.

The project is launched for a period of three years and is funded significantly by the Bavarian government.

Note from DVN

Autonmous transportation under control of “teleoperators” is a significant step to evolve to full autonomy. It also creates a fruitful testing ground for sensor developers and suppliers under real world conditions. Worldwide we see lots of such projects and for lidar sensor suppliers it is a big opportunity to increase their knowledge and innovation direction by being part of such initiatives. We are interested, how Blickfeld can benefit from this engagement.

Scantinel Photonics claims FMCW 5D+ lidar capability

Scantinel Photonics, a start-up based in Ulm, Germany recently claimed the demonstration of the world first full solid state parallelized FMCW 5D+ lidar system. The 5D+ scanning lidar measures the three-dimensional location vector, velocity, reflectivity, and Meta information with an effective range of over 300 meters. Key elements of the system are Photonic Integrated Circuits (PIC) which the company considers as groundbreaking work to enable CMOS compatible manufacturing scaling and thus will open doors to significant unit cost reductions. Furthermore the company uses “Frequency Modulated Continuous Wave (FMCW)” lidar as a key enabler for long range (>300m) measurements including direct velocity measurement in every pixel, which is not possible for ToF (Time of Flight) systems according to Scantinel. The 5D+ full solid-state scanning has the potential for superior robustness and scanning rates.

Quoting Communication Director Dr. Michael Richter : "The first lidar demonstrator based on 5D+ full solid state will be available by mid of this year. The ultimate goal in the automotive sector is autonomous driving. Our FMCW lidar technology brings us closer to that goal."

Scantinel Photonics was founded on December 1st, 2019 as a venture of Carl Zeiss AG with its longstanding experience in optics and optoelectronics. This relation gives Scantinel access to expertise and technology of the Zeiss group. Furthermore the company has established close relations with Bridger Photonics, another Zeiss venture company and IMEC (Interuniversity Micro Electronics Center) , a leading European research center on silicon photonics technology located in Leuven, Belgium. The lidar technology of the company combines coherent ranging and spectral scanning on a solid-state platform. As a target, this should allow an exact detection of the environment of the vehicle combined with high range, reliability, compactness, and low costs. On the other hand, the company works with 1550 nm technology which is still rather expensive due to material cost and limited volumes.

The company is managed by Andy Zott and Michael Richter. Mikael Adelsburg is one of their key advisory board members (see photos). Andy Zott, Founder & Managing Director, is an expert in establishing and managing technology teams. Prior to the founding of Scantinel, Andy Zott was a project manager with ZEISS and other leading electronics companies.


Andy Zott


Michael Richter


Mikael Adelsburg

Dr. Michael Richter, Commercial Director has over 25 years of professional management experience. He has a long background in the semiconductor and sensor industries and held among others management positions at Infineon, Intel, Ampleon and ams.

At this point of time, Scantinel is backed by two venture capital arms of well known companies : ZEISS Ventures and Scania Growth Capital. In May 2021, a consortium led by Scania Growth Capital injected 7.5 Mio Euro into Scantinel. In return, Mikael Adelsburg (see photo) became a seat on the Scantinel advisory board. Mikael is Scania's senior vice president for Connected, Autonomous and Embedded Systems.

With respect to the financial engagement at Scantinel he stated :

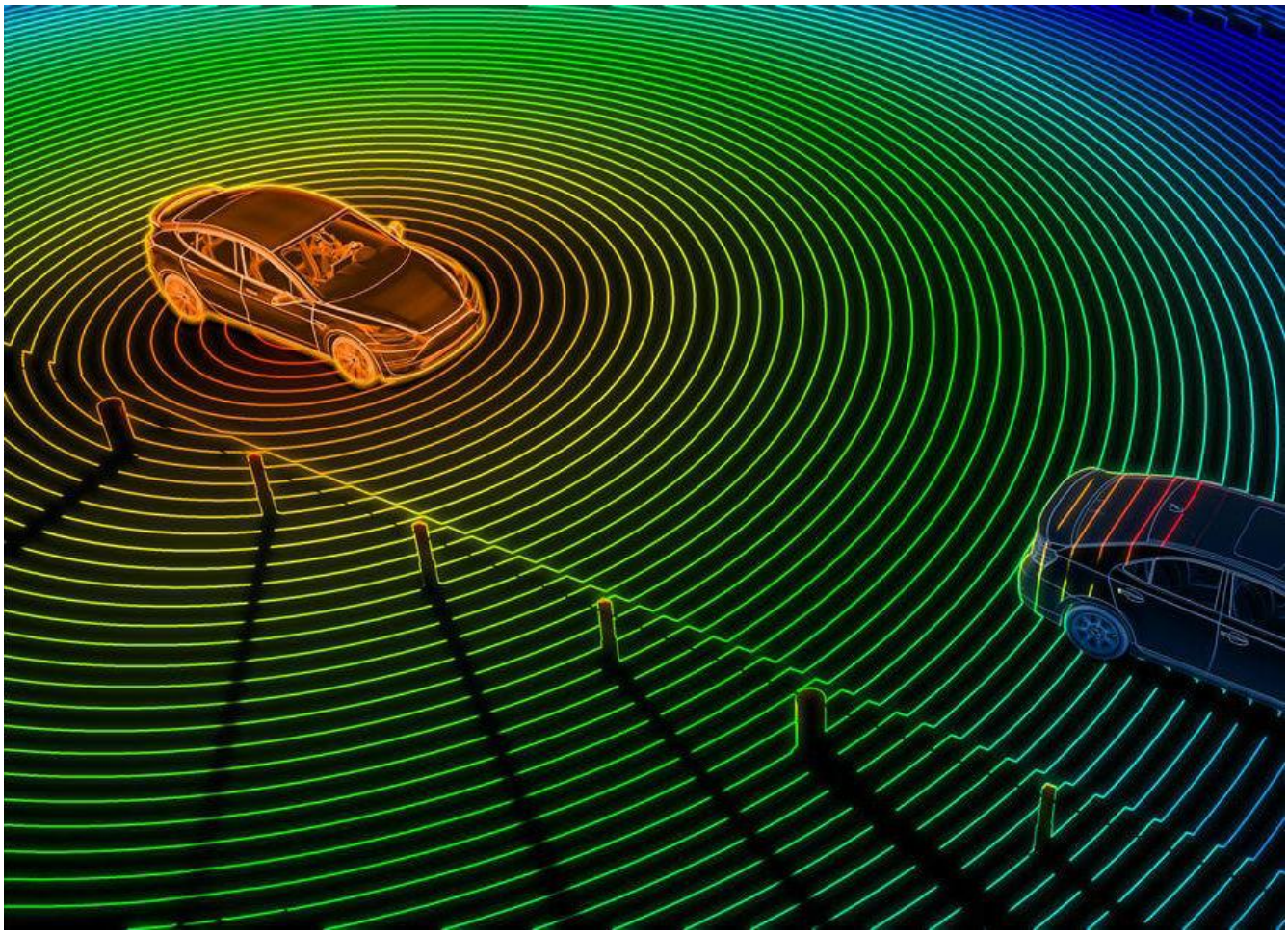
"At Scania, very early, we became aware that the future performance and safety of autonomous vehicles is based on FMCW LiDAR sensor technology. Scantinel is one of the most exciting companies I have seen in this space, and I am convinced the technology can gain real market advantage. It will be very interesting to not only follow the development at a close range but also be actively involved."

Note from DVN

FMCW modulation principles will allow lidar systems to reach the same performance as radars in terms of speed measurements. This capability is known to accelerate clustering of reflecting points associated with a same object. As a positive consequence a shorter response time to recognize separate objects in the road scene is enabled resulting in higher frame rates.

Although just founded less than 2.5 years ago, Scantinel has allocated powerful seed partners. Their mother venture capitalist ZEISS Venture allows them access to superior optical and optoelectronics technology. Additionally, by bringing Scania on board, they secured not only funding, but also a source of direct information about application requirements in the vehicle industry. DVN will follow the further evolution of Scantinel carefully.

Next DVN Lidar Event



After our first Think Tank in February and positive feedback about the event, the DVN Lidar team is launching its second Think Tank to promote the development of our Lidar Community further in line with our roadmap. Please find below more information about location and agenda. The DVN Lidar team is working hard to make also this event an excellent communication platform about lidar technologies and markets. Our greatest pleasure will be if you can create new, fruitful networking links to your peers, customers and suppliers to further develop and promote the fascinating automotive lidar technology as cornerstone for driving automation.

The location for the event will again be the well-known Dorint Hotel Frankfurt-Sulzbach.

This TT will be executed as a hybrid event due to the circumstances of the pandemic. This means that about half of the participants will take part “in-person” at the physical location of the TT, whereas the others will join “online”. Please find the technical instructions about online participation below.

AGENDA

30.05.2022

18:30	Welcome of “in-person” participants
19:00	Cocktail
20:00	Dinner

31.05.2022

09:00	Welcome & opening - HF
09:05	Introduction of participants (In-person & Online) - All
09:20	Recap on DVN Lidar Community - RS/LM
09:40	Presentation 1 Incl Q&A - Prof. Ling Ming Prof. Ling Ming : Shanghai University of Engineering Science(SUES)/ Professional Committee on Beidou. Application of Standards and Regulations Working Committee of CAAM (working group of vehicle Lidar). Presentation title: “Progress of China’s Vehicle LiDAR Standards”
10:20	COFFEE BREAK
10:50	Presentation 2 incl Q&A - Dr. A. Zlocki Dr. A. Zlocki, FKA GmbH Aachen/Aachen University Presentation title: “Lidar testing and evaluation initiative”

11:30	Presentation 3 incl. Q&A - TBC OEM speaker (Volvo / Stellantis TBC) : “lidar requirements”
12:15	LUNCH BREAK
13:45	Working Groups about three topics of interest – All
14:45	COFFEE BREAK
15:00	Reporting back incl discussion WG 1, 2, 3
16:00	Next steps Lidar Community : discussion and suggestions - All
16:30	Closure - RS/LM/AS/HF

Organised and moderated by DVN: Alain Servel (AS), Hector Fratty (HF), Leo Metzemaekers (LM), Ralf Schäfer (RS)

To enquire on this event—or the DVN lidar community—please email DVN's **Geoffrey Lebrun** or **Alain Servel**.