

LiDAR is facing headwinds: is diversification the solution? ¹

OUTLINES:

- LiDAR industry: Yole Développement (Yole) announces increasing volumes but decreasing unit prices.
- Market trends:
The overall 2025 LiDAR market² should reach US\$3.8 billion, with a 19% CAGR³ between 2020 and 2025.
The automotive segment is expected to be the main driver for LiDAR technologies in the next five years.
The industrial market will show a moderate growth between 2019 and 2025, due to lower LiDAR unit prices.
- LiDAR could be adopted for most robots and smart facilities.
- The LiDAR competitive landscape is shifting. Who will hold on?
- COVID-19 outbreak: without doubt, the crisis is putting financial pressure on car manufacturers.

*“The price drop in LiDAR in the past three years has been massive,” asserts **Pierrick Boulay, Technology & Market Analyst, Solid-state Lighting at Yole Développement (Yole)**. “Indeed, it is the result of strategies by different companies and not due to the result of mass-production. Volumes have not evolved significantly in these three years and mass adoption of LiDAR still has to happen. However, this price drop of LiDAR has a significant impact on market forecast. At Yole, we expect that the unit price of LiDAR will continue to decline, and large volumes will be needed in order to maintain the market.”*

This year again, Yole and its partner [System Plus Consulting](#) investigate in depth the LiDAR industry and its disruptive technologies. The two companies combine their market and technical expertise to convey their vision. To support this collaboration, Yole and System Plus Consulting are part of the [Imaging & LiDAR for Automotive Forum 2020 taking place on](#)

¹ Extracted from:

[LiDAR for Automotive and Industrial Applications report](#), Yole Développement
[Hamamatsu Photodiode and Laser in Livox's Horizon LiDAR report](#), System Plus Consulting
[Livox Horizon LIDAR tracks](#), System Plus Consulting

² Including automotive and industrial market segments.

³ CAGR: Compound Annual Growth Rate

September 10, 2020 at Shenzhen, China. Make sure of gaining a deep understanding of the latest innovations by attending the conference: [Register!](#)

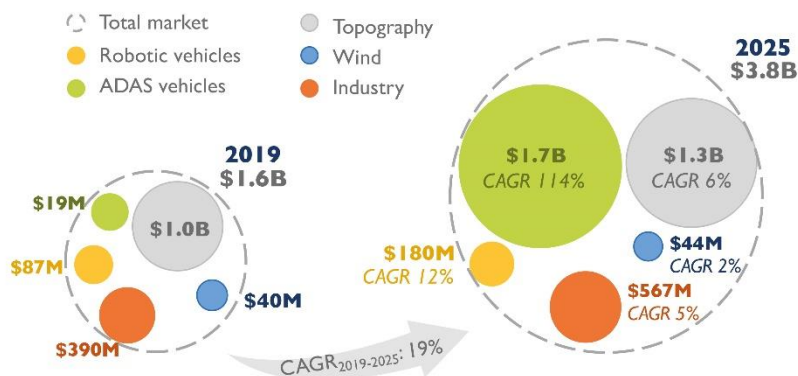
The market research & strategy consulting company Yole releases today the [LiDAR for Automotive and Industrial Applications report](#). In this 2020 update, Yole’s experts deliver an in-depth understanding of the industry status, taking into account the technology evolution and COVID-19 outbreak. Including market and revenue forecasts, market and technology trends, this report offers an application-related focus on key existing markets as well as the most promising emerging ones. This study delivers an accurate analysis of the LiDAR business value chain, infrastructure, and players as well as the LiDAR supply chain with partnerships between OEMs, tier-1s and LiDAR manufacturers.

In parallel, System Plus Consulting’s analysts provide an intensive analysis of the [pulsed laser and the photodiode developed by Hamamatsu](#) and embedded in the automotive Horizon LiDAR from Livox. This report includes a complete technical and cost analysis of both optoelectronic components. In addition, the company announces the complete profile of the full LiDAR system developed by Livox, the [Horizon LiDAR](#), through its track offering. Indeed, System Plus Consulting provides unmatched intelligence into numerous systems, including phones, tablets, wearables, smart home devices, and components. Such teardown profiles include pinpoint power measurements, detailed parts lists, block diagrams, x-rays, and high-resolutions photos. Each step of the teardown process is carefully documented by System Plus Consulting’s experts to present detailed insights into component parts and costs, as well as chip system functionality... [More info.](#)

What is the status of the LiDAR industry today? Who are the key LiDAR players and how they are related? What technology do they provide? What is the supply chain?... Yole and System Plus Consulting’s analysts shed light on the total LiDAR ecosystem.

LiDAR market 2019-2025 forecast by application

(Source: LiDAR for Automotive and Industrial Applications report, Yole Développement, 2020)



Note: ADAS vehicles do not include non scanning LiDAR used in ADAS levels 1 and 2.
 ADAS: Advanced Driver Assistance System

In this complex and rapidly evolving environment, Yole’s analysts predict that the LiDAR market for automotive and industrial applications will be US\$1.7 billion in 2020. Growth is expected to be 19%. Yole’s forecast is a revenue of US\$3.8 billion in 2025.

Automotive applications are expected to be the main driver for LiDAR in the next five years, providing US\$1.8 billion growth between 2019 and 2025. With several partnerships between LiDAR manufacturers and car manufacturers, the market research and strategy consulting company Yole expects 3.2% of personal cars to adopt LiDAR by 2025.

On the other hand, the impact of robotic cars on LiDAR will be more modest due to lower deployment of robotic cars than once expected. LiDAR for personal cars could also be jeopardized. The COVID-19 crisis is putting financial pressure on car manufacturers. Regulations imposing reduced carbon emissions are pushing investments toward electrification. Finally, the ambition of Tesla to rapidly achieve autonomous cars without LiDAR could make LiDAR less essential in the coming years.

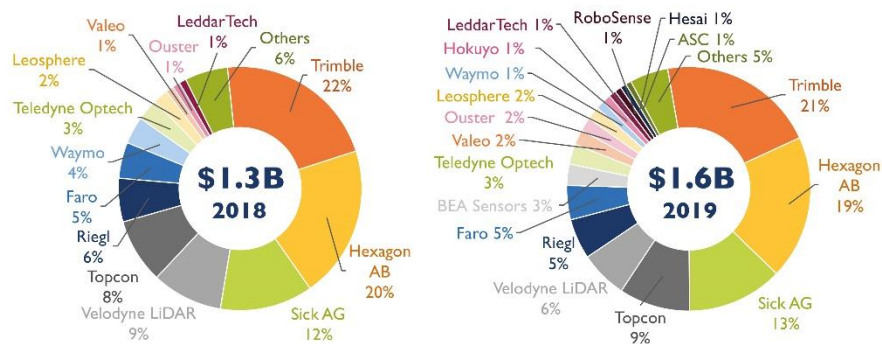
Alexis Debray, PhD., Technology & Market Analyst, MEMS, Sensors & Photonics at Yole asserts: “A new trend in the LiDAR business appeared a few years ago, which might dramatically change the shape of the LiDAR market, namely dropping prices. Velodyne has announced a plan to reach an average unit price of US\$600 by 2024, from US\$17,900 in 2017”.

And the story does not stop here. Indeed, Chinese LiDAR companies, which usually have LiDAR unit prices one-fifth of that of other companies and usually below US\$1,000, are gaining market share and expanding their business. LiDAR with lower unit prices is expected to enter new industrial applications, including factory, logistics and security. However, because of lower LiDAR unit prices, the industrial segment is expected to have moderate growth between 2019 and 2025, expanding from US\$390 million to US\$567 million.

“LiDAR technologies could be adopted for most robots and smart facilities”, says **Pierrick Boulay from Yole**.

2018-2019 LiDAR market share evolution

(Source: LiDAR for Automotive and Industrial Applications report, Yole Développement, 2020)



Since the 2005 DARPA Grand Challenge, vehicles have been a major application for 3D real-time LiDAR. In 2017, Audi equipped some of its cars with the Valeo Scala, a long-range LiDAR. At the end of 2018, Waymo launched Waymo One, its robotaxi service equipped with its own mid-range and long-range LiDAR. Continental has announced short-range flash LiDAR for 2020. Aimed at ADAS⁴ cars, it could also equip robotaxis or even industrial platforms. Other LiDAR manufacturers that have partnership with car manufacturers, such as Innoviz, Velodyne and Luminar, are targeting long-range applications.

As a key player in the LiDAR industry, Hamamatsu has developed photodiodes and lasers for Livox's Horizon LiDAR.

According to **Sylvain Hallereau, Project Manager Integrated Circuits, Power Semiconductors and LEDs at System Plus Consulting** and author of the [Hamamatsu Photodiode and Laser in Livox's Horizon LiDAR report](#): *"LiDARs are manufactured around four main components: the pulsed laser diode, avalanche photodiodes, opto-mechanical system (to scan the environment in front of the car), and the processor"*. The LiDAR sensing module includes a custom six-photodiode array die from Hamamatsu. These optoelectronic components have been specifically developed for LiDAR applications. The design is particularly optimized to increase the sensitivity of the six avalanche photodiodes, states System Plus Consulting in its new reverse costing report. The photodiode dies are assembled in a package with a 905nm narrow bandpass filter.

In parallel, industrial applications of LiDAR have a longer history, with topographic applications dating from 1970s.

This business is well-established and operated by large companies, explains Yole in its 2020 LiDAR report. Mining applications started to develop in 2008 with Komatsu and Caterpillar offering autonomous dump trucks. Their positions as solution and service providers have helped them operate these fleets. Recently, many new industrial applications have been emerging for LiDAR, including warehouse AGVs⁵, terminal AGVs, delivery robots and drones, autonomous forklifts, inspection robots and drones, intelligent traffic systems, security, and, soon to come, autonomous trucks and smart farming... Yole announces a 31% volume CAGR between 2020 and 2025 for logistics and other industrial applications.

Throughout the year, [Yole Développement](#) and [System Plus Consulting](#) publish numerous LiDAR-related reports. Make sure you are aware of the latest news emanating from the industry, while gaining an overview of our activities, including interviews with leading companies, analyses from our experts and dedicated online and onsite events on [i-Micronews](#).

In this regard, the [Imaging & LiDAR for Automotive Forum 2020](#) on September 10, 2020 at Shenzhen, China, will help you gain a clear view of key automotive vision technologies.

⁴ ADAS : Advanced Driver Assistance System

⁵ AGV : Automated Guided Vehicles

Confirmed speakers:



Hitronics Technologies - John Ling, Chairman and CEO

On Semiconductor – Dr Yolanda Xi, Regional Marketing Director

Smartsens - James Ouyang, Deputy General Manager

Surestar - Claire Zhang, Director of Overseas Business

System Plus Consulting - Wilfried Theron, Electronic System Department Director

Yole Développement - Pierre Cambou, Imaging Principal Analyst and Alexis Debray, MEMS, Sensors & Photonics Technology & Market Analyst

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About our analysts

As part of the Photonics, Sensing & Display division at Yole Développement (Yole), **Pierrick Boulay** works as Market and Technology Analyst in the fields of Solid-state Lighting and Lighting Systems to carry out technical, economic, and marketing analysis. Pierrick has authored several reports and custom analyses dedicated to topics such as general lighting, automotive lighting, LiDAR, IR LEDs, UV LEDs and VCSELs. Prior to Yole, Pierrick has worked in several companies where he developed his knowledge on general lighting and on automotive lighting. In the past, he has mostly worked in R&D department on LED lighting applications. Pierrick holds a master's degree in Electronics (ESEO – Angers, France).

Alexis Debray, PhD is a Technology & Market Analyst, Optoelectronics at Yole Développement (Yole). As a member of the Photonics, Sensing & Display division, Alexis is today engaged in the development of technology & market reports as well as the production of custom consulting projects dedicated to the imaging industry. After spending 2 years at the University of Tokyo to develop an expertise focused on MEMS technologies, Alexis served as a research engineer at Canon Inc. Over 15 years he contributed to numerous developmental projects, focusing on MEMS devices, lingual prehension, and terahertz imaging devices. Alexis is the author of various scientific publications and patents. He graduated from ENSICAEN and holds a PhD in applied acoustics.

Sylvain Hallereau has been Project Manager at System Plus Consulting since 2000. He is in charge of costing analyses for Integrated Circuits, Power semiconductors and LEDs and has significant experience in the modeling of manufacturing costs for electronics components. Sylvain holds a master's in Microelectronics from the University of Nantes, France.

Nicolas Radufe is in charge of physical analysis at System Plus Consulting. He has a deep knowledge in chemical and physical analyses. He previously worked in microelectronics R&D for CEA/LETI in Grenoble and for STMicroelectronics in Crolles.

About the reports

LiDAR for Automotive and Industrial Applications

LiDAR is facing headwinds and is looking for diversification. – Performed by Yole Développement

Companies cited:

ABAX, Airbus, ASE Technology, Audi, Beijing Surestar Technology, Continental, Epistar, Epsilone, Hesai Photonics Technologies, Hokuyo Automatic, Huawei, Hyundai, Hybo, Hybrid LiDAR Systems, Infineon Technologies AG, Insight LiDAR, Iridian Spectral Technologies, Irvine Sensors Corp., Jabil, Jaguar, Kaarta, Intelligent System, Leonardo, Leosphere, Lexus, LG, Livox, Lumentum, Lumibird, Luminar Technologies, Lumotive, Magna, Marelli, Meller Optics, Mercedes-Benz, METEK Meteorologische Messtechnik GmbH, Micralyne and many more...

Hamamatsu Photodiode and Laser in Livox's Horizon LiDAR

Analysis of the six channels and 905nm pulsed laser and photodiode from Hamamatsu, in Livox's LiDAR for automotive ADAS. – Performed by System Plus Consulting

Livox Horizon LIDAR

From the system teardown to component analyses - Performed by System Plus Consulting

Related reports

- [Status of the MEMS Industry 2020](#)
- [Sensing and Computing for ADAS Vehicle 2020](#)
- [3D Imaging & Sensing 2020](#)
- [Sensors for Robotic Mobility 2020](#)
- [Artificial Intelligence Computing for Automotive 2020](#)

About System Plus Consulting

System Plus Consulting specializes in the cost analysis of electronics, from semiconductor devices to electronic systems. Created more than 20 years ago, System Plus Consulting has developed a complete range of services,



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About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide... [More](#)

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