Press Release
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LYON, France

Automotive lighting: from "Vision" to "Driving Assistance" [1]

OUTLINES:

- Automotive lighting market is expected to reach US$38.8 billion by 2024, with 4,9% CAGR[2] between 2018 and 2024.
- Evolution of lighting technologies enables new functionalities.
- ADAS[3] vehicles: sensors integration is becoming mandatory.
- LiDAR[4] integration: OEM[5]s have several requirements at different levels.

"Autonomous vehicle technologies have a direct impact on traditional vehicles market and behind that the automotive lighting industry", announces **Martin Vallo, PhD., Technology & Market Analyst, Solid-state Lighting at Yole Développement (Yole).** *"ADAS represents clearly a strong opportunity for the automotive lighting companies. For highest levels of autonomy, a combination of sensors in addition to AI[6] and digital lighting will be so implemented for all weather capability."*

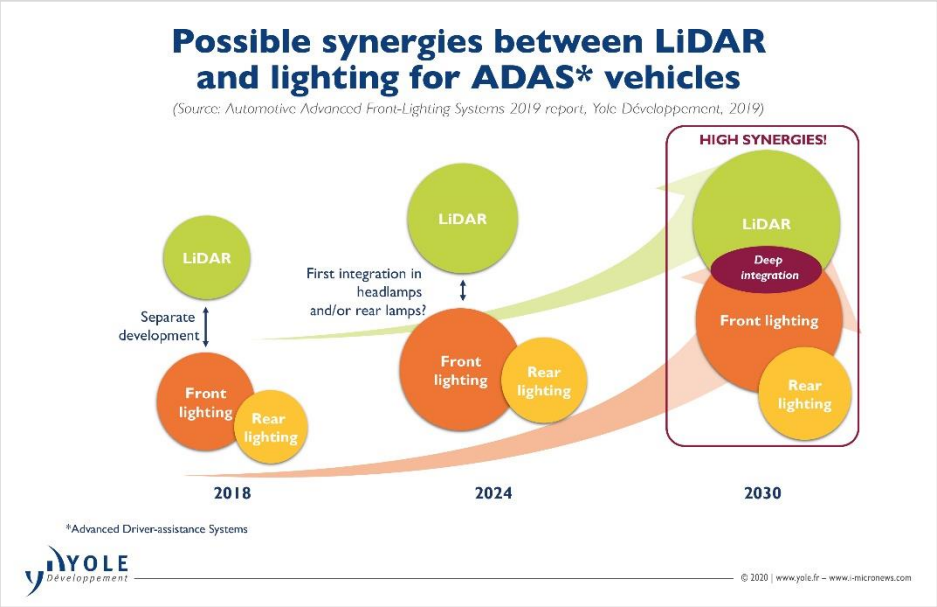
Without doubts, automotive lighting will evolve from a pure "*Vision*" function to a "*Driving Assistance*" function.

The market research & strategy consulting company Yole analyzes this evolution in a new dedicated automotive lighting report, titled Automotive Advanced Front-Lighting Systems report. Yole proposes a comprehensive overview and deep understanding of the automotive lighting market and advanced technologies. This report analyzes the current status and future trends related to automotive front-lighting market applications, reviews the automotive lighting industry's structure and future trends, examines the AFLS[7] used for automotive applications, especially ADAS ones, and the associated roadmaps. This study also points out market insights and details regarding benefits and drawbacks, integration status, development roadmaps, market forecasts and much more.

Lighting is evolving from a basic passive feature used in vehicles to help the driver to see the road in dark conditions to a new function where lighting becomes an active feature able to detect oncoming traffic and reduce glare. The evolution of lighting technology with

[1] Extracted from : Automotive Advanced Front-Lighting Systems 2019 report, Yole Développement
[2] CAGR: Compound Annual Growth Rate
[3] ADAS: Advanced Driver-Assistance Systems
[4] LiDAR : Light Detection and Ranging
[5] OEM : Original Equipment Manufacturer
[6] AI : Artificial Intelligence
[7] AFLS : Advanced Front-Lighting Systems

increasing resolution gives the possibility to enable new functionality like projections on the road. Trends toward ADAS, lighting digitalization and deep integration of advanced sensors will enhance the functional content of headlamps. And this will bring synergy to the automotive lighting and sensing industry.



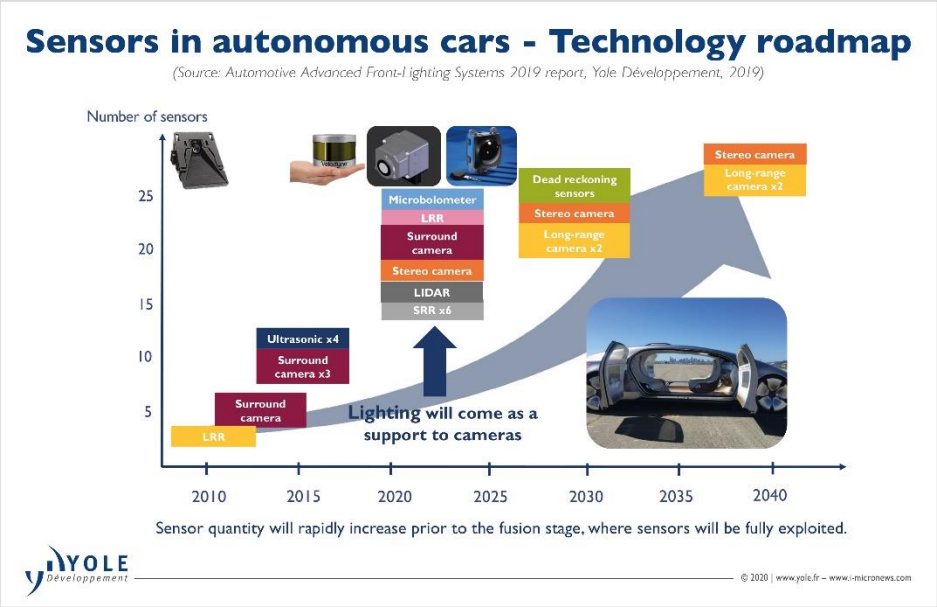
ADAS emergence was driven by the development and the integration of sensors into cars, starting with basic functionalities and progressing to complex functionalities, such as infrared LED[8] for rain sensor, radar for blind spot monitoring, cruise control, adaptive cruise control, camera for traffic sign recognition, or lane departure warning. *"The integration of sensors in ADAS vehicles is mandatory,"* demonstrates Yole's team in the Automotive Advanced Front-Lighting Systems report.

Furthermore, the development of advanced ADAS systems is linked with the development of new innovative sensors, that can be introduced into automotive, and data processing. Currently, ADAS using camera(s) have different levels of complexity: The basic level is ACC[9] using camera, with the camera used to monitor the distance between two vehicles. The advanced level, with traffic sign recognition, where the camera must be able to read numbers, and the complex level, which corresponds to driver monitoring, where the camera is able to identify the eyes of the driver and detect drowsiness levels.

For **Pierrick Boulay, Technology & Market Analyst, Solid-state Lighting at Yole**: *"The development of advanced ADAS functions means an increasing penetration of electronics into the vehicle. It started with one module for one function, but now some devices are multi-functional, like the front camera/s, and such evolution is also occurring at the sensor level, such as combination of the camera with radar".*

[8] LED : Lighting Emitting Diodes
[9] ACC : Adaptive Cruise Control

Increased integration of electronics is also benefiting exterior lighting applications. Indeed, sensors and related data collected can be processed for advanced lighting functions. A clear example is the use of the camera for high-resolution lighting where the camera is used to detect oncoming or preceding vehicles.



Under this dynamic context of innovations, OEM are playing a key role. Martin Vallo from Yole comments: *"OEM requirements were quite different one or two years ago, but now tend to homogenize as they better understand the technology."*

As an example, OEMs have several requirements at different levels in integrating LiDAR. First, the optical integration limits losses in range detection to 10%, and high level of transmission (90%) is required. Also, surface close to the normal of LiDAR installation to limit deviation. Regarding the thermal integration, LiDAR needs to operate in all conditions, so the sensor has to handle temperature above 95°C in specific situations. Management of internal humidity will be mandatory. De-icing will be also problematic, and washing and heating system for the outer lens must be evaluated. Then, for shock and mechanical integrations, LiDAR is not easy to break, so in case of pedestrian impact effect on lower leg must be taken into account. Depending on the vertical field of view of the LiDAR, aiming system may be mandatory (mechanical dispersion, load, acceleration, braking). Finally, the styling integration needs a compromise between performance, technical constraints and aesthetics. Integration of LiDAR can be done in two ways: invisible or visible, depending on whether the OEM wants to show its technology or not. A detailed analysis of innovative technologies has been made by Yole's analysts in the automotive lighting report…

Throughout the year, Yole Développement, publishes numerous solid-state lighting reports, including Automotive Advanced Front-Lighting System report. The market research and strategy consulting company also proposes a wide collection of reports focused on the automotive industry on i-Micronews.

Make sure to be aware of the latest news coming from the industry and get an overview of our activities, including interviews with leading companies, analyses from our experts and dedicated online and onsite events on i-Micronews.
Stay tuned!

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About the analysts

Martin Vallo, PhD, is serves as a Technology & Market Analyst specialized in solid-state lighting technologies, within the Photonics, Sensing & Display division at Yole Développement (Yole). With 9 years' experience within semiconductor technology, Martin is involved today in the development of technology & market reports as well as the production of custom consulting projects at Yole.
Prior his mission at Yole, he worked at CEA (Grenoble, France), with a mission focused on the epitaxial growth of InGaN/GaN core-shell nanowire LEDs by MOCVD and their characterization for highly flexible photonic devices. Martin graduated from Academy of Sciences, Institute of Electrical Engineering (Slovakia) with an engineering degree in III-nitride semiconductors.

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 analysis 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 for LED lighting applications. Pierrick holds a master degree in Electronics (ESEO – Angers, France).

About the report

Automotive Advanced Front-Lighting Systems

Headlamp digitalization is driving automotive lighting's growth and technological evolution. - Performed by Yole Développement

Companies cited:

3M, Abarth, Acura, Alfa Romeo, AMG, Apple, Aston Martin, Audi, Autoliv, Automotive Lighting, Avago, Avis, BASF, Bentley, BlaBlaCar, BMW, Bolloré, Bosch, Brightek Optoelectronic, Bugatti, Buick, BYD, Cadillac, Chevrolet, Chrysler, Cisco, Citizen Electronic, Citroen, Clean Technology Leader, CML Innovative Technologies, CnLight, Continental, Covestro, Cree, Dacia, Daihatsu and more...

Related reports:

- Light Shaping Technologies for Consumer and Automotive Applications
- LiDAR for Automotive and Industrial Application
- Valeo SCALA Laser Scanner

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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. 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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