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APPLICATIONS

CES 2018: Round-up of new vehicle-focused photonics technologies

10 Jan 2018

Automotive vision systems boost driver and self-drive safety; they can even spot when drivers doze off then drive them to safety.

At this week's **Consumer Electronics Show (CES 2018)** in Las Vegas, NV, which runs through Friday January 12, many new technologies are being presented to enable cars to be driven (or drive themselves) more safely. A separate *optics.org* news story focuses on new car **control technologies based on lidar**, while here we report on other types of new vehicle-focused photonics technologies.



Foresight: QuadSight imaging system.

Autonomous vehicle vision

Foresight Autonomous Holdings, Ness Ziona, Israel, an innovator in automotive vision systems, is presenting its QuadSight vision system targeting the semi-autonomous and autonomous vehicle market.

Foresight says **QuadSight** is the industry's "most accurate, quad-camera vision system", offering exceptional obstacle detection for semi-autonomous and autonomous vehicle safety. QuadSight uses four-camera technology that combines two pairs each of stereoscopic infrared and daylight cameras to set a new bar for autonomous vehicle vision. The system is designed to achieve near-100% obstacle detection with near zero false alerts under any weather or lighting conditions – including complete darkness, rain, haze, fog and glare.

Haim Siboni, CEO of Foresight, commented, "Vision is the foundation of passenger safety, and vision perfection under all weather and lighting conditions is clearly the breakthrough that vehicle makers need to build consumer confidence in order to accelerate autonomous vehicle adoption."

Stereoscopic vision

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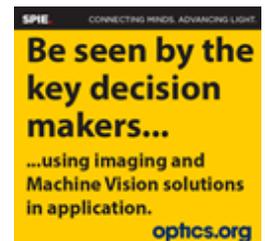
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technology's exceptional 3D images, detection and accuracy are essential for safe and reliable semi-autonomous and autonomous vehicle vision systems.

Stereoscopic cameras exceed a human driver's ability to see 3D objects in real time, whether

objects are large or small, in-motion or static, or detected from short or long-range distances. The dynamic driving environment demands a level of accuracy that only stereoscopic cameras can provide.

"Because vision perfection is that elusive capability autonomous vehicle makers have long pursued, the potential impact of Foresight's breakthrough cannot be overstated," said leading market analyst Jean-Christophe Eloy, President, CEO and Founder of market analyst Yole Développement.

"QuadSight surpasses so many other approaches that simply can't address the real world need for all-weather, all-conditions driving, making it the relevant answer for the industry's long-term trajectory."

High luminance LaserLight sources

SLD Laser (formerly SoraaLaser), Goleta, CA, a developer of visible laser light sources, is demonstrating its innovative LaserLight source technology for automotive applications. The company says that LaserLight illumination sources deliver more than 10 times the luminance of LEDs, "ushering in a brilliant new era in automotive lighting performance, safety, and styling."

At CES, the company will showcase the LaserLight-SMD, a direct emission miniature 7x7mm module, as well as the LaserLight-Fiber, a fiber-delivered remote lighting module. LaserLight sources provide safe, extended range illumination for high beam applications and precise beam control for glare reduction, while enabling compact headlamp designs with unique form factors for advanced styling.

LaserLight sources utilize the company's proprietary and patented semi-polar GaN laser diodes, combined with advanced phosphor chip technology, and novel high luminance packaging. By utilizing this laser pumped phosphor architecture, LaserLight delivers safe, high luminance white light output with more than 10 times the brightness of LEDs, enabling vastly superior optical control with miniature optics and reflectors, along with high efficiency fiber optic transport and waveguide delivery.

Beyond automotive applications, LaserLight sources deliver high luminance performance for consumer products related to portable lighting, drone lighting and LiFi for internet-of-things, as well as professional products in entertainment, security, architectural, and outdoor lighting.



SLD Laser (formerly SoraaLaser): LaserLight source



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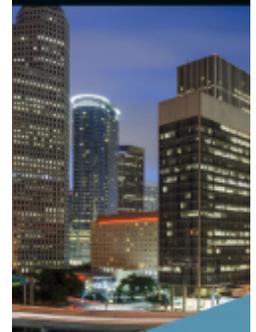
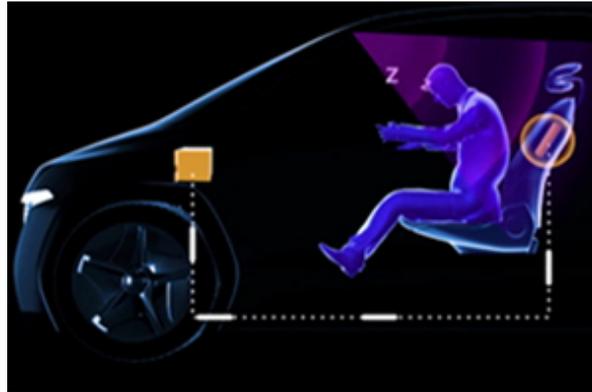


Image sensors

ON Semiconductor has joined Baidu's Apollo Autonomous Driving Platform, which is also **on show at CES 2018**. Apollo provides an open source, reliable software and hardware system, enabling the efficient development of autonomous driving systems by automotive systems designers. Image sensing is a key component of the Apollo platform which supports enhanced autonomous driving functionality.

ON Semiconductor's qualified 3µm-based advanced **CMOS image sensor** allow customers to develop vision systems for autonomous driving, with the flexibility to move to future sensors at volume deployment. With a high dynamic range, the sensor can provide clear single images and video in the challenging low and mixed light scenes synonymous with automotive environments.

Hyundai Mobis is showing its latest life-saving DDREM (Departed Driver Rescue & Exit Maneuver) technology. DDREM detects when a driver has dozed off and has begun to depart the road whereupon it springs into action and autonomously guides the vehicle to safety.



Hyundai Mobis: life-saving DDREM.

The AAA Foundation for Traffic Safety estimates for the US, over 20% of traffic fatalities per year – approximately 7,000 deaths – are due to drowsy driving. “By narrowing our focus to the safety aspects of autonomy, we can bring lifesaving “level 4” autonomous technology into passenger cars quickly,” said David Agnew, director of autonomous vehicle development, at Hyundai Mobis North America.

DDREM uses three identifiers to determine if a driver is at risk and compares driver actions to a database of drowsy driving incidents. Checkpoints include: an infrared camera scans driver facial and eye movements to determine if the exhibits signs of drowsiness – even through spectacles; the technology looks for key identifiers used in ADAS – if the driver is moving erratically; and if DDREM determines that the driver has fallen asleep, it transitions vehicle control to “level 4” autonomous driving mode.

Thermal camera kit for self-driving cars

FLIR Systems is demonstrating its high-resolution **Thermal Vision Automotive Development Kit** featuring the Boson thermal camera for automakers, tier-one automotive parts suppliers, and innovators of ADAS. The ADK allows developers to add an affordable, long-range thermal camera to their development vehicles to boost reliability and redundancy required for self-driving cars.

Claiming to be the auto industry's only automotive-qualified passive infrared sensor

currently in production, FLIR says its sensors are already deployed on numerous vehicles from General Motors,



FLIR Systems: Thermal Vision's automotive development kit.

Peugeot, Mercedes, Audi, and BMW, and as an aftermarket system. An ideal sensor technology for pedestrian and animal detection, thermal sensors can see up to four times the distance of typical headlights.

Thermal imaging helps drivers and future self-driving vehicles see in challenging environments such as darkness, sun glare, fog, smoke, and haze. Given this differentiated sensing capability and intense market focus, ABI Research expects annual shipments of night vision systems, including thermal imaging sensors, to grow from 200,000 in 2017 to 4.2 million in 2021.

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