

Autonomous Vehicle

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SENSORS



Velodyne's Velarray and VelaDome

Common goals

The AV industry needs to work together on the validation and standardization of lidar sensors

by Dieter Gabriel, marketing manager, Velodyne Europe

LIDAR TECHNOLOGY WAS INSPIRED BY THE DARPA GRAND CHALLENGE

Today, lidar sensors are installed in thousands of vehicles worldwide and have demonstrated their reliability in operation on millions of miles of roads. Velodyne Lidar, a California-based company founded in 1983, supplies sensor technology for dozens of autonomous vehicle programs around the world.

In 2005 Velodyne's founder and CEO, David Hall, invented real-time surround view lidar systems, revolutionizing perception and autonomy in a variety of industries, including automotive, new mobility, mapping, robotics and security. The idea to use lidar technology for autonomous driving came to Hall after competing as one of the first participants of the DARPA Grand Challenge. He developed lidar to provide autonomous vehicles with 360° real-time vision, and with that paved the way for a revolution in the automotive industry.

Velodyne lidar has been producing 3D multichannel lidar sensors for 14 years, and at the beginning of 2019 introduced a range of innovative products to its portfolio.

Sensor solutions

Velodyne's VelaDome is the industry's first and only lidar sensor covering a half-hemisphere, with a compact embeddable lidar that provides an ultra-wide 180° x 180° image for near-object avoidance.

The VelaDome's innovative hemispherical field-of-view and high-density image offers game-changing possibilities in pedestrian, cyclist and blind-spot

detection. Powered by Velodyne's patented Micro Lidar Array (MLA) technology, the VelaDome is optimized for manufacture and designed to meet automotive-grade standards. Thanks to its compact size, the sensor is also ideal for a variety of low-profile mounting and styling options.

Alongside this, Velodyne has also introduced Velarray – the company's new, long-range directional lidar solution for ADAS applications. It is the first 200m (660ft) directional ADAS sensor, with a compact form for seamless integration. At CES 2019, Velodyne demonstrated the use of the sensor behind a vehicle's windshield. Working with automotive Tier 1 supplier Veoneer, Velodyne is able to provide the Velarray with ASIL-B functional safety and advanced diagnostics and enables flexible vehicle integration via a vehicle interface module.

Veoneer's partnership with Velodyne is committed to the design and manufacture mass production lidar systems for autonomous vehicles, with Velodyne providing core lidar technology to Veoneer.



The VelaDome is a compact embeddable lidar for an ultra-wide 180° x 180° image for near-object avoidance

Award-winning technology

Velodyne founder David Hall was named the 2018 Inventor of the Year by The Intellectual Property Owners Education Foundation. He was recognized for creating the groundbreaking lidar sensor technology that is the essential component for fully autonomous

vehicles and enables more sophisticated advanced driver assistance systems (ADAS). Each year the Foundation recognizes outstanding inventors for their contributions to the economy and overall quality of life.

To build upon Velarray's directional view sensor, Velodyne has introduced Vella, an advanced driver assistance solution that is intended to improve advanced driver assistance functionalities currently on the market, such as lane keeping assist (LKA), automatic emergency braking (AEB), and adaptive cruise control (ACC).

Working together

Velodyne has taken a leadership role in advocating the need for autonomous vehicle community cooperation in

addressing safety and standardization requirements for lidar sensors.

Heading the initiative is Dr Mircea Gradu, senior vice president of quality and validation at Velodyne and former SAE International president. Gradu has proposed the AV community must work together in a non-competitive way to identify requirements and methods for lidar sensor testing and validation. The goal is to create a repository of sensor validation tools that can become an industry standard, available to every company in the industry.

"With the AV industry in a nascent stage, now is the time to support the development and testing efforts of automotive OEMs and Tier 1 suppliers by deepening understanding of lidar and applying rigorous sensor validation," says Gradu. "Today there is too much misleading information about the precision, accuracy and range of lidar sensors. To be of value to auto makers, all lidar sensors need to be assessed by the same measurements. Lidar companies must be ambassadors of the AV safety message by promoting transparency."

Velodyne envisions the community pulling together to identify lidar requirements and standardizing how to address them. The ultimate goal is to have lidar products undergo testing and validation based on standards set early in the product's lifecycle development with the results made available to automotive manufacturers and Tier 1 suppliers.

Challenging real-world scenarios, such as a high-speed merge onto a highway or navigating a T-junction, present elevated safety risks in autonomous driving. The AV community needs to work together to create specialized tests and validation cases that establish standard methods to determine whether lidar sensors can address these safety challenges. ◀

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