

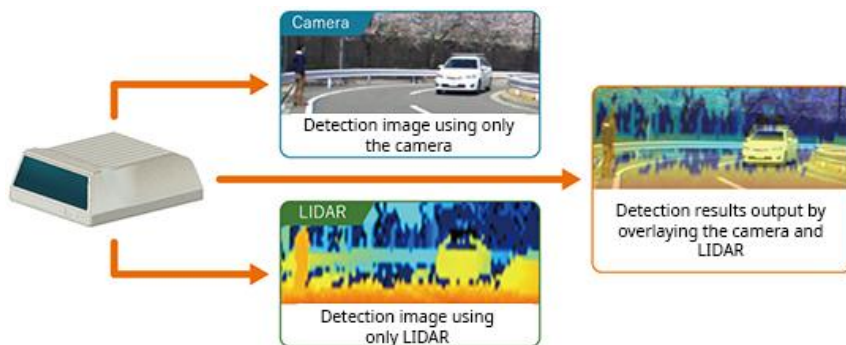
Press Information

Revolutionizing detection: Kyocera unveils the world's first Camera-LIDAR fusion sensor with perfect optical alignment

Cutting-edge precision with unmatched laser irradiation density for parallax-free, long-distance obstacle detection ideal for autonomous driving.

Kyoto, 4th February 2025. Kyocera Corporation is presenting the development of its unique Camera-LIDAR Fusion Sensor, the world's first¹ LIDAR that aligns the optical axes of the camera and LIDAR into a single sensor. This unique design allows for the real-time acquisition of parallax-free superimposed data, a feat that was previously unattainable. It also features the world's highest² laser irradiation density as a LIDAR sensor, enabling long-distance and high-precision object detection.

LIDAR is expected to be essential to the commercialization of autonomous driving. It provides instant acquisition of long-range, highly accurate 3D information, enabling the detection of obstacles in complex environments and during high-speed movement with unparalleled accuracy. It offers excellent spatial recognition, identifying the distance to an object and its size from the time and angle of the reflected light bouncing back from a laser beam over a wide area. Typically, LIDAR is used with cameras to more accurately identify objects but parallax in the data from the separate units often caused delays from calibration between the sensors. Kyocera's new Camera-LIDAR Fusion Sensor integrates the camera and high-resolution LIDAR in a single unit for parallax-free, real-time data integration, ensuring efficient and accurate results.



Images detected by Camera-LIDAR fusion sensor

¹ In the development of a sensor in which the optical axes of the camera and LIDAR are aligned and integrated into a single unit; October 2024, based on Kyocera research.

² At the irradiation densities of LIDAR currently announced for commercialization, October 2024, based on Kyocera research.

Key features

Camera and LIDAR integration for most accurate object recognition

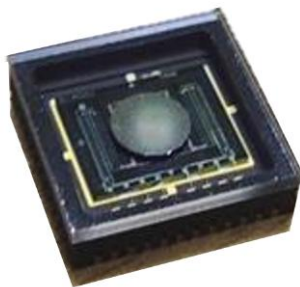
Using its unique optical design technology, Kyocera is the first to integrate the camera and LIDAR into a single unit with aligned optical axes. This enables the real-time integration of camera image data and LIDAR distance data for the most advanced object recognition to date.

High-resolution with world's highest² laser irradiation density

LIDAR can recognize small obstacles over long distances by increasing the density of laser beams emitted, thereby improving resolution and accuracy. Kyocera's innovative sensor has an irradiation density of 0.045 degrees, which utilizes the Company's proprietary laser scan unit technology from MFPs and printers, making it possible to detect a 30 cm falling object at a distance of 100 m.

High durability with proprietary MEMS mirror

In LIDAR, a MEMS mirror or motor is required to irradiate laser light over a wide and high-density area. However, MEMS mirrors typically have lower resolution and motors tend to wear out quickly. Kyocera's new integrated sensor provides both higher resolution than motor-based systems and greater durability than conventional MEMS mirrors. A proprietary MEMS mirror, developed with Kyocera's advanced manufacturing and ceramic package technologies, and high-resolution laser scanning technology, support high-precision sensing for various industries including autonomous vehicles, marine/ships, heavy machinery, and more.



Kyocera's proprietary MEMS mirror

Customization options

Kyocera can customize solutions for specific applications to optimize performance and features necessary for a wide range of use cases. Each element is developed and manufactured by Kyocera for total control and customization, from MEMS mirrors to optical systems, electrical circuits, and software.



Kyocera aims to introduce this innovative integrated sensor for automotive applications and various other fields, such as construction machinery, ships, robots, and security systems that recognize people and objects. We are working towards the early commercialization of this device.

The technology has been exposed at CES 2025 trade fair that took place from January 7 to 11 in Las Vegas, USA.

For more details, please click here: <https://global.kyocera.com/ces/2025/index.html>

For more information on Kyocera: www.kyocera.com

About Kyocera

[Kyocera Corporation](http://www.kyocera.com) (TOKYO:6971, www.kyocera.com), the parent and global headquarters of the Kyocera Group, was founded in 1959 as a producer of fine ceramics (also known as “advanced ceramics”). By combining these engineered materials with metals and integrating them with other technologies, Kyocera has become a leading supplier of industrial and automotive components, semiconductor packages, electronic devices, smart energy systems, printers, copiers, and mobile phones. During the year ended March 31, 2024, the company’s consolidated sales revenue totalled 2 trillion yen (approx. EUR 12.29 billion). Kyocera is ranked #874 on Forbes magazine’s 2024 “Global 2000” list of the world’s largest publicly traded companies, and has been named among “The World’s 100 Most Sustainably Managed Companies” by *The Wall Street Journal*.

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