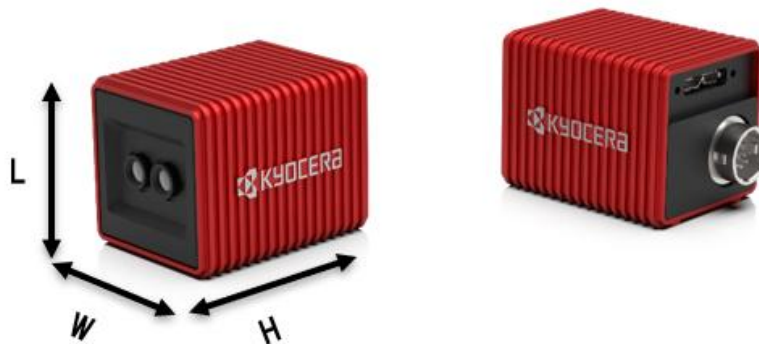


Press Information

Kyocera's AI-based high-resolution depth sensor for close imaging sets new records

World's first to deliver 100 μm resolution at 10 cm range, even with tiny, reflective or semi-transparent objects; ideal for highly accurate measurement towards flexible automation.

Kyoto, 21st January 2025. Kyocera Corporation is introducing a high-resolution AI-based depth sensor for measuring tiny objects that have been difficult to measure using conventional depth-sensing technologies. Kyocera's new camera delivers record-setting depth measurements with 100 μm resolution at a 10 cm range, even from reflective or semi-transparent objects.¹ Kyocera's innovation will support manufacturing, medicine, logistics and a variety of other fields requiring automated identification and precise depth measurement, unlocking the potential of AI and robotics with vision capabilities far exceeding the human eye.



Size (L x W x H): 29 x 20 x 43 (mm), Weight: 65 (g)

Features: Kyocera's AI-based high-res depth sensor for close imaging

1. Dual-lens sensor measures tiniest objects

A unique configuration incorporating two lenses on a single sensor, Kyocera's AI-based depth sensor provides the industry's highest-resolution depth measurements to date among stereo cameras. The exceptionally narrow baseline of Kyocera's depth sensor allows it to calculate the positional disparities of an object through the left and right lenses at a shorter distance

¹ Record-setting performance: AI-based depth sensor capable of measuring extremely small objects with measurement resolution of 100 μm at a distance of 10 cm from the object, including reflective and semi-transparent objects; source: Kyocera Corporation research, as of November 2024.



than conventional methods. This precision enables the sensor to make accurate measurements of even the smallest objects.

2. Measure reflective or semi-transparent objects

Kyocera's AI stereo vision algorithms enable precise depth measurements of reflective or semi-transparent objects. Traditional stereo vision algorithms involve matching objects between left and right images. However, reflective or semi-transparent objects often lack the necessary contrast, or are challenging to identify as the same object, causing measurement errors. Kyocera's AI-based methods leverage extensive training data to measure accurately, even with challenging reflective or semi-transparent objects.

Along with their advantages, AI-based approaches often include high annotation costs and extended training times due to the extensive data required for high accuracy. Kyocera therefore developed two key technologies to reduce training costs:

1. Label-free pre-training

2. Data generation using computing graphics for ten times more precise measurements

Kyocera's distinctive AI solution utilizes pre-training technology without labels, providing equivalent recognition with only 10% of the training data. To address the issue of conventional AI requiring large amounts of training data, Kyocera developed a computer graphic data-generation technology. This technology enables the automatic generation of training data in a CG simulation environment that accurately reproduces the target objects and settings. Additionally, Kyocera improved and accelerated the CG rendering calculation method. This CG simulation for AI training makes it possible to adapt to new objects and environments, allowing for highly accurate 3D distance measurement, even with reflective or semi-transparent objects.

Kyocera's label-free pre-training technology has been recognized internationally for its novelty and effectiveness, including acceptance at BMVC 2024 (The 35th British Machine Vision Conference), one of the world's leading conferences in the field of machine vision.

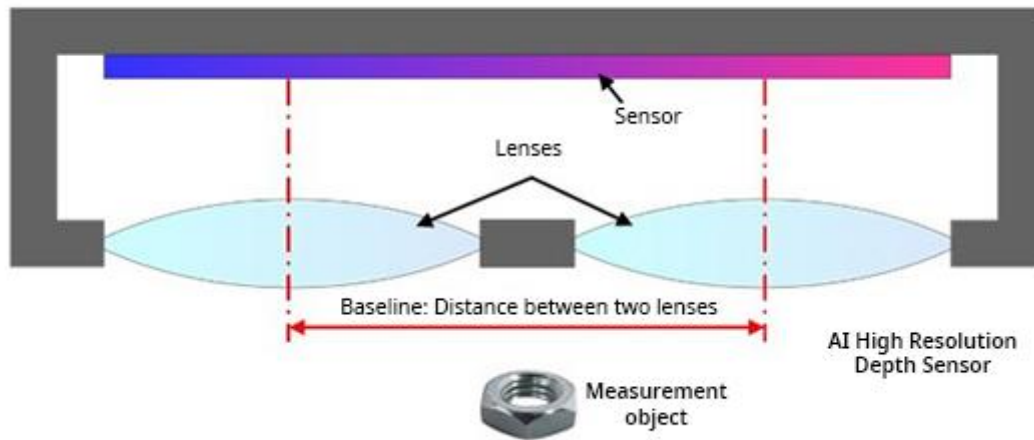
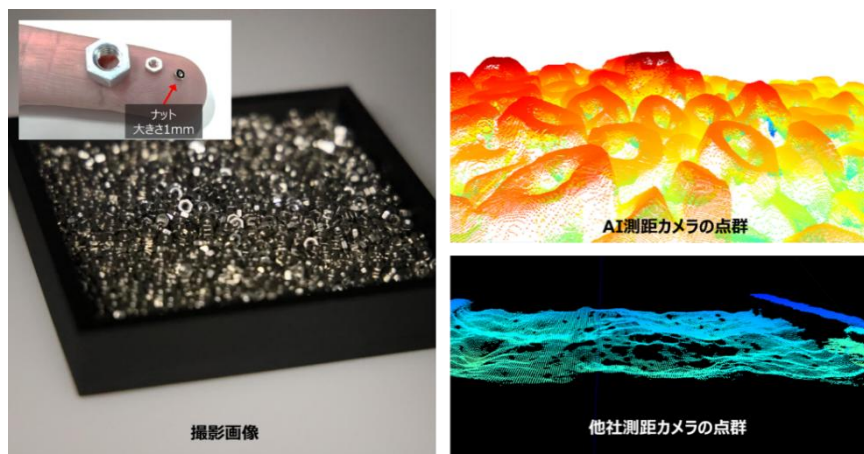


Diagram of Kyocera's AI-based high-resolution depth sensor for close imaging



Objects measured using Kyocera's AI-based high-res depth sensor for close imaging and a conventional stereo camera (upper left); Kyocera's depth map (upper right); conventional camera's depth map. (lower right)

Future developments

Kyocera's high-resolution AI-based depth sensor has many applications, including integration with robotic arms in manufacturing for precise depth measurement of objects as small as 1 mm. With this level of precision, robotic arms could select individual parts from a batch in a warehouse and recognize high-resolution body measurements or reflective surgical instruments in the medical field. Transport robots in logistics and retail could also more accurately monitor surroundings with this new innovation, helping to address labour shortages and boost societal productivity.



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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