Press Information

Kyocera and Nitto Seimo launch trial of smart-sensing research buoy powered by ocean currents

Continuous data collection can monitor climate change and marine resource management.

Kyoto/London, 3rd April 2025. Kyocera Corporation developed a smart-sensing research buoy[1] for continuous ocean data collection, powered by tidal energy harvesting technology from Nagasaki University. A paid trial service for this innovative solution using Kyocera's IoT technology will begin in Japan in April 2025.

As part of this initiative, Kyocera will collaborate with Nitto Seimo Co. to provide customers a total solution including cloud-based, real-time ocean monitoring, buoy installation, maintenance, and retrieval operations.

Smart-sensing research buoy

Observation off the coast of Itsuwa Town, Amakusa City, Japan

Development background

As climate change and marine resource management become pressing global issues, the importance of accurate and stable ocean data collection is increasing. IoT technology for real-time ocean environment monitoring is expected to revolutionize marine conservation, disaster prevention and sustainable fishing.

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[1] Previously referred to as the "Energy Harvesting Smart Buoy".

However, data collection using research buoys has traditionally faced challenges such as power supply limitations and high maintenance costs, making long-term operation and deployment in remote offshore locations difficult.

Addressing these challenges, Kyocera has developed a Smart-Sensing Research Buoy using tidal current power generation to avoid the need of a conventional power source. This innovative solution, which harnesses ocean currents to generate and store electricity, ensures stable and efficient data collection over the long term, far from power grids, significantly expanding the scope of marine data utilization.

Japan's Science and Technology Agency (JST) will adopt these buoys in its "Co-Creation for Ocean Industry (COI-NEXT)" program, aiming for solutions to marine environment conservation and food security challenges. Buoys will also be provided for the "Nagasaki BLUE Economy: Aquaculture Industrialization Co-Creation Hub for Sustainable Seafood Production," to support a more sustainable future.

Roles of each company

Kyocera	- Manufacturing and supplying smart buoys - Development, supply, and maintenance of cloud applications
Nitto Seimo	- Buoy installation and retrieval (including mooring design) - Regular maintenance and inspections

Features of the Smart Buoy:

1. Tidal power generation system unaffected by weather conditions

Developed in collaboration with Nagasaki University, the buoy includes a tidal power generation system that utilizes ocean currents to rotate an onboard turbine, generating electricity. Even with weak currents[2], the system can generate power and store it in an onboard battery, ensuring stable long-term data collection.

2. Communication modules and sensors for comprehensive ocean data collection

The buoy is equipped with Kyocera's communication modules, which transmit sensor data every five minutes. Internal sensors collect information such as internal temperature, humidity, acceleration, motor rotation speed, battery level, GPS location, and signal strength. Additionally, external sensors[3] can measure a wide range of oceanographic data, such as current speed and

[2] Requires a current speed of at least 1 knot for power generation.

[3] Up to two external sensors from JFE Advantech Co., Ltd. can be connected simultaneously.

direction, salinity, chlorophyll concentration, turbidity, dissolved oxygen (DO), and water temperature. This flexibility allows customers to select sensors that best suit their specific data collection needs, empowering them with control over their data.

3. Real-time data monitoring and anomaly alerts from the Cloud

Ocean data is monitored in real-time through a dedicated cloud application alongside the buoy. If an anomaly is detected, users can receive email alerts, enabling rapid response to changes in the marine environment without continuous attention.

Comment from Prof. Daisaku Sakaguchi, Dean of the Faculty of Engineering, Nagasaki University:

“In recent years, the demand for ocean data collection has been increasing, mainly due to the impact of red tide on aquaculture in Japan. At Nagasaki University, we installed this system off the coast of Itsuwa Town, Amakusa City, on September 26, 2024, to collect fundamental data for red tide prediction.”

This development is poised to significantly impact fisheries, marine conservation, and many other fields. From aquaculture to environmental research, the potential applications of this system are vast, promising to contribute to solving a wide range of both social and environmental issues.

For more information on the service, please visit Kyocera’s website (Japanese only):

https://www.kyocera.co.jp/prdct/smartbuoy/

For more information on Kyocera: uk.kyocera.com

About Kyocera

Kyocera has been successful in Europe for over 50 years. From its European headquarters in Esslingen am Neckar, KYOCERA Europe GmbH operates 28 sites including manufacturing facilities, with products ranging from fine ceramics, electronics, automotive, semiconductor and optical components to industrial tools, LCDs, touch solutions, industrial printing components, solar systems and consumer goods such as kitchen and office products.

KYOCERA Europe GmbH is a company of the KYOCERA Corporation headquartered in Kyoto/Japan, a world leader in semiconductor, industrial and automotive components as well as electronic components, printing and multifunction systems, and communications technology. The technology group is one of the world's most experienced manufacturers of smart energy systems, with more than 45 years of industry expertise. The Kyocera Group comprises 292 subsidiaries (31 March 2024). In England, Kyocera has a subsidiary in Frimley, KYOCERA Fineceramics Ltd. With around 79,200 employees, Kyocera generated net annual sales of around EUR 12.29 billion in the 2023/2024 fiscal year.

Kyocera is ranked 874 on Forbes magazine's 'Global 2000' list for 2024, and ranked as 'The 100 Most Sustainably Managed Companies in the World' according to the Wall Street Journal. For the second year in a row, Kyocera qualified for the Dow Jones Sustainability Index (Asia-Pacific). As well, Kyocera receives a Bronze rating on EcoVadis Sustainability Survey and was acknowledged as a 'Top 100 Global Innovator 2023' for the second consecutive year, being one of the world's leading innovators, for the eighth time by Clarivate.

Kyocera also takes an active interest in cultural affairs. The Kyoto Prize, a prominent international award, is presented each year by the Inamori Foundation — established by Kyocera founder Dr Kazuo Inamori — to individuals worldwide who have contributed significantly to the scientific, cultural, and spiritual betterment of humankind (equivalent to approximately €596,500 per prize category).

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