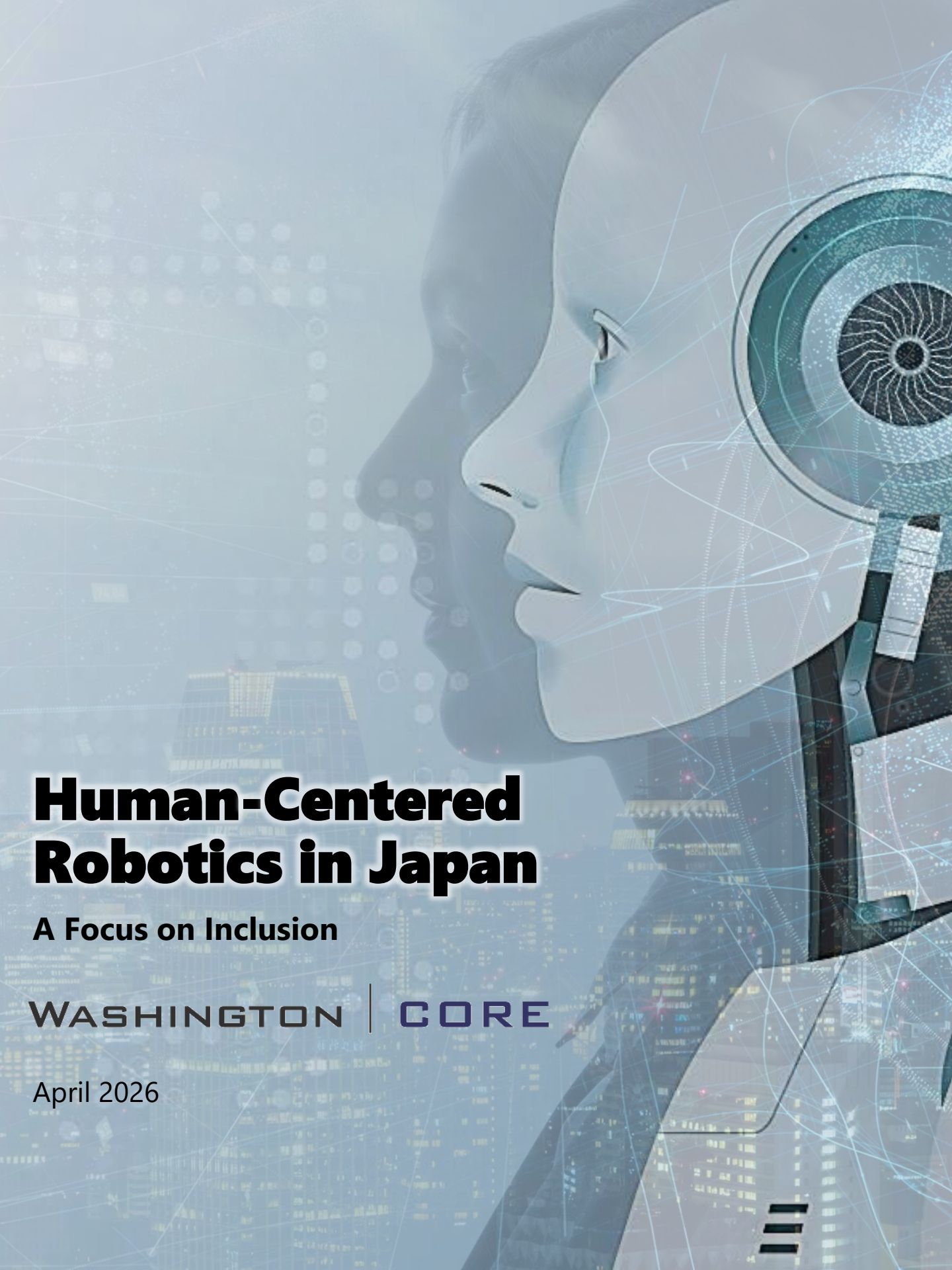

Human-Centered Robotics in Japan

A Focus on Inclusion

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In Japan, "symbiotic robots," designed to coexist with humans, are rapidly gaining visibility in society. Active across a wide range of fields, these robots support the elderly, work in factories, help those with disabilities perform daily tasks, and help socially isolated people reconnect with their communities.

As the world competes to develop AI-driven robots, Japan has focused on building robots who live and work alongside humans. In this article, Washington CORE explores the current and future state of Japan's symbiotic robotics development through an interview with Yukiko Hoshino, the Senior Researcher at the Technology Research Center in the Technology Development Division of KAWADA Technologies, Inc.,[1] a company driving cutting-edge robotics development in Japan.

The Birth of the Tele-Barista: a Dream Born from a Single Cup of Coffee

The Avatar Robot Cafe "DAWN Ver. β," located in Nihonbashi, Tokyo, is garnering attention from around the world. At the cafe, two types of robots—the avatar robot OriHime, which talks with customers, and the coffee-brewing robot NEXTGATE—work together to serve coffee to customers. The project began with the heartfelt wish of Mikako Fujita, a professional barista who became unable to continue working after developing ALS, to "brew delicious coffee once again."

Inspired by this wish, Tadahiro Kawada, President of KAWADA Technologies, Inc., and Ory Yoshifuji of Ory Laboratory Inc. (currently Co-founder and CVO), whose booths happened to be next to each other at an exhibition, hit it off, deciding to take on the challenge of creating a system in which the industrial and social robots developed by each company could work together. As a result, in today's inclusive café, a new teleoperated robot called the "Tele-Barista" was born.

"NEXTAGE": A Symbiotic Robot Created by Japanese Mechatronics Technology

Supporting this initiative is the humanoid symbiotic robot NEXTAGE, born from Japan's mechatronics technology. NEXTAGE is an industrial robot developed by KAWADA Robotics Corporation, a group company of KAWADA Technologies, with special capabilities in tasks suited to high-mix, low-volume production, such as inspection, assembly, picking, and packaging.

Another defining feature of NEXTAGE is its compact, safety-first design, specifically engineered to work weight and cost performance improvements have contributed alongside humans.

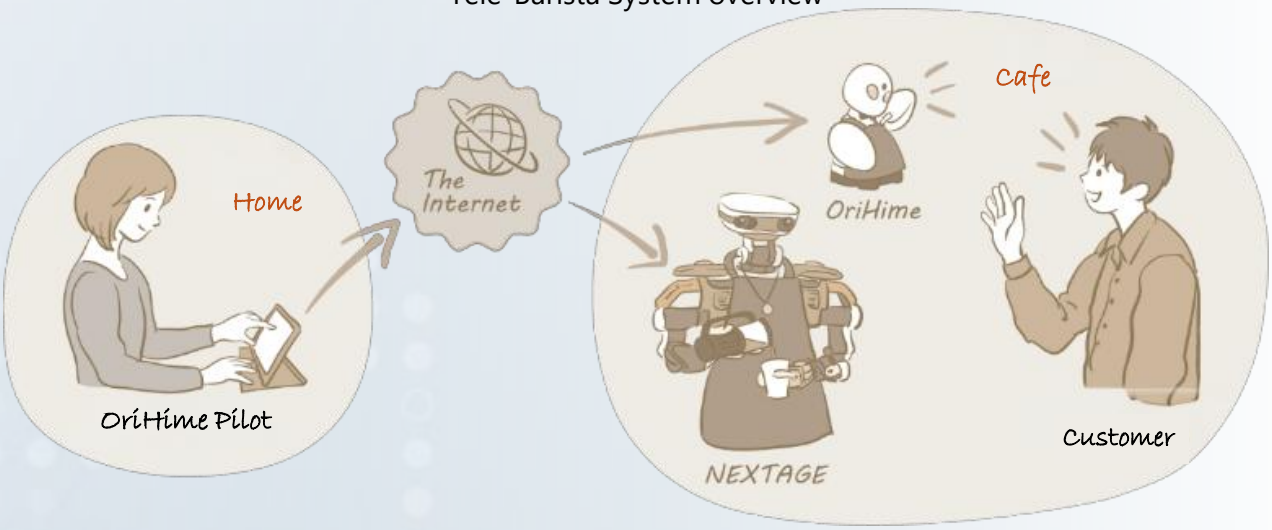
Tele-Barista brewing coffee in a cafe

Source: KAWADA Technologies, Inc.[3]

NEXTAGE working alongside people in factories

Source: GLORY LTD.

Tele-Barista System overview



Source: KAWADA Technologies, Inc.[3]

In recent years, advancements in weight reduction and cost performance have been made. Concurrently, its adoption is steadily growing.[2] The dexterous manual operations and flexible movements of NEXTAGE can be described as the culmination of Japan's strengths in precision machinery, control technology, and safety design. Today it is becoming more prominent, expanding beyond collaborative work in factories to other areas of society.

In the Tele-Barista system, the robots do not operate autonomously. Instead, pilots (remote operators) who access the system from all across Japan converse with customers through OriHime and instruct NEXTAGE to brew the coffee. This emerging profession gives people like Mikako Fujita the opportunity to participate in society by making it possible to work remotely.

Featured on TripAdvisor as an avatar café

Source: TripAdvisor

The avatar robot café "DAWN Ver.β," where the Tele-Barista system operates, experienced a surge of popularity after being featured by TripAdvisor as a "must-visit" for those visiting Tokyo.[4] Since then, it has grown into such a popular tourist destination that securing a reservation has become difficult.

Reconnecting with Society—How Pilots Transform

Many of the Tele-Baristas' pilots have faced difficulties working in traditional work environments due to illness, disability, or social withdrawal. Now, with the ability to operate remotely, people are regaining their confidence through their work in this emerging field.

"The pilots themselves are very motivated and constantly honing their skills," explains Dr. Hoshino. Study groups have formed among the pilots to strengthen their customer service abilities not only in English, but in several languages. For example, when the First Lady of Vietnam was scheduled to visit, the pilots studied Vietnamese so that they could greet her in her native language. Dr. Hoshino also notes that there are cases in which those who are typically reserved become remarkably talkative while serving customers.

By working through these robots, pilots become more driven for self-improvement, showing how meaningful employment can help workers gradually rebuild their social connections.

Japan's "Technology with Compassion"

Unlike robots who make their own judgments and move autonomously, symbiotic robots are, at their core, meant to assist while allowing people to do the decision-making. Tele-Barista robots, for example, are intended not to replace human labor, but to enrich and expand people's opportunities to participate in society.

Today, symbiotic robots are used across a wide range of fields. In manufacturing, they assist workers by handling components and supporting precision tasks; in healthcare, they aid with nursing, rehabilitation, and mobility support, sometimes functioning as powered exoskeletons or assisting surgeons with medical procedures. These robots are designed to operate under human direction, supervision, and judgment, with a strong emphasis on safety through features such as force limitations and emergency stop mechanisms. This distinguishes them from autonomous technologies such as self-driving cars and drones, which seek to minimize the role of human involvement.

In the field of symbiotic robotics, humans play the leading role, while robots work as supportive partners. This approach reflects Japan's longstanding expertise in precision machinery, sensor technology, control engineering, and rigorous safety and quality control. Together, these technological strengths address major societal challenges, including the country's aging population and persistent labor shortages.

Here you can also see the influence of Japan's cultural imagination, as shown in popular works such as Doraemon and Astro Boy, where robots are depicted not as tools to be controlled, but as companions and partners deserving of care and respect. This worldview continues to influence public attitudes, contributing to Japan's fundamentally human-centered approach.

Japan has sometimes been criticized for its slow adoption of data-driven and AI technologies—however, many believe that its placement of human well-being at the forefront of technological development will add lasting value to society.

"The Tele-Barista project provides an open space where pilots, customers, and engineers can all be happy. As an engineer myself, I'm deeply moved when I see our technology making a genuine contribution to society!"

—Yukiko Hoshino, KAWADA Technologies, Inc.

The Road to a More Inclusive Society - Using technology to improve people's lives

Another defining feature of the Tele-Barista is its intentionally slow and measured movements. As Hoshino explains, "We keep our robots' movements slow so that customers can savor the simple act of brewing a cup of coffee." In an era that prioritizes speed, efficiency, and automation, Tele-Barista takes the opposite approach. Its careful sequence of movements have been likened to the Japanese tea ceremony, where the act of brewing coffee itself becomes an opportunity to engage with visiting customers.

At the avatar robot café where the Tele-Barista system operates, there is a strong commitment not to reduce the number of workers, but rather to create even more opportunities for people to work. Nearly ten people, including robot maintenance staff, currently work on-site at the café. Individuals who have difficulty going out can also work remotely through avatar robots, expanding the range of employment options available to them.

The Ever-Evolving Tele-Barista business

This project, which began as the simple wish to "brew delicious coffee for customers once again," continues to evolve by flexibly incorporating proposals from the pilots. New initiatives are currently in the works—for children, playful elements such as rock-paper-scissors have been introduced, and for adults, the development of a "Tele-Bartender," which serves cocktails, is also underway.[5] Full-scale research is being conducted to reproduce the complex motions of shaking a cocktail shaker with both hands.

Within this dream-like space where humans and machines freely coexist, customers find fulfillment through meaningful interactions, pilots reconnect through dialogue with customers, and engineers feel proud of how the technology they developed is being used to bring other joy.

Exhibition at CES

Source: KAWADA Technologies, Inc.[6]

By combining advanced technology with continuous creativity, this initiative presents a uniquely Japanese model of an inclusive society in a country at the forefront of tackling complex challenges.

Introducing Japanese Robotics to the World

NEXTAGE has also been showcased at major international events, including the Consumer Electronics Show (CES), the world's largest electronics exhibition held every January in Las Vegas, and Future Robot Week at the 2025 Osaka-Kansai Expo. With overseas expansion in view, the business is now entering its next phase. By having real, physical robots in operation rather than just virtual ones, the Tele-Barista project continues working tirelessly to actualize the world it aims to create.

Hoshino notes that "not everyone can clearly visualize their final goal from the start." For this reason, she emphasizes the importance of seeing ideas become tangible, as demonstrated by the Tele-Barista. Regarding the future, she said, "By taking action, you come to recognize what you are capable of, and in doing so, you can discover the possibilities of tomorrow."

Exhibition at the Osaka-Kansai Expo

Source: KAWADA Technologies, Inc.[7]

Reference

1. The KAWADA Group has long supported the construction sector and has a proven track record of advancing the development of cutting-edge technological products. https://www.kawada.jp/global/
2. https://www.kawadarobot.co.jp/en/
3. https://www.kawada.jp/global/business/telebarista
4. https://www.tripadvisor.com/Restaurant_Review-g1066444-d23654471-Reviews-Dawn_Avatar_Robot_Cafe-Chuo_Tokyo_Tokyo_Prefecture_Kanto.html
5. Aiming to achieve it within fiscal year 2026.
6. https://www.kawada.jp/global/news/detail/20260106_ces_en.html
7. https://www.kawada.jp/csr/report/detail/20250804_456.html (Japanese only)

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Dr. Yukiko Hoshino earned her Ph.D. in Mechano-Informatics from the Graduate School of Engineering at the University of Tokyo in 2001. In the same year, she joined Sony Corporation, where she contributed to the development of the entertainment robot QRIO and conducted research on behavioral learning in autonomous learning agents.

In 2013, she joined the KAWADA Robotics Corporation; since 2017, she has been affiliated with the Technical Research Center of KAWADA Technologies, Inc..

She is currently engaged in research on AI robotics, as well as the development of tele-barista systems at an avatar robot café.

Awards

- 1996: 11th Research Encouragement Award, The Robotics Society of Japan
- 1999: 13th Best Paper Award, The Robotics Society of Japan
- 2012 : 26th Best Paper Award, The Robotics Society of Japan
- 2022: 14th Robot Utilization Social Contribution Award, The Robotics Society of Japan (jointly with Ory Laboratory)
- 2024: 17th Distinguished Service Award, The Robotics Society of Japan