

VENDING MACHINES AS GUARDIANS

IoT, the most advanced technology has potential to get back the human connection which once existed strongly in the society.



In Sumida Ward, Tokyo, a child carries a location transmitting device attached to his school bag.

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THIS June, the National Institute of Information and Communications Technology (NICT) commenced a field verification test, “Community-based IoT Infrastructure Using Vending Machines,” in Sumida Ward, Tokyo. The service is designed to monitor the safe status of children and the elderly by building a security network using vending machines with handheld terminals such as smartphones.

IoT is an abbreviation for the Internet of Things. It is today’s most prevalent technology for the collection and analysis of data from many sensors, providing useful information for future decision making or to control direction. However, NICT’s ideas for the use of IoT are slightly different.

Yozo Shoji, Ph.D., director of the Social-ICT Innovation Laboratory of NICT, says, “Generally, IoT is assumed to use Big Data. However, that might not be effective for a system to solve local issues related to the safe and secure life of the



Dr. Yozo Shoji, director of the Social-ICT Innovation Laboratory at NICT
Photo: Kumiko Sato

people. This project is based on the idea of local data production for local data consumption, though the scale of the collected data is not so big.”

The community contributing type of IoT service promoted by NICT is characterized by the creation of a real-time information sharing network for the local area using the wireless communications standard Wi-SUN, marking the first attempt in the world to do so. Wi-SUN possesses radio-wave detection capabili-



NICT’s location-transmitting device is small and portable.

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ties of about several hundred meters, with a “multi-hop” communications characteristic which enables data to be sent by relay. If wireless bases that serve as relay points are distributed within the range of radio waves, it is possible to develop wireless communications platforms in high density covering a wide range at a low cost, without the need to construct large



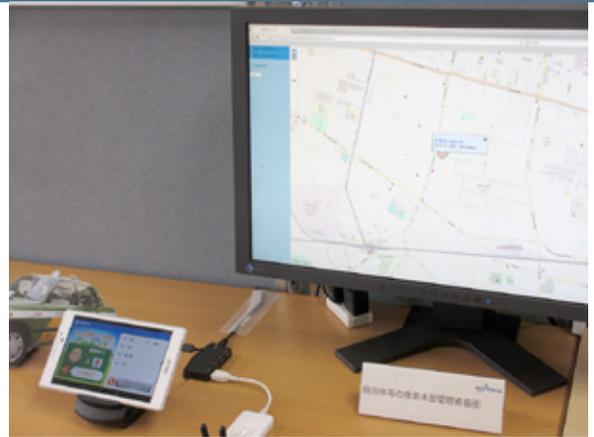
This vending machine in Tokyo's Sumida Ward serves as a wireless base and communications relay point.

Photo: Kumiko Sato

base stations. However, in reality it is time-consuming and expensive to secure locations for installing wireless bases and construct them. As a result, NICT turned its attention to vending machines, which are widely distributed throughout Japan. Vending machines are located within several hundred meters of each other in urban areas. If fixed type wireless routers are installed in them, vending machines can become reliable wireless bases. Asahi Soft Drinks Co., headquartered in Sumida Ward, is cooperating in this verification test. It is estimated that more than 90% of the Sumida Ward area can be covered using the company's soft drink vending machines as wireless bases. Moreover, if taxis and suchlike, which run actively in the region, have a function for the collection and distribution of information regarding IoT wireless service, IoT wireless service areas will be created more efficiently in residential areas. This year, with the cooperation of Honjo Taxi Co., also headquartered in Sumida Ward, smartphone-type wireless routers will be installed in its vehicles, and the verification of "moving" IoT wireless service areas will be carried out.

"Our laboratory's job is to verify how new wireless technologies will support society. This infrastructure must be a shared type that everyone can use, in a way that will benefit society. Therefore, it will be indispensable to obtain approval from organizations and companies which operate and provide the service putting it into practical use," says Dr. Shoji.

Although the volume of data to be handled is not



The whereabouts of individuals can be searched simply by entering a registered name into a PC or smartphone interface.

Photo: Kumiko Sato

so big, the IoT of Wi-SUN makes it possible to share local information in real time, and it can be expected to solve a variety of issues. Potential uses include searching for lost elderly persons, the monitoring of vacant homes which might collapse, supporting regional security and safety, such as crime prevention, and encouraging community revitalization by sending notifications of events in shopping districts, as well as tourist information.

For example, NICT planned a system to ensure traffic safety for children during this verification test. In the system, a small transmitter is distributed to children aged 7 and 8, who statistically have the largest number of accidents caused by rushing out in front of cars. When these children run near a vending machine which serves as a base, the information will be sent to the next base, one after another, and be shared. Vehicles equipped with the smartphone-type wireless router will be alerted before the children run by. Dr. Shoji says, "Even at a crossing with a blind spot, it will be possible to share the presence of a running child sufficiently early via wireless communications." He adds, "In the past, there would be an adult who would see a child playing on the road and say to him or her, 'Watch out!' The Monitoring Vending Machines are inspired by such an adult, who would watch the community and twitter."

In modern Japan, networks of human relationships of the past no longer functioned. Cutting-edge IoT might be able to compensate and recreate such networks. 