

# Robots That Care

The International Robot Exhibition 2011, cosponsored by the Japan Robot Association and *Nikkan kogyo shimbun*, was held at Tokyo Big Sight in Ariake, Tokyo over four days, from November 9 to 12. One of the world's largest robot fairs, it attracted nearly 100,000 visitors from Japan and abroad. This marked the 19<sup>th</sup> edition of the exhibition, a biannual event, and featured its largest number of exhibitors ever, with 272 companies and organizations, including robot manufacturers and universities.

Notable exhibits were industrial robots for use in factories, such as in manufacturing food and automobiles, and robots dedicated to nursing and medical care. Meeting the needs of the aging society and birthrate decline was a visible trend. Ai Kitabayashi introduces some of the exhibits.

## NSK: Guide Dog Robot

The robot that NSK exhibited is capable of replacing a guide dog. It can go up and down stairs while leading a visually impaired person. The tip of each of its four-wheeled legs is equipped with multiple sensors, which it uses to three dimensionally detect the width and numbers of stairs. It can also detect obstacles on the street and otherwise adequately guide the user. Observers of the demonstration were drawn to the robot's functions that reflect meticulous consideration for the user's safety. It temporarily stops just before going up the stairs and again before reaching the landing floor. Each of the legs is equipped with two wheels to ensure greater stability. The wheels are used to move on flat surfaces and the legs for traversing stairs. Users can easily change course by strengthening their grip in the desired direction. Practical use of this robot would reduce problems tied to the time for training required for service dogs. Demand may also grow among potential users who are averse to dogs.



## Nippon Dental University Hospital, J. Morita MFG and Kokoro: SIMROID

At a glance, the SIMROID human-shaped patient robot for use in dental clinical training, collaboratively developed by Nippon Dental University Hospital and J. Morita MFG, looks like a person. With a sensor built into the mouth, the robot moans when the scraper contacts the wrong tooth. It can even make an anxious expression and a nausea-like response. Asking it "Are you all right?" will return a verbal response. It also recognizes sound. The monitor displays the amount of burden experienced by the robot, as well as the dentist's attitude. Development of the robot was aimed at training dentists to have high communication skills and be capable of exercising care for the psychological aspects of patients, along with training in treatment-related technology. Robot manufacturer Kokoro designed the robot's highly realistic artificial skin, made from strong silicon to enable the mouth to easily be opened wide.



## Fujitsu Laboratories: Baby Bear Social Robot

Fujitsu Laboratories developed a social robot designed to look like a stuffed baby bear, which can be used at facilities for the elderly for mental care and at pre-schools for emotional education. The robot detects the user's face via the camera installed in its nose, waves its hands and imitates the user's movements. Touch sensors are embedded in thirteen parts of the body. Touching these parts makes the bear smile, which can put the user at ease. The robot has three different characters. The cheerful bear is suitable for recreational support, while the calm bear is more suited for acting as a pet in homes. The shy bear turns its eyes away at first, but gradually becomes attached if it is treated kindly. During this bonding

process, the shy bear may be able to help the elderly recall their childrearing experience and motivate them to act spontaneously. Fujitsu Laboratories in fact conducted experiments at the home of an elderly dementia patient, and witnessed revitalization of the subject's autonomic nerves.

Since the bear robot is connected with the Internet, it can also be used to monitor the user. Family members at remote locations can review recorded graphs of the user's movements and facial expressions.



## Kyokko Electric: Telexistence FST

Telexistence FST can be operated from a distance, but provides users with the sense they are actually performing the work. The operator wears a head-mounted display showing a three-dimensional image of what the robot sees, and wears a pair of gloves that lets the robot sense even minute movements of the fingertips. The operator's moves are communicated to the robot via a sensor tube determining the whole body's movements. In this way, the robot's arms and fingers move exactly like those of the operator. The same sense is sent to the operator when the robot grasps something. One visitor who experienced the remote operation of the robot reported being impressed by the feeling of being nearly one with the robot.

## National Institute of Advanced Industrial Science and Technology: Paro

The seal-shaped Paro was developed for facilitating robot therapy to reduce the effects of dementia and relieve stress. Its body is covered with an anti-bacterial artificial fur and it acts autonomously using artificial intelligence. It reacts when its name is called, expresses happiness when it is caressed and provides users with a sense of happiness and peacefulness through its communication. The shape and movements of the Paro model those of a baby seal and appear very realistic because of the efforts of developers who traveled to the North Pole to study how seals live. Due to allergies and the possibility of infections, elderly facilities are not allowed to keep animals, so Paro is also highly regarded as a good alternative to animal therapy, both in Japan and abroad. Paro is in fact already in use at elderly facilities in countries such as Japan, Denmark, Italy and Germany.



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