

Features

A new approach to design robots for health care environments

Kazuhiko Terashima, head of Toyohashi University of Technology's new Center for Symbiotic Human Robotics Research proposes new 'smart robots' for hospitals.

Japan has made global headlines with its development of humanoid robots that can walk, run, sing, dance, and even peddle bicycles. But Kazuhiko Terashima, head of Toyohashi University of Technology's new Center for Symbiotic Human Robotics Research, asks, "Where are the practical applications from all this research?" Even robotics researchers focused on taking care of humans have little to show for their efforts, says Terashima. The reason, he suggests, is because so much of the research is carried out in laboratories—not in real-world environments like a hospital, care center or the home.

"What's more, researchers generally set robots a single task to perform," he adds. "But in a hospital or care center, a robot must be able to perform a variety of tasks if it is to be useful. It needs to assist a patient or aged person to sit in a chair, lie down on a bed, enter a bath, walk, practice therapy, and so on."

This requires a new thinking in design where robots are considered part of an overall system of care, controlled directly by humans such as nurses and aides, who will be necessary in order to give reassurance to patients. The different tasks will be laid out and conducted in a workflow manner using concepts taken from factory automation. Key technologies for such a scheme under development at the Robotics Center are methods for vibration dampening, omni-directional movement, and sensor-based power-assisted movement.

"Instead of spending our funds on building complicated robots of limited use, we're developing much simpler power-assisted systems that can help the infirmed move about comfortably and safely," explains Terashima.

Heavy tasks such as lifting and moving a bed-ridden person, for instance, would be done by a single nurse or assistant using a system of personal power-assisted body cranes incorporating sensors to make the raising, lowering and moving possible with one hand and without causing unpleasant vibrations or swinging. The key to smooth operations here will be the interface between the operator and the system. "It must be simple to use and comfortable to handle with one hand," says Terashima.

To implement such a system will require coming up with a new architecture for hospitals and care centers that would incorporate a system of these overhead cranes. So the researchers are collaborating with doctors from the nearby Fukushima Hospital, which is supporting the research, who visit the Robotics Center regularly to provide feedback.

"Over the next five years, we will develop this smart system in our Center," says Terashima. "During the following five-year phase, after optimization, we'll transfer it to Fukushima Hospital. Then after ten years we will be ready to commercialize the system and offer it to the world."



Kazuhiko Terashima, head of Toyohashi University of Technology's new Center for Symbiotic Human Robotics Research



Smart robots at the Center for Symbiotic Human Robotics Research



Omnidirectional wheelchair robot being developed at the Center for Symbiotic Human Robotics Research