



# ROBOTS PAST, PRESENT AND FUTURE

INTERVIEW WITH THE DIRECTOR OF THE  
INTELLIGENT SYSTEMS RESEARCH INSTITUTE

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**A**DVANCES in robotics and artificial intelligence have created great expectations for their potential to make people's lives more comfortable and convenient. We spoke to Dr. Kazuhito Yokoi, the director of the Intelligent Systems Research Institute—part of the National Institute of Advanced Industrial Science and Technology (AIST), in Tsukuba, Japan—about the path robotics has traversed in Japan and prospects for the future.

**Please tell us about the path the robotics marketplace has taken so far in Japan, and the current environment.**

In Japan, starting from the establishment of the Japan Robot Association in 1972, a number of corporate researchers explored practical applications for robots during the seventies. And since 1980, which is regarded as year one of the robot era, industrial robots have proliferated in everyday society here.

The robotics industry went into decline when the economy took a downturn, but it is once again flourishing. The Honda Motor Company caused a stir in 1996 when it devised the bipedal humanoid robot P2. In recent years robots that are useful in our everyday lives have been proliferating—Softbank's communication robot Pepper is a hugely popular example—and anticipation about the development of robots in the field of livelihood support is growing.

**Please talk about the industries that are working to incorporate robot technology and related trends.**

As we can see from the advances made in existing robot technologies—such as the cleaning robot Roomba and medical robot da Vinci—we're likely to see robots employed in a wide variety of familiar service fields, like the fully automatic driverless Google car and freight distribution drones such as Amazon's Prime Air. In addition, communication robots that can draw emotionally close to people—like PARO, Pepper and JIBO—are anticipated to develop more therapeutic features, which are in huge demand in today's society.

In Japan, where industrial robots are advancing at a rapid pace, cooperation between humans and robots has deepened. The incorporation of industrial robots will make huge inroads in the food, cosmetics and pharmaceutical industries. We can expect the arrival of robots equipped with artificial intelligence that can make decisions autonomously. With frameworks being established for certifying human safety, wearable

## ROBOTS—A CHRONOLOGICAL TABLE

1954

American inventor George C. Devol, Jr. acquires a patent for Programmed Article Transfer, which becomes the basis for Unimate, the world's first industrial robot

1968

The introduction of new technology spurs the domestic production of robots in Japan

1972

The Japan Industrial Robot Association is established

1974

The International Symposium on Robotics is held for the first time in Japan

1980

The year full-scale proliferation of robots begins in Japan; now known as “Robot Year One”

1996

Honda announces the development of the P2, its bipedal humanoid robot



1999

The U.S. firm Intuitive Surgical Inc. announces the release of its robotic da Vinci Surgical System

2002

The U.S. firm iRobot Corporation announces the release of the Roomba, its autonomous robotic vacuum cleaner



2014

Softbank Group Corp. announces the release of Pepper, its emotion-sensing humanoid robot



robot technology that increases contact between humans and robots—such as wearable robotic suits for caregiving support or autonomously running wheelchairs—is receiving wider support.

### How far has the development of next-generation robots progressed?

After the disaster at the Fukushima Daiichi nuclear power plant in 2011, research into robots for fieldwork has progressed. AIST and Honda have joined hands to apply ASIMO's technology toward the development of the High-Access Survey Robot, which has already been sent into Fukushima Daiichi. At AIST, a project with the New Energy and Industrial Technology Development Organization (NEDO) is working to develop disaster response humanoid robots that can function autonomously in unknown environments outside of prelearned movement patterns, and field robots that can provide infrastructure maintenance and update work through preventive measures and inspection duties. However, the practical applications for disaster response humanoid robots no doubt lie a bit farther into the future.

### What do you foresee happening in Japan's robotics industry?

While Japan is known as a “robot superpower,” the country faces many issues: a declining birthrate, an aging and deteriorating population, and a shrinking generation of workers destined to bear the weight of Japan's primary industries. Because we are an advanced nation with such pressing issues, robots are viewed with great hope. The arrival of the age of the Internet of Things, where the “things” that comprise our everyday life from industrial machines to consumer goods are all connected by the Internet, is expected to be driven by big data and networks, and the shift toward robots possessing artificial intelligence is imminent. We hope that solving Japan's societal problems and strengthening its international competitiveness will give rise to a society where robots generate added value, and make Japan the world's number one culture in the integration of robots in society. 

Source: Japan Robot Association