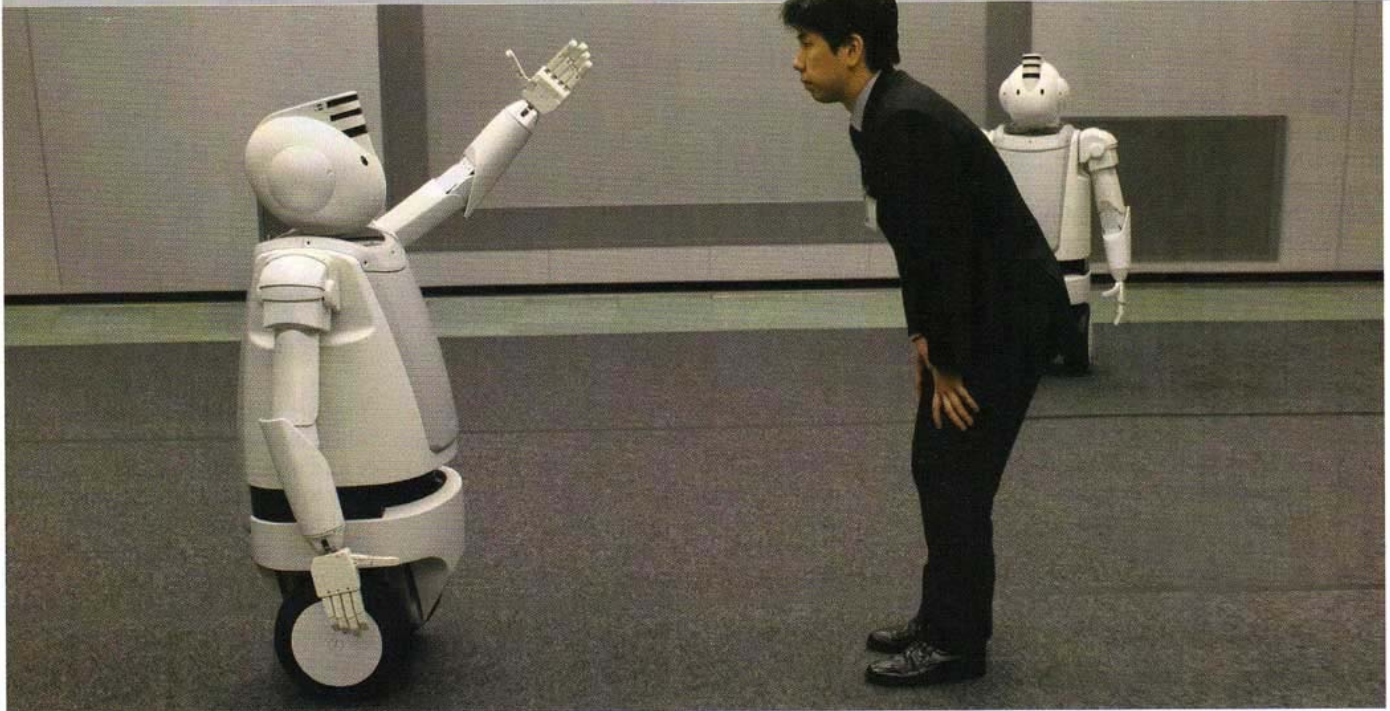


## Japan's humanoid robots



# Better than people

TOKYO

## Why the Japanese want their robots to act more like humans

**H**ER name is MARIE, and her impressive set of skills comes in handy in a nursing home. MARIE can walk around under her own power. She can distinguish among similar-looking objects, such as different bottles of medicine, and has a delicate enough touch to work with frail patients. MARIE can interpret a range of facial expressions and gestures, and respond in ways that suggest compassion. Although her language skills are not ideal, she can recognise speech and respond clearly. Above all, she is inexpensive. Unfortunately for MARIE, however, she has one glaring trait that makes it hard for Japanese patients to accept her: she is a flesh-and-blood human being from the Philippines. If only she were a robot instead.

Robots, you see, are wonderful creatures, as many a Japanese will tell you. They are getting more adept all the time, and before too long will be able to do cheaply and easily many tasks that human workers do now. They will care for the sick, collect the rubbish, guard homes and offices, and give directions on the street.

This is great news in Japan, where the population has peaked, and may have begun shrinking in 2005. With too few young workers supporting an ageing population, somebody—or something—needs to fill the gap, especially since many of Japan's young people will be needed in science, business and other creative or knowledge-intensive jobs.

Many workers from low-wage countries are eager to work in Japan. The Philippines, for example, has over 350,000 trained nurses, and has been pleading with Japan—which accepts only a token few—to let more in. Foreign pundits keep telling Japan to do itself a favour and make better use of cheap imported labour. But the consensus among Japanese is that visions of a future in which immigrant workers live harmoniously and unobtrusively in Japan are pure fancy. Making humanoid robots is clearly the simple

and practical way to go.

Japan certainly has the technology. It is already the world leader in making industrial robots, which look nothing like pets or people but increasingly do much of the work in its factories. Japan is also racing far ahead of other countries in developing robots with more human features, or that can interact more easily with people. A government report released this May estimated that the market for “service robots” will reach ¥1.1 trillion (\$10 billion) within a decade.

The country showed off its newest robots at a world exposition this summer in Aichi prefecture. More than 22m visitors came, 95% of them Japanese. The robots stole the show, from the nanny robot that babysits to a Toyota that plays a trumpet. And Japan's robots do not confine their talents to controlled environments. As they gain skills and confidence, robots such as Sony's QRIO (pronounced “curio”) and Honda's ASIMO are venturing to unlikely places. They have attended factory openings, greeted foreign leaders, and rung the opening bell on the New York Stock Exchange. ASIMO can even take the stage to accept awards.

### The friendly face of technology

So Japan will need workers, and it is learning how to make robots that can do many of their jobs. But the country's keen interest in robots may also reflect something else: it seems that plenty of Japanese really like dealing with robots.

Few Japanese have the fear of robots that seems to haunt westerners in seminars and Hollywood films. In western popular culture, robots are often a threat, either because they are manipulated by sinister forces or because something goes horribly wrong with them. By contrast, most Japanese view robots as friendly and benign. Robots like people, and can do good.

The Japanese are well aware of this cultural divide, and com- ►►

## Japan's humanoid robots

mentators devote lots of attention to explaining it. The two most favoured theories, which are assumed to reinforce each other, involve religion and popular culture.

Most Japanese take an eclectic approach to religious beliefs, and the native religion, Shintoism, is infused with animism: it does not make clear distinctions between inanimate things and organic beings. A popular Japanese theory about robots, therefore, is that there is no need to explain why Japanese are fond of them: what needs explaining, rather, is why westerners allow their Christian hang-ups to get in the way of a good technology. When Honda started making real progress with its humanoid-robot project, it consulted the Vatican on whether westerners would object to a robot made in man's image.

Japanese popular culture has also consistently portrayed robots in a positive light, ever since Japan created its first famous cartoon robot, Tetsuwan Atomu, in 1951. Its name in Japanese refers to its atomic heart. Putting a nuclear core into a cartoon robot less than a decade after Hiroshima and Nagasaki might seem an odd way to endear people to the new character. But Tetsuwan Atomu—being a robot, rather than a human—was able to use the technology for good.

Over the past half century, scores of other Japanese cartoons and films have featured benign robots that work with humans, in some cases even blending with them. One of the latest is a film called "Hinokio", in which a reclusive boy sends a robot to school on his behalf and uses virtual-reality technology to interact with classmates. Among the broad Japanese public, it is a short leap to hope that real-world robots will soon be able to pursue good causes, whether helping to detect landmines in war-zones or finding and rescuing victims of disasters.

The prevailing view in Japan is that the country is lucky to be uninhibited by robophobia. With fewer of the complexes that trouble many westerners, so the theory goes, Japan is free to make use of a great new tool, just when its needs and abilities are happily about to converge. "Of all the nations involved in such research," the *Japan Times* wrote in a 2004 editorial, "Japan is the most inclined to approach it in a spirit of fun."

These sanguine explanations, however, may capture only part of the story. Although they are at ease with robots, many Japanese are not as comfortable around other people. That is especially true of foreigners. Immigrants cannot be programmed as robots can. You never know when they will do something spontaneous, ask an awkward question, or use the wrong honorific in conversation. But, even leaving foreigners out of it, being Japanese, and having always to watch what you say and do around others, is no picnic.

It is no surprise, therefore, that Japanese researchers are forging ahead with research on human interfaces. For many jobs, after all, lifelike features are superfluous. A robotic arm can gently help to lift and reposition hospital patients without being attached to a humanoid form. The same goes for robotic spoons that make it easier for the infirm to feed themselves, power suits that help lift heavy grocery bags, and a variety of machines that watch the house, vacuum the carpet and so on. Yet the demand for better robots in Japan goes far beyond such functionality. Many Japanese seem to like robot versions of living creatures precisely because they are different from the real thing.

An obvious example is AIBO, the robotic dog that Sony began selling in 1999. The bulk of its sales have been in Japan, and the

*The country is lucky to be uninhibited by robophobia*



company says there is a big difference between Japanese and American consumers. American AIBO buyers tend to be computer geeks who want to hack the robotic dog's programming and delve in its innards. Most Japanese consumers, by contrast, like AIBO because it is a clean, safe and predictable pet.

AIBO is just a fake dog. As the country gets better at building interactive robots, their advantages for Japanese users will multiply. Hiroshi Ishiguro, a robotocist at Osaka University, cites the example of asking directions. In Japan, says Mr Ishiguro, people are even more reluctant than in other places to approach a stranger. Building robotic traffic police and guides will make it easier for people to overcome their diffidence.

Karl MacDorman, another researcher at Osaka, sees similar social forces at work. Interacting with other people can be difficult for the Japanese, he says, "because they always have to think about what the other person is feeling, and how what they say will affect the other person." But it is impossible to embarrass a robot, or be embarrassed, by saying the wrong thing.

To understand how Japanese might find robots less intimidating than people, Mr MacDorman has been investigating eye movements, using headsets that monitor where subjects are looking. One oft-cited myth about Japanese, that they rarely make eye contact, is not really true. When answering questions put by another Japanese, Mr MacDorman's subjects made eye contact around 30% of the time. But Japanese subjects behave intriguingly when they talk to Mr Ishiguro's android, ReplieeQ1. The android's face has been modeled on that of a famous newsreader, and sophisticated actuators allow it to mimic her facial movements. When answering the android's questions, Mr MacDorman's Japanese subjects were much more

likely to look it in the eye than they were a real person. Mr MacDorman wants to do more tests, but he surmises that the discomfort many Japanese feel when dealing with other people has something to do with his results, and that they are much more at ease when talking to an android.

Eventually, interactive robots are going to become more common, not just in Japan but in other rich countries as well. As children and the elderly begin spending time with them, they are likely to develop emotional reactions to such lifelike machines. That is human nature. Upon meeting Sony's QRIO, your correspondent promptly referred to it as "him" three times, despite trying to remember that it is just a battery-operated device.

What seems to set Japan apart from other countries is that few Japanese are all that worried about the effects that hordes of robots might have on its citizens. Nobody seems prepared to ask awkward questions about how it might turn out. If this bold social experiment produces lots of isolated people, there will of course be an outlet for their loneliness: they can confide in their robot pets and partners. Only in Japan could this be thought less risky than having a compassionate Filipina drop by for a chat. ■

