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???(Robotic Fan) ? ??? ? ??,??,??? ? The rise of the humanoid robot

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😊 The rise of the humanoid robot

By Anthony Paul

COME June, spectators gathered in an industrial pavilion in Lisbon will witness some unusual sporting spectacles - RoboCup2004. None of the players will be human. Some will be two-legged robots; others, wheeled robots. Some will be four-legged robotic dogs - Sony's entertainment robot known as 'Aibo'.

Other robotic devices will also be competing - in displays ranging from the ability to dance to rescuing people trapped in dangerous situations. But the soccer match will be the core event, and for a very serious scientific purpose. RoboCup 2004 will be the latest step in a long-term scientific exercise - the development of humanoid teams capable of defeating the World Cup champions by 2050.

RoboCup 2004 is the eighth in a series that began in Osaka in 1997. Asia-Pacific teams in Lisbon are expected to include Australia, China and Japan. And Singapore will be there: Singapore Polytechnic boasts one of the region's most advanced robotic research centres.

Why should soccer be so important to robotic science? 'It's a game that best illustrates a human's various complex skills,' says Dr Zhou Changjiu, a humanoid robot specialist in the polytechnic's Electrical and Electronic Engineering School. 'These include locomotive skills (walking, running, kicking, jumping), perceptive skills (recognising the terrain, identifying the ball and players), and mental skills (tactics, strategy and deceiving opponents).'

In order to standardise the soccer players, the 'robot platform' for the 2004 play-offs will be one of three versions of Sony's four-legged entertainment robot known as 'Aibo'.

When Aibo entered the market five years ago, it was first seen to be little more than a very expensive toy. But the robot's name pointed to something more than that: The first two letters in Aibo stand for Artificial Intelligence, and the Japanese word itself means 'partner'.

Aibo can talk, play with a ball and develop a personality. (It remembers how well you treated it - gently or with unfriendliness - and responds accordingly.)

Despite a whopping US\$2,200 (S\$3,740) opening price, the first batch of 3,000 units were snapped up in 20 minutes in Japan. Sony's Tokyo office tells me that at last count, the company had sold 130,000 worldwide at around \$2,000 each.

Now, robotic dogs are all very well. But as any Hollywood movie-maker will tell you, the mass market identifies more closely with machines that are vaguely human in appearance. (Think R2-D2, and Arnold Schwarzenegger - in any role.) Hence, all the work currently being done on humanoid robots. (Dr Zhou, formerly of the Railway University in Dalian, China, is a world leader in the field, and this year's RoboCup Humanoid League co-chairman.)

Last September, Sony followed Aibo with a humanoid robot, Qrio (evoking 'Quest for curiosity' and pronounced curio). The machine, which vaguely resembles a 60cm tall dwarf in a spacesuit, entertained a Paris audience with a dancing display, and held limited conversations in French and English. Since then, Qrio's accomplishments have included a walking, running and jumping display in Tokyo in December (top speed: 14m per second). Last month, one of the humanoids conducted the Tokyo Philharmonic in a rendition of Beethoven's 5th Symphony.

Toyota, at about the same time, introduced a humanoid trumpet-player to a Tokyo audience. It hopes to have it playing in an entire robot band for the 2005 World Expo in Aichi in central Japan.

DIGITAL CREATURE

'THE 1980s through the 1990s was the era of the digital computer,' Sony Computer Science Laboratories chief Toshi Doi told me at one of Aibo's early appearances in Tokyo. 'We're about to enter the era of the digital creature.'

Mr Doi, who led Aibo's development, sees these early 'entertainment robots' eventually developing into, among other things, electronic servants, especially for the aged.

Dr Zhou concurs. 'My mission is to develop a low-cost humanoid platform akin to a housemaid: a robot that will bring something over to you, do something for you, and so on.' He believes that it should eventually be possible to build a humanoid robot that will 'perform all manual or even mental tasks as well as, if not better than, a human being'.

For the moment, the Japanese are in the forefront of robot development. Since 1986, Honda has been experimenting with its life-sized (1.2m tall) humanoid robot named Asimo (for Advanced Step in Innovative Mobility, and an echo of the late Isaac Asimov, author of many novels about robots). NEC also has its R100, billed as 'a robot with attitude'. It takes 250 photos of you at your first meeting, and with a memory based on such data is able to recognise you (and up to nine other people) at subsequent encounters, and shape its behaviour according to how well you behaved.

Last December, NEC's PaPeRo arrived, billed as the world's first interactive robot able to translate Japanese and English. It can identify 25,000 different English words despite pronunciation differences, analyse each sentence's subject, verb and predicate, and then translate it into spoken Japanese.

As this very promising 21st century industry emerges, how will Singapore be contributing?


Dr Zhou is very upbeat about the Republic's role. 'In the area of robotics applications in industry, like electronics manufacturing - particularly vision and system integration, military robots and robotics systems for education - we are near the lead,' he told me. 'Unmanned autonomous vehicles (UAVs), robot soccer and humanoids are some good examples.'




The polytechnic's humanoid robots, known as Robo-Erectus, won first place in Humanoid Free Performance at RoboCup in Padua, Italy, last year.



And the pay-off for Singapore?


'Robotics is a synergy of many technologies,' says Dr Zhou. 'The R&D in robotics will also promote advancement in areas like control, sensor, vision and high-precision manufacturing. I'm confident that Singapore will be a hub for advanced robotics research and applications.'

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