

Developing robots with human-like behaviour

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European and Japanese scientists have been successful in the field of artificial intelligence, especially regarding the development of robots that carry out repetitive tasks in process control and assembly. But challenges still exist.

Determined to bring to market robots with human-like behaviour, scientists from the European Science Foundation (ESF) and the Japan Society for the Promotion of Science (JSPS) are encouraging young researchers to develop robots that can conform to situations and physical movements in ways that humans do.

The ESF and JSPS co-launched an event earlier this year bringing together young researchers from the fields of robotics and cognitive science. The aim of the conference was to strengthen a new generation of intelligent machines.

Citing Russian neurophysiologist Nikolai Bernstein during his presentation, Professor Florentin Wörgötter from Göttingen University in Germany said the difficulty in 'mimicking animal movements' is that their development needs 'a complex combination of mechanics, neuronal feedback and instantaneous adaptability'.

But Professor Wörgötter pointed out that gaining more insight into how animals coordinate their movements could help people transfer the same principles to robots and their development.

The ESF/JSPS conference also touched on how it would be ideal to develop robots that can adapt and learn from their mistakes. The University of Tokyo's Professor

Yasuo Kuniyoshi said conventional methods based on artificial intelligence techniques developed since the 1980s have failed to produce adaptable robots.

'Such techniques involve breaking down events that a robot has not been programmed to expect into smaller parts in an attempt to analyse them,' he said. Professor Kuniyoshi commented that the problem is that the robot has no opinion on how to act best.

For his part, Dr Shuuji Kajita presented conference participants with new walking techniques on biped robots. The AIST group researcher based the techniques on the 'Zero-Moment Point' (ZMP) principle. ZMP guarantees that a top-heavy system, including a humanoid robot, will not have difficulty walking and will not pressure its points of contact with the ground, the professor said. The end result is an improved robot with better moving action.

The event also focused on the importance of the communication channel between humans and robots, regardless of the method used to instruct robots. Professor Aude Billard from the Swiss Federal Institute of Technology said latest efforts on developing natural means of transmitting human knowledge about tasks and skills to robots have been fruitful.

Professor Billard has been investigating various methods of human-machine interaction, including how a robot imitates a human. According to her, enabling robots to interpret a person's intention and predict their action will help researchers meet the challenge of getting robots to imitate simple human gestures.

Experts say that combining the techniques presented at the ESF/JSPS conference will benefit cognitive robotics in the years to come. The upshot is that humanoid machines with the ability to support people in homes and at work will become a reality.

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