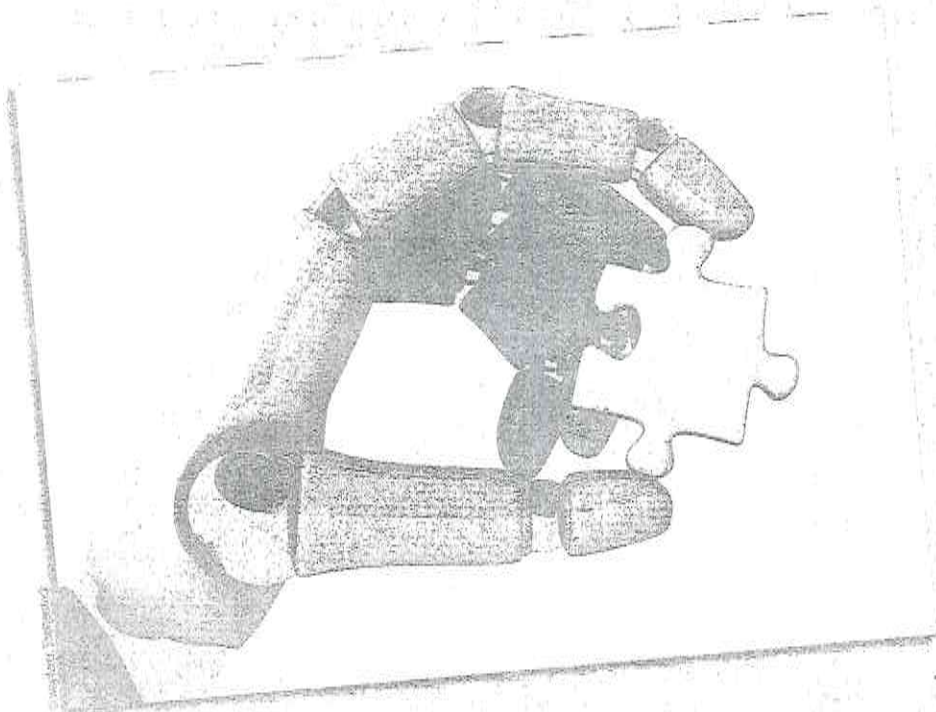


Fingertip sensitive robot to boost competitiveness

EU-funded researchers have created a robot able to be employed at any modern industrial workstation with such advanced fingertip sensitivity it can even hold an egg without cracking it. They believe the invention will help keep European production competitive with the rest of the world.

This innovative robot is an outcome of the PISA (1) project, which clinched EUR 7 million under the 'Nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices' (NMP) thematic area of the EU's Sixth Framework Programme (FP6).

The workerbot can also inspect components over a continuous 24-hour period — an important advantage when precision is of the utmost importance, such as in the field of medical technology, where a defective part can, in the worst case scenario, endanger human life.



Another distinctive feature of the pi4-workerbot is that it has two arms. 'This allows it to carry out new kinds of operations,' said Dr Dragoljub Surdilovic, head of the working group at the Fraunhofer Institute. 'These robots can transfer a work-piece from one hand to the other.'

He explained that this could be useful, for instance, for observing complex components from all angles. Dr Surdilovic added that conventional robotic arms generally only have one swivel joint at the shoulder, while all their other joints are articulated. 'In other words, they have six degrees of freedom, not seven like a human arm,' he said.

Developed by the Fraunhofer Institute for Production Systems and Design Technology (IPK) in Berlin, Germany, the robot known as 'pi4-workerbot' is similar in size to a human being, and has two arms, three cameras, fingertip sensitivity and a variety of facial expressions. It is capable of making many more movements than a normal robot. It was designed to help manufacturers operating in Germany who need technology that can be adapted for and cope with a variety of product versions and fluctuating volumes.

A state-of-the-art 3D camera in its forehead captures its general surroundings, and the other two are used for inspection purposes. Matthias Krinke, managing director of pi4-Robotics, the company that is bringing the workerbot to market said these different cameras allow it to perform a wide range of tasks. 'It can measure objects or inspect a variety of surfaces,' he said. Mr Krinke pointed out that the robot can, for example, identify whether or not the chromium coating on a work-piece has been perfectly applied by studying how light reflects off the material. 'If you use two different cameras, it can inspect one aspect with its left eye, and another with its right,' he said.

However, as well as the swivel joint at its shoulder, the workerbot has an additional rotation facility that corresponds to the wrist on a human body. Dr Surdilovic's working group developed the control system for the workerbot. 'Programming the two arms to work together — for example, to inspect a work-piece or assemble two components — was a real challenge as it requires additional sensor systems,' he commented.

The researchers also endowed the robot with fingertip sensitivity. 'If you set the strength of the grip correctly, it will take hold of an egg without cracking it,' said Dr Surdilovic. And it even has a variety of facial expressions. 'If its work is going smoothly, it will smile happily, but if it looks bored it's waiting for work and the production manager knows the production process can be speeded up,' according to the team.

(1) Flexible assembly systems through workplace sharing and time sharing human-machine cooperation.