Robots seek role in reactors

Artificial cognitive systems will soon be able to play a greater role in dealing with problems such as Fukushima

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Robots will be needed more in hostile environments

Robots will soon be able to play a greater role in dealing with emergencies such as those unfolding at the Fukushima nuclear plant in Japan, experts have said.

More than 400 European robotics experts met in Sweden last month to discuss advancements in the design of cognitive robots whose thought processes would be akin to artificial intelligence. The consensus was that such robots could play a crucial role in solving situations like Fukushima, but that certain technical limitations still needed to be addressed.

Dr Vincent Müller, the research co-ordinator for EUCogII, a European network for researchers in artificial cognitive systems, said that fragmented activities in the robotics research community meant that many existing robots were too fragile for the hostile conditions they might face. "Our current robots are like laptops – they either work or they don't," he said. "We need to focus on developing intelligent, flexible, biologically inspired alternatives. Robots of the future need to be less like laptops and more like cockroaches, being more adaptive and using low power."

Müller said that as long as sequences of events such as Fukushima were impossible to predict, there would be a need for research activities to address issues of flexibility. "The reactors shut down as planned, but when the electricity supply went down nothing happened and there was nothing in the manual about this eventuality. As we will never be able to achieve 100% accurate predictions of the future, we must develop intelligent, robust, autonomous systems that will keep on working in less than ideal situations.

"The ramifications will be huge, not just for the nuclear sector, but for mining, space and the oil and gas industries."

While teams such as EUCogII may be some years away from developing fully functioning cognitive robots, other speakers at the event made it clear that the Japanese authorities' action plan would have benefited enormously from a truly accurate understanding of events unfolding within the troubled plant. The solution to this, a branch of robotics known as surveillance, has existed for many years and is both mature and effective.

Geoff Pegman, managing director of Manchester-based RU Robots, one of the leading robotics firms in the UK, said: "Europe has a world-leader position in intervention robots, partly thanks to funding from the EU. France and Germany, both nations dependent on nuclear power, have robotically equipped response teams and the Japanese should clearly have sought help from these specialists to whom robots are not seen as futuristic, but standard kit. One wonders why all nuclear nations do not maintain such a capability."

Perhaps the best-known surveillance and intervention robot on the market is the radiation-tolerant, nose-following snake arm developed by Bristol-based OC

By PE

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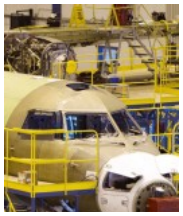

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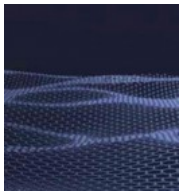

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Robotics, which has been used in nuclear plants in Canada and Sweden.

The snake arm can deliver cameras and other pieces of monitoring equipment to areas of nuclear plants that cannot be safely accessed by humans. The snake arm can cope with particularly high doses of radiation because it has no motors or electronics in the arm itself. The motion comes from wire actuators delivered from the motors and electronics at its base. Dr Rob Buckingham, managing director of OC Robotics, said: "Semi-autonomous robots such as our snake arm can be used in conjunction with humans to provide surveillance of major parts of nuclear plants such as the vessel and the pipes that go into it. We have just completed delivery of such a system to one of Ontario Power Generation's plants in Canada."

Buckingham said that cognitive robotics may become useful for problems like Fukushima in the future but, in the near term, the nuclear industry would continue to make more use of existing reliable, cost-effective, remote-controlled automation. "Cognitive robotics is an exciting area but more effective surveillance and intervention is achieved when robots and people work together," he said.

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