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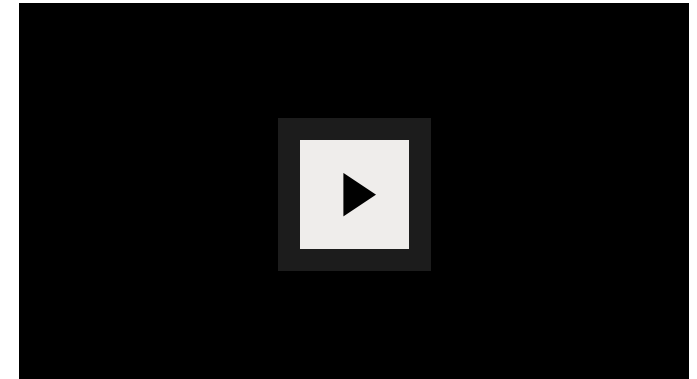
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# Scientists Develop Robots That Adapt to Damage, Keep Working

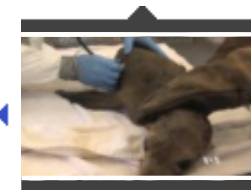
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This damaged robot tests different responses using a trial-and-error algorithm and can learn to get up and keep walking in about a minute. (Credit: Antoine Cully/Pierre and Marie Curie University)

Jessica Berman

May 27, 2015 4:02 PM



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Robots are everywhere. They can build cars, play chess or clean your house, and someday they may drive your car.

Beyond this planet, Rovers named Spirit and Opportunity were sent to Mars on a continuing mission of exploration.

Robots also play vital roles in natural disasters, according to University of Wyoming computer scientist Jeff Clune with the Evolving Artificial Intelligence Lab.

Roving robots are deployed in search-and-rescue operations following an earthquake and may someday be used to sort through the wreckage of a nuclear accident like the one in Fukushima, Japan.

“The problem is that all of those types of situations and environments are extremely unpredictable and hostile,” he said. “And it is very likely that robots and humans in those situations become damaged. And when seconds count and lives are on the line, we definitely do not want robots to give up at the first sign of injury. We want them to be able to adapt and deal with any damage and injury they suffer to continue to perform their mission until they can be brought back in to be repaired.”

With this idea of adaptation in mind, Clune and colleagues in France have



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added one more function to the skill set of robots operating under potentially harsh conditions.

In an article detailing their work in the journal *Nature*, Clune and French designers describe how they programmed a robot with six legs and a robotic arm to learn how to overcome injury.

"Once they become damaged," he said, "they use their intuition and that knowledge of how their body works to come up with hypotheses, like a scientist almost, saying, 'Oh, I think this might work. Oh, no, that did not work. Let me try something completely different. Oh, that does not work either. Let me try this third thing. Ah, that works fine despite the damage. Now, let me go about my business.' "

Clune said the robots are programmed with a childlike curiosity, and they use that primitive algorithm to figure out how to adapt to injury.

It takes about a minute for the robots, using the trial-and-error process, to figure out how to overcome damage.



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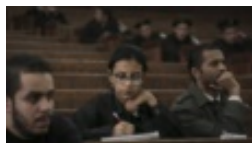


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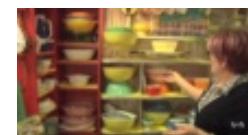
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needed relief but officials said the intense heat was likely to continue for another day

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