Teaching robots to feel pain to protect themselves

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A pair of researchers with Leibniz University of Hannover has demonstrated the means by which robots might be programmed to experience something akin to pain in animals. As part of their demonstration at last week's IEEE International Conference on Robotics and Automation held in Stockholm, Johannes Kuehn and Sami Haddaddin showed how pain might be used in robots, by interacting with a BioTac fingertip sensor on the end of a Kuka robotic arm that had been programmed to react differently to differing amounts of "pain."

The researchers explained that the reason for giving robots pain sensors is the same as for existing biological adaptations—to ensure a reaction that will lessen the damage incurred by our bodies, and perhaps, even more importantly, to help us to remember to avoid similar situations in

the future. In the case of the robots, the researchers have built an electric network behind the fingertip sensor meant to mimic nerve pathways below the skin in animals, allowing the robot to "feel" what has been programmed to describe various types, or degrees of pain.

In the demonstration, the researchers inflicted varying degrees of pain on the robot, explaining the reasoning behind the programmed reaction: When experiencing light pain or discomfort, for example, the robot recoiled slowly, removing itself from the problem. Moderate pain, on the other hand called for a rapid response, moving quickly away from the source, though it had the option to move back, albeit, tentatively, if need be. Severe pain, on the other hand, is often indicative of damage, thus the robot had been programmed to become passive to prevent further damage.

Such robots are likely to incite a host of questions, of course, if they become more common—if a robot acts the same way a human does when touching a hot plate, are we to believe it is truly experiencing pain? And if so, will lawmakers find the need to enact laws to prevent cruelty to robots, as is the case with animals? Only time will tell of course, but one thing that is evident in such demonstrations—as robotics technology advances, researchers are more often forced to make hard decisions, some of which may fall entirely outside the domain of engineers.

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