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## [A Robot That Knows When to Back Off](#)

A modified Roomba tries to detect, and avoid, stressed-out users.  
Friday, March 13, 2009  
By Kristina Grifantini

We all feel the urge to kick our home appliances occasionally. But what if they all rushed into another room as soon as you started getting angry?

It's not such a far-fetched idea. At the [2009 Human-Robot Interaction conference](#), which took place this week in California, researchers presented a range of research on how to improve communication between humans and machines. One presentation revealed a modified vacuum-bot that can detect its owner's emotional states.

In a paper titled "[Using Bio-electrical Signals to Influence the Social Behaviors of Domesticated Robots](#)," [researchers from the University of Calgary](#) describe connecting a headband that reads bioelectrical signals to a humble floor-cleaning [Roomba](#).

The headband, which is sold as a gaming device, detects muscle tension in the wearer's face, so the researchers were able to directly control the Roomba's speed by, for example, clenching their jaws or tensing their eyebrows. They also developed a somewhat crude way to evaluate a person's emotional state, based on facial muscle tension (the more tension, the more stress), and programmed the Roomba to respond. If a person exhibited high stress, the Roomba continued cleaning but moved away from the user, according to the paper.

Robots that can sense human emotions could be much more responsive, the researchers say. Envision a robot cowering under the bed if a user is feeling angry and looking for something to kick. Alternatively, a robot designed to provide comfort could instinctively approach a person who is feeling particularly sad or stressed.

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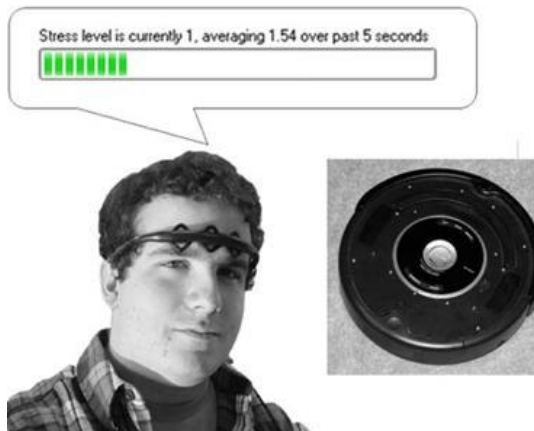
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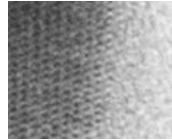
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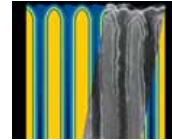
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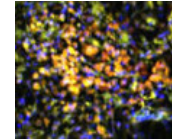
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