

Programming for the love of it

Human beings know to take a step back from someone who's stressed - but who would expect that from a machine?

Paul Saulnier has designed a robot that can do just that.

A 2008 graduate of the University of New Brunswick's Saint John campus, Paul made world technology headlines in March 2009 when the media got word of his invention, a project he's titled 'Robot Emotional Control.'

The project was developed as part of his graduate studies in Calgary with the goal of designing a robot that responds to human emotion.

The current prototype uses bioelectrical signals and forehead muscle tension to determine stress. It consists of a Roomba robotic vacuum cleaner and an OCZ neural impulse headset, both of which are available commercially.

When a person feels stressed and wears the headset, the Roomba will recognize this and move away from the person while vacuuming. When stress disappears, the Roomba will return to the person.

"It tunes into brain signals, decodes them and tries to separate them," says Paul. "It feeds them into a software program, which we link to the Roomba to interpret stuff based on those signals."

The synergy of the two products comes from a program Paul designed himself.

"The Roomba came with its own software and we couldn't really extend it," he explains, "so I wrote my own program that would take signals from this software."

Engagement through emotion

Paul's robot got international attention after he presented it at a Human Robot Interaction conference in March 2009. Stories about the robot were published in Wired, Gizmodo and the MIT Technology Review, along with many other publications.

The robot is just a prototype, though - with the Roomba robot a success, Paul now believes there is plenty of room to expand on the concept of emotional control.

"Most times, robots respond to what you tell them to do - like a standard desktop computer, where you press keys and issue commands to get a task done," says Paul. "Our project is implicit interaction; it's indirect control. The robot is responding to your emotions, by reading them and then deciding what to.

"You don't have to tell it what to do at all. All you have to do is go about your normal life and wear an input device, such as a brain headband. In the future, you may not even need that."

Imagine using having a robot to comfort you when you're stressed or sad - this could be possible using the Robot Emotional Control technology by developing a new robot to react to different emotions.

The robot could also be used for teaching - particularly in school systems in Japan, where robots are being considered to fill gaps in a dwindling workforce of teachers.

"The average teacher can sense when a class is unhappy, sad or even stressed about the class material, but a robot can't. A robot would just be going through the material at a standard pace."

"But if we added an emotional control element to it, the robot might actually tune into the emotions of everybody. If everyone is absolutely relaxed, maybe the robot is going too slow. If everyone is stressed or sad, maybe the material is too difficult and the robot needs to slow down and go over more examples. A robot could recognize that and react."

Paul is now focusing his research on robots that behave appropriately based on the context that they're in. "When a robot needs to interrupt a person," he says, "it should do so appropriately using behaviour that matches the circumstances - like using calm movements when telling the user it's lunch time, and using much less relaxed behaviour if there is a more urgent situation, such as a fire alarm."

Learning the ropes at home

Paul considered not going to university after high school, but thanks to encouragement from friends and the close-knit community at UNB Saint John, Paul went so far as to pursue a graduate-level education.

He had a great experience with both classmates and professors while studying towards his bachelor of science in computer science in New Brunswick's largest city.

"You got to know just about every professor, and every professor got to know who you were. With fewer students, too, you're together with the same students more. It's a bit easier to make friends in the program, and get to know what they're about, rather than never seeing them again like at bigger schools."

Despite being a smaller campus, the Computer Science program at UNB Saint John - as well as the one in Fredericton - is nationally accredited, giving UNB students the same edge as large schools but with a more close-knit experience.

"It's just as well recognized as a program from a much larger university in another province," says Paul. "It was very convenient to be able to do that right in New Brunswick."

Contributed by Josh O'Kane. This story was made possible thanks to the financial support of the [UNB Associated Alumni](#)