‘Robots for Humanity’ Helps Quadriplegic Perform Daily Tasks

Georgia Institute of Technology

Since his stroke 10 years ago, Henry Evans has been unable to scratch an itch or shave his own face.

But now, even though he is mute and quadriplegic, he can scratch himself and shave his cheek with the aid of a Personal Robot 2 (PR2) in a laboratory setting.

The successes come out of a new project called Robots for Humanity, a collaboration of the Georgia Institute of Technology, Willow Garage and Henry and Jane Evans of Palo Alto, Calif.

The initial steps show great potential for the role of personal robots in assisting individuals with disabilities.

“This is just the beginning,” said Charlie Kemp, director of the Healthcare Robotics Lab at Georgia Tech and assistant professor of biomedical engineering. “We hope to really push on these technologies so robots like this can actually help people every day. “

The Robots for Humanity project started somewhat serendipitously. Last year, Henry Evans saw Kemp on CNN demonstrating his research with the PR2, a robot built by private research lab Willow Garage. Evans was excited about the robot’s potential to help him, so he contacted Willow Garage and Kemp to see if they would be willing to work with him.

Since January, the team has been crafting various interfaces, tools and control software to help Evans perform more tasks on his own. In March, Kemp and members from his research team – Georgia Tech graduate students Tiffany Chen, Philip Grice and Hai Nguyen – flew to California to work with Willow Garage researchers and Henry and Jane Evans. At this meeting, Evans controlled the robot to scratch his own face for the first time in 10 years. Researchers also went to the Evans’ home to learn more about Henry and his needs.

After years of physical therapy, Evans was able to regain the use of a finger and movement of his head, which allows him to use computers. In addition to bringing the team together, Evans has been instrumental in design and execution of the research, Kemp said.

“Henry is very much a collaborator in the process,” Kemp said. “He gives us expert end user suggestions, actively contributes valuable ideas and is highly motivating with his passion and charisma. He's definitely one of the project leaders. He also has a good engineering sense.”

Since the start of the project, Evans has virtually visited Kemp’s lab at Georgia Tech many times to help develop and test the PR2’s controls via a web-based interface. Before the project got off the ground, Evans used PowerPoint to design a layout for an interface, which guided the first implementation.

“Using new web technologies, we’ve set up all the controls so they are entirely in the web browser,” said Georgia Tech graduate student Philip Grice. “Henry can use the interface from his home in California and control the robot here in Atlanta. There is nothing he has to download.”

Kemp, and team members Chen, Grice and Kelsey Hawkins, returned to California in June to work with Willow Garage and Evans, testing methods for shaving and scratching. It was then that Evans was able shave his cheek. Back in Atlanta, Kemp’s post doc Chih-Hung Aaron King has been a key part of the project as well.

Using a head tracker to operate a variety of experimental user interfaces, Evans can directly move the robot's body, including its arms and head. He can also invoke the robot’s autonomous actions. For example, Evans was able to click on his head in a camera image to command the robot to autonomously navigate up to his wheelchair and reach out to a clicked location, so that the scratching tool was close to his face.

An important challenge going forward, Kemp said, is to enable Evans to use the robot on his own without researchers looking over his shoulder. Each time Evans uses the robot, he must be accompanied by researchers ready to intervene in case something goes wrong.

Given the success so far, the team is excited to push forward on the project.

“We think it's an incredibly compelling use of a general-purpose robot,” said Steve Cousins, CEO of Willow Garage, a company that develops hardware and open source software for personal robotics applications. “Robotic technologies that augment people's abilities will definitely become more common over time.”

Related Links

- Charlie Kemp's Homepage [1]
- Georgia Tech's Healthcare Robotics Lab [2]
- Video on Robots for Humanity Project [3]

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