

iRobot rolls, crawls and creeps

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The iRobot can drive on its wheels, crawl like an inchworm, or stand up and rotate as a platform. Credit: Graham Ryland/Harry Cheng, UC Davis

An intelligent, reconfigurable modular robot invented by a UC Davis alumnus and a professor of mechanical and aerospace engineering is headed for commercial development with the help of a grant from the National Science Foundation.

Graham Ryland and Professor Harry Cheng hope their "iRobot" will be a useful research and teaching tool. They also say the technology could be used in industrial applications for rapidly prototyping complex robotics - and may eventually form the basis of robots for search-and-rescue operations in difficult terrain. The university has filed a patent on the robot.

Ryland and Cheng developed the iRobot while Ryland was studying for his master's degree in mechanical engineering and conducting research in Cheng's Integration Engineering Laboratory at UC Davis.

A single iRobot module has four controllable degrees of freedom, with two joints in the center section and two wheels, one on each end. An individual module can drive on its wheels, crawl like an inchworm, or raise one end of its body and pan around as a camera platform.

Individual modules could be assembled into larger robots for particular tasks, such as a snakelike robot that could get into confined spaces, or a larger, wheeled robot for smoother terrain.



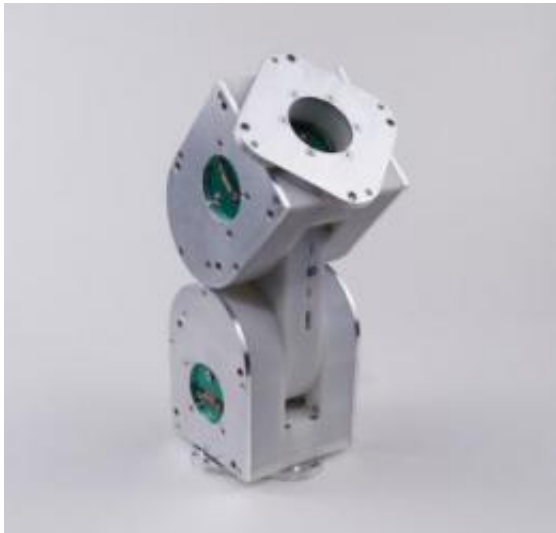
A single module has four degrees of freedom. Credit: Graham Ryland/Harry Cheng, UC Davis

"We wanted to create a robot that was modular and could be assembled together, but was also mobile and useful by itself. We feel this hardware platform could drastically speed up university and industry research in the field of robotics," Ryland said.

Commercial robots are usually built for a specific application. But there is a lot of interest in modular robots -- machines made up of durable subunits that can function alone or be configured for a specific task.

The iRobot could be used as a testbed tool for engineers studying control systems for individual robots or groups of robots, Cheng said.

"It's very difficult to build the kind of robot with flexibility, modularity, and reconfigurability that people want to use for research and teaching," he said.



Barobo Inc., a UC Davis startup company, is developing the commercial prototype of the iMobot. Credit: Graham Ryland, Barobo Inc.

By using an off-the-shelf commercial robot like iMobot, researchers can focus on solving problems in areas such as artificial intelligence, robot collaboration, and reconfigurable and adaptive systems, without having to first develop the hardware part of the robot.

Currently, there are no commercial research-grade modular robots available, Ryland said.

Cheng and Ryland have formed a company, [Barobo Inc.](#), to develop the [robot](#) commercially. Ryland is the company's president. Barobo recently received a small-business innovation research grant from the National Science Foundation to begin commercial development. The initial grant is for \$150,000 over six months, with the opportunity to apply for another \$500,000. The inventors hope to have the [robot](#) on the market by the end of this year.

Provided by University of California - Davis
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