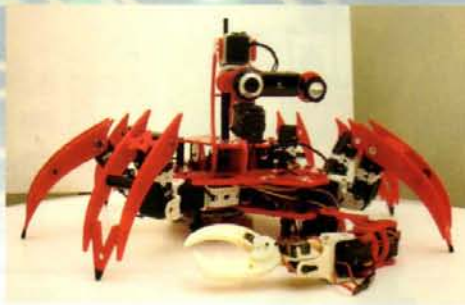


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## LEADING EDGE ROBOTICS NEWS

by Tom Atwood & Kevin Berry



### The Robotics Institute, Carnegie Mellon University

[www.ni.cmu.edu](http://www.ni.cmu.edu)

#### CHIARA

<http://chiara-robot.com>

"We're trying to make state-of-the-art algorithms directly available to users. A lot of robotics research has divided into separate fields of study, and there has been less emphasis on integrating back into complete, working systems. We want to help buck this trend by providing basic implementations of everything you need to write interesting applications."

—Ethan Tira-Thompson,  
Carnegie Mellon Robotics Institute doctoral student

### CHIARA: Designed for Computer Science R&D

A research group at Carnegie Mellon is developing "Chiara"—a new robot platform for undergraduate computer science majors. A hexapod, it has a 6-degrees-of-freedom arm with gripper plus a webcam and an IR range sensor on a shared pan-and-tilt mount. Chiara includes a Pico-ITX computer running Ubuntu Linux, and it has 1GB of RAM, an 80GB hard drive and both Ethernet and wireless networking capability. "Basically, it's a laptop with legs" says research professor David Touretzky, who heads the project, which is funded in part by a grant from the National Science Foundation. "It's the kind of platform computer science professors need for teaching students the software side of robotics—computer vision, inverse

kinematics, map building, navigation, manipulation, path planning and human-robot interaction."

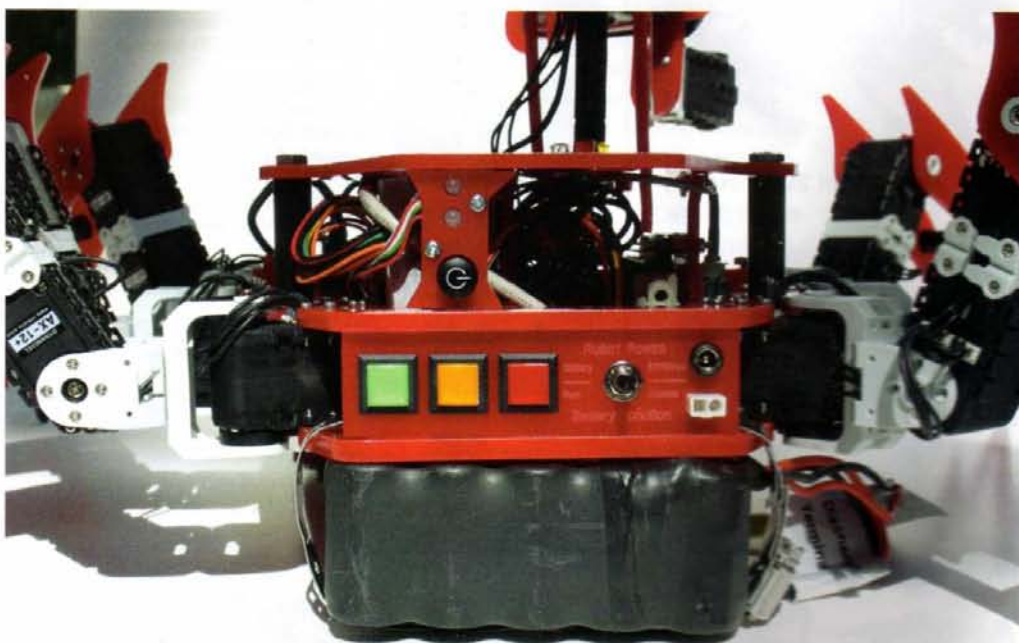
The robot is programmed in C++ using the Tekkotsu open source software framework developed at Carnegie Mellon and available free at [www.tekkotsu.org](http://www.tekkotsu.org). Ethan Tira-Thompson, a doctoral student in Touretzky's lab and the principal architect of Tekkotsu, initially created it as a programming framework for the Sony AIBO. With the demise of the AIBO (discontinued by Sony) and without a suitable replacement in sight, the Tekkotsu team designed their own platform. A hexapod, Chiara can move stably and accurately in any direction without dynamic balance.

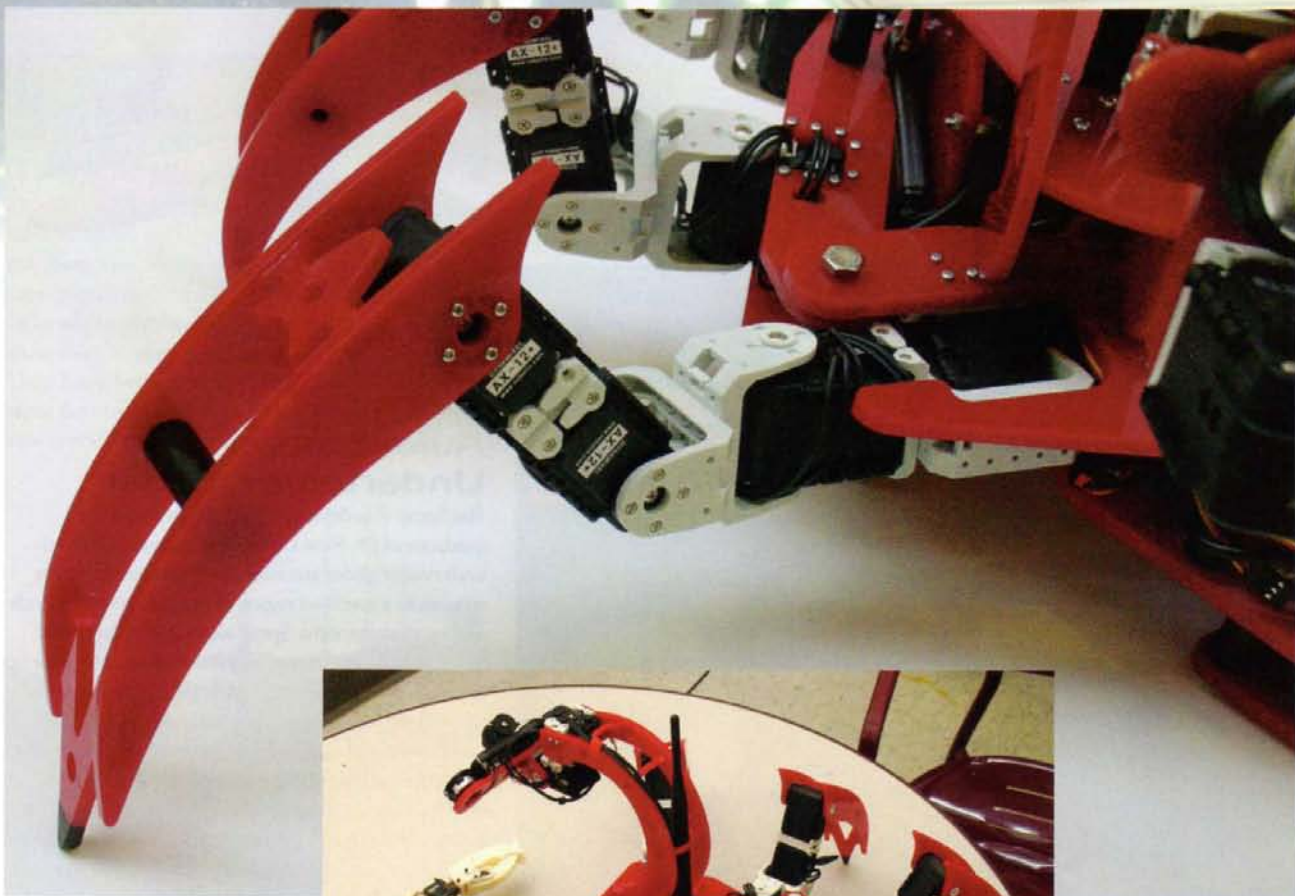
Two Chiara prototypes debuted at the Association for the Advancement of Artificial Intelligence (AAAI)—[www.aaai.org](http://www.aaai.org)—July conference in Chicago, where they were awarded second place in the robot exhibition. The production version will be narrower and taller than the prototype shown. See Chiara-Robot.com, or "Chiara robot" on YouTube for ongoing details.

RoPro Design ([www.roprodesign.com](http://www.roprodesign.com)) a Pittsburgh, PA, company that has done robotics engineering work for NASA, DARPA and the DOE, is expected to deliver ready-to-run production Chiara robots in December at a street price of about \$2,500.

Chiara is open source and will be released under the open-source general-purpose license (GNU GPL).

Carnegie Mellon and RoPro will publish the Solidworks models and component specifications so that users will be able to modify the design as they wish. "As an academic, I know how important it is for research and education platforms to be open source," says Touretzky, "... and the RoPro folks completely support this. It's been a pleasure working with them."





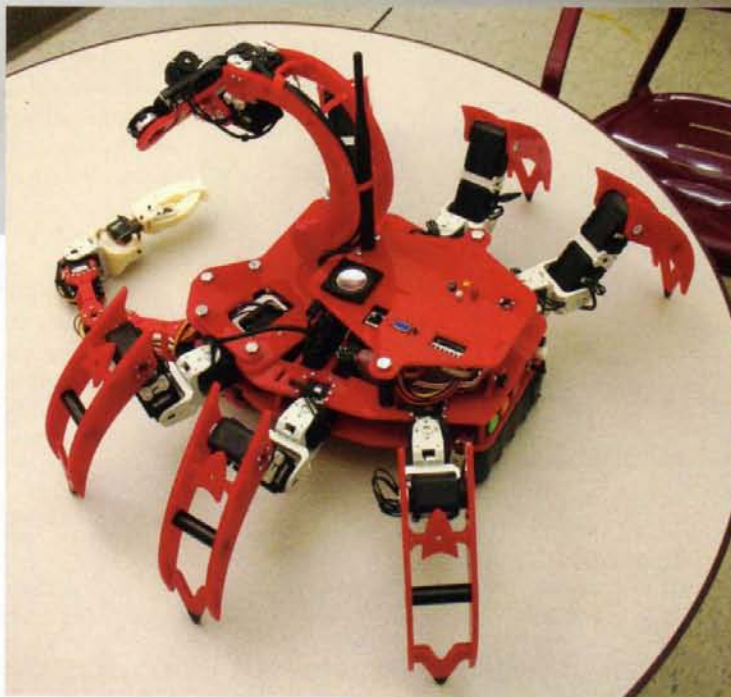
## STUDENT INPUT

One of the cool things about the Chiara project is the involvement of students. The prototype's body was designed by Gaku Sato, a Carnegie Mellon masters student in Product Development who has a BS in Mechanical Engineering. The gripper was created by David Rice, a research engineer at the Carnegie Mellon National Robotics Engineering Center; he holds dual BS degrees from Carnegie Mellon in Mechanical Engineering and in Engineering and Public Policy. The software is being developed by Robotics doctoral student Ethan Tira-Thompson.

## FROM AIBO TO CHIARA

Touretzky has taught an undergraduate course in Cognitive Robotics at Carnegie Mellon for the past three years using AIBOs, but in January 2009, the course will switch to the Chiara. Lecture notes, labs and homework are all available online, so you can get them, too. For details, please visit [Tekkotsu.org](http://Tekkotsu.org). Photos by Ethan Tira-Thompson, Carnegie Mellon Robotics Institute.

*Editor's note: we thank David Touretzky of the Center for the Neural Basis of Cognition and Carnegie Mellon University's Robotics Institute for their assistance with this article. The final version of Chiara will differ in appearance from the prototype shown because the body has been redesigned to improve performance.*



"The software framework Tekkotsu is good for researchers who want to focus on their particular field

of study, for students who want experience with the tools and techniques for programming intelligent robots, and for serious hobbyists who want quick results without having their hands tied. Combined with advanced hardware like the Chiara, we hope we will open doors for a lot of people to make their robots 'do' things."

—Ethan Tira-Thompson