

Hopping Robot Captures Top Research Expo Honor

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Christopher M. Schmidt-Wetekam, a Ph.D. candidate in UCSD's Jacobs School of Engineering, and iHop, a robot with a fine sense of balance.

The goal of Christopher M. Schmidt-Wetekam was to build a robot with off-the-shelf parts for his graduate research project that could roll around and hop over obstacles like a motorized kangaroo on roller skates. His two-wheeled creation called “iHop” does just that, an

accomplishment that won Schmidt-Wetekam, a UC San Diego graduate student, top honors at the Jacobs School of Engineering's annual Research Expo on Feb. 21.

A research presentation by Schmidt-Wetekam, a Ph.D. candidate in the Jacobs School's Department of Mechanical and Aerospace Engineering, was one of 246 poster presentations exhibited simultaneously in a gymnasium-sized exhibition tent during Research Expo on the UCSD campus.

The annual one-day research extravaganza attracted more than 600 faculty, students, alumni, and industry guests. Research Expo is designed to highlight a broad range of cutting-edge research being conducted by graduate students in the labs of 181 Jacobs School faculty members.

"I think the judges liked the simplicity with which we approached this problem," said a surprised Schmidt-Wetekam about an hour after an awards ceremony. "Instead of adding a bunch of extra limbs and arms, we're just using what we have, and adding some intelligence as far as balancing algorithms to make the most out of a small number of components."

Schmidt-Wetekam's poster was one of six finalists, one each for the Jacobs School's six academic departments. The six were selected by a team of industry judges. Those finalists were evaluated by a team of faculty members that picked Schmidt-Wetekam's iHop presentation as the best.

The iHop robot was developed under the direction of Thomas Bewley, a professor of mechanical and aerospace engineering who directs the UCSD Coordinated Robotics Lab. Over the past year, Schmidt-Wetekam and Bewley have been teaching the wallaby-sized iHop to perform increasingly amazing tricks.

It maneuvers on wheels like other robots, but can also balance in an upright position, quickly turn and roll, jump and even twist in mid-air and land without falling over. The robot's gyroscopes and accelerometers feed sophisticated on-board attitude estimation and stabilization algorithms in its tiny silicon brain. Bewley said that not only does iHop and a family of similar robots have potential as toys, but they can also be used to search for people stranded in burning buildings or operate in a variety of other hazardous environments.

“Most people are captivated by iHop’s playful demeanor,” said Bewley. “However, its mechanical simplicity, efficiency and maneuverability make it an appealing candidate for search-and-rescue, defense and homeland security applications.”

The 2008 version of Research Expo, the 27th annual celebration of graduate student research in engineering, was one of six related events this year at UCSD held during National Engineers Week. The week's events began on Feb. 19 with Engineering Games, or E-Games, an entertaining and whacky competition in which teams of undergraduate engineering students were challenged to quickly design a container to protect an over-ripe tomato from bursting upon sudden impact. As part of the competition, the juicy spheres, in their hastily designed and constructed containers, were dropped 120 feet from a helium-filled balloon. Judging of each team's performance was based partly on the tomato-drop survivability.

Even San Diego 8th grade students were involved in National Engineers Week at UCSD as part of “Enspire” on Feb. 20. About 400 students from Pershing and Gompers Middle Schools toured engineering labs and then participated in a design competition involving ordinary soft-drink straws. Teams of the students fashioned the straws with tape into bridges, towers, buildings and a variety of more creative structures. The student-run Enspire event was designed to introduce middle school

students to university-level engineering.

Research Expo and a concurrent undergraduate research expo, called Eureka, were held on Feb 21. In addition to highlighting a broad range of cutting-edge research at the Jacobs School of Engineering, Research Expo is designed to provide technology leaders, investors and engineering project managers with an opportunity to recruit top talent. Expo was sponsored this year by three companies, ViaSat, Northrop Grumman Space Technology, and Yahoo.

On Friday, Feb. 22, about 2,000 undergraduate and graduate engineering students met with recruiters representing 90 companies in a recruiting fair called Disciplines of Engineering Career Fair (DECaF). The E-Week activities were capped Friday evening with a student-organized engineers' ball dubbed "Impulse."

One of the highlights of the National Engineers Week events was the Research Expo luncheon keynote talk in one of two cavernous tents on campus. Dwight C. Streit, vice president of electronics technology for Northrop Grumman Space Technology, talked about the importance of engineering education to ensuring long-term economic strength.

"I am extremely impressed with what's going on here at UC San Diego as I think everyone is who has had a chance to look at the posters and see what's happening with the school," said Streit. "Engineering education ignites innovation here locally at the corporate level and at the national level and at the global level as well."

Source: UCSD

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