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# Building Strength in Computer Science and Engineering

September 12, 2006

MERCED - The founding faculty in computer science and engineering at the University of California, Merced, are adeptly finding the balance between offering a firm footing in the basics for students and exploring new horizons in their field.

"Our computer science and engineering professors are innovative thinkers and determined researchers," said UC Merced Dean of Engineering Jeff Wright. "Each of them holds an ambitious vision for the future of computer science and engineering as they work to build strong collaborative ties with faculty in other disciplines. That means that our students get a solid foundation in computer skills and theory while also obtaining a strong sense of how that knowledge is applied in the real world."

Professor Alberto Cerpa specializes in sensor networks for environmental applications like river systems, and envisions using the same principles to help improve efficiency in buildings and energy systems, as well. He collaborates frequently with other UC faculty in those fields at Merced and at sister UC campuses.

"My goal is to build and deploy useful systems, and with that in mind, I've never had to search for a problem to solve in my research," Cerpa said. "There are infinite problems, and the problems find you. It's also very rewarding - the problems are really worth solving."

Cerpa also introduces students to open-source computing in UC Merced's innovative Linux teaching lab, where all the computer stations are connected to a single server. Any user can call up work from any other user on his or her own monitor. This makes it extraordinarily easy for students - and their professors - to work and learn in collaboration.

Professor Marcelo Kallmann's expertise lies in creating realistic animated or robotic reproductions of complex movements - for example, walking by a pillar or street lamp while holding an umbrella. He collaborates with faculty in UC Merced's cognitive science program to examine how the brain learns and then reproduces motion.

"When we learn how to synthesize motion, we can better understand real motion and learn to recognize it," Kallmann said. "That might help us in the future to create better intelligent rooms or security applications."

Kallmann recognizes that his work will also apply to the burgeoning field of computer game development, and hopes to offer students a good background for working in that arena.

"After the dot-com bust, the United States is facing a shortage of qualified information technology work force," he said. "To overcome that, we have to change the image of back-room programmers. Teaching good programming skills comes automatically when we're working on exciting applications."

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Professor Shawn Newsam works in advanced image recognition techniques, striving for a day when image databases will be searched based on the content of images rather than on keyword descriptions - for example, your online image search for "hats" would find any image that looks like a hat, not just images labeled with the word "hat." His work lends itself to interdisciplinary collaboration with biologists and environmental scientists.

"Computer image recognition is now mimicking the early steps of the human visual system," Newsam said.

This year, Newsam will also advise a group of Engineering Service Learning students exploring the potential for developing a UC Merced radio station. They'll consider technical requirements, a business model and the community's programming needs.

And, along with his colleagues, he's expanding the computer science and engineering major to bring students into the field where this exciting work is being done.

"We don't have a legacy restricting us at UC Merced," Newsam said. "Instead, we have young faculty bringing in new ideas based on their research and experience. We get the students grounded in the basics with a broad background, and then help them learn to apply those skills in niche applications. Based on that approach, we've come up with a cutting-edge computer science and engineering program."

Cerpa, Kallmann and Newsam all joined the faculty at UC Merced in time for its opening a year ago. Two new faculty members will soon add to the computer science and engineering team. Acclaimed cognitive scientist David Noelle, hired in a joint appointment with the School of Social Sciences, Humanities and Arts, will help strengthen connections between the computer science and engineering program and the cognitive science program. And Stefano Carpin, who will arrive in January, specializes in robotics and machine learning.

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