

## Education

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### WSU lab building stellar reputation

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Wichita State University may be known internationally for its aviation research program, but it is also quietly building another engineering research powerhouse.

The 7-year-old Advanced Networking Research Center is set to nearly double in size over the next 18 months because of interest from major technology companies and university officials' ambitious plans.

"The potential is extraordinary," said Gary Miller, WSU's provost and vice president for academic affairs and research. "There are networks in everything."

Wichita benefits from that growth by retaining and attracting more top students at WSU, by producing better-trained workers for local industry and, eventually, university officials say, by seeing an economic boost from new companies that develop out of the center.

Networks are groups of computers linked to each other and are essential in systems ranging from a few computers at home to the massive systems that cross the globe.

Students at the center do real research and work on corporate projects, gaining the experience that will give them an advantage in landing jobs in information technology.

The graduates can compete not just with graduates of the University of Kansas and Kansas State University, but with those from California or India because of the hands-on nature of the education, said Ravi Pendse, the university's chief information officer, associate provost, and the creator and driving force behind the center.

"This type of facility does not exist anywhere else in the world," Pendse said.

"They will be able to come out of here and compete very well with graduates from anywhere in the world because they have a sound theoretical background and, oh, by the way, they also have several years of experience under their belts using the tools and techniques they will use when they get to work."

The center has already helped the university make progress in one of its goals: attracting top local students like Ryan Clough.

Clough, a sophomore, was valedictorian at Newton High School with a 4.0 grade point average and obvious math and science ability. He looked at the Massachusetts Institute of Technology and other top colleges.

Instead, WSU landed him with a large scholarship and the chance to do research as an undergraduate, something typically reserved for graduate students.

Today, he is happy with his choice and spends 20 hours a week working at the center on a steady stream of networking problems and questions from customers of Cisco Systems, one of the world's largest networking companies.

One day last week he was trying to figure out whether the Cisco software that allows remote computers to operate as part of secure networks would work with Windows 7, the latest Microsoft operating system.

"This is the real thing," he said.

### **Four in one**

The Advanced Networking Research Center is really an umbrella for three centers: the Cisco Technical Research Center, the Center for Information Security, and the Technology Evaluation Center.

A fourth, the Center for Storage Networking — with financial support from data storage giant LSI — will be formally unveiled in the next few weeks, Pendse said.

The Cisco center is the largest and best funded by far. Cisco Systems, based in San Jose, Calif., first began working with WSU 12 years ago and established the center in 2005.

That has meant a pipeline for Cisco money, expertise and connections. More than two dozen WSU graduate students have gone to work for Cisco over the past decade, and that is likely to accelerate as the program grows.

Students do research in frontier areas such as cloud computing, unified computing and a Cisco project called Autofocus, where students use statistics to analyze which network features clients really use.

The other centers also benefit from Cisco money.

The Center for Information Security focuses on how to bolster network safety and security. One project that students are working on is how to safeguard the airplane-controlling computer networks that pilots use from attacks by passengers.

Cisco has been so pleased with the center that it has added projects, said Joe Pinto, Cisco's senior vice president for technical services.

"Cisco is able to extend its work force and tap into fresh minds and critical resources to help maintain its industry leadership position," Pinto said.

### **All on the computers**

The center is the research arm for existing electrical engineering and computer engineering classes at WSU.

The Advanced Networking Research Center consists of several large rooms filled with tables and cubicles, computers, routers and servers. It's quite unglamorous.

The action is on the computers. That is where the problems exist and where the students, under guidance of faculty and staff, solve problems and test their hypotheses.

On Tuesday, Nagaraja Thanthry, a research associate and Ph.D. candidate, led three undergraduates in a discussion of a project on how to connect people using Internet-based phone service to 911 emergency communication.

The problem, he said, is that 911 dispatchers' automatic locating systems show the caller's location as their street addresses rather than the locations from which they are calling.

Thanthry came to Wichita from India in 2004 and has worked toward his doctorate ever since. He hopes to earn his degree in December.

Although many of the students are from India and China, Pendse said one of the university's goals in bringing undergraduate students into the research program is to encourage more local engineering students to go on to master's degrees or Ph.D.s rather than head immediately into the work force.

### **A bright future**

Pendse tries to be cautious about raising expectations for the center too high. It is small compared to its big brother next door, the National Institute for Aviation Research.

The 24-year-old aviation research center has 178 full-time staff, 161 graduate and undergraduate student/researchers, and a budget of more than \$35 million.

The Advanced Networking Research Center, he said, will have six or seven staff and 200 students within two years.

But he's irrepressible. He can't help but present a glowing vision for the center:

The new master's degree in networking will pull in more students locally and from around the world to the center. The program will grow and require more space and more staff, and that will attract more funding.

Pinto, the Cisco VP, agreed that his company is interested in helping take the program to a higher level. LSI is stepping up its commitment as well.

Eventually the benefits will spill over into the community, Pendse said. The amount of talent in the area could attract companies. And he expects that networking students, with an assist from the university's entrepreneurship training, will start their own companies.

Pendse sees the center achieving a reputation similar to NIAR relatively quickly.

"I expect in three to five years for our networking program to be known in the United States and around the world like our aerospace program is right now," he said.

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