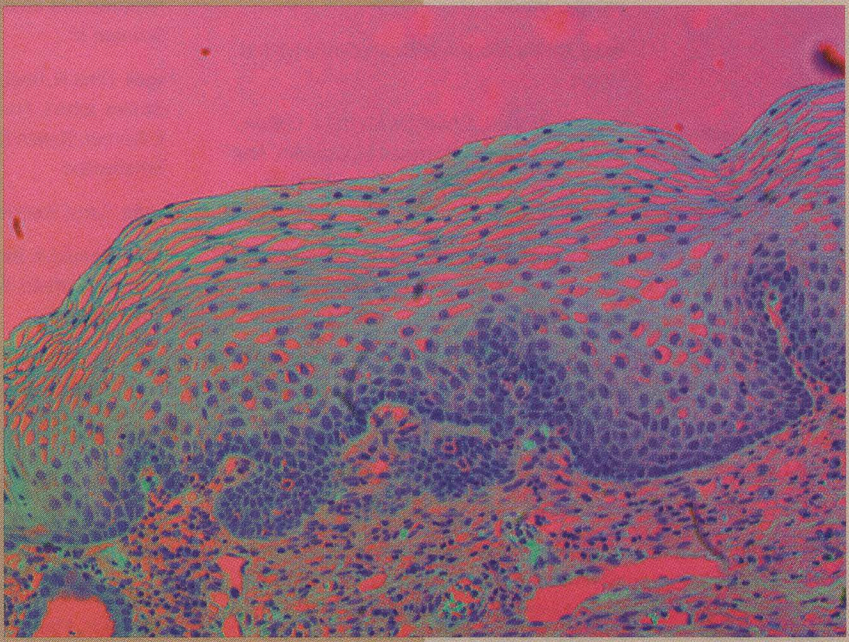
View from the Hill



courtesy of the scalable concurrent programming laboratory

Through multi-spectral imaging, a cervical cancer cell can be highlighted to assist pathologists in their research.

High-speed computing with a multi-spectral edge

Steve Taylor likes to give computers a workout. Inside the Scalable Concurrent Programming Laboratory in the Center for Science and Technology, amid the whir of hard drives, it's apparent he doesn't flinch in the face of complex computing tasks. Under Taylor's direction, the lab tackles mind-boggling programming quandaries with a high-speed distributive computing network of 50 machines. When that's not enough power, it can tap into supercomputer centers around the country. "I'm interested in every aspect of computing," says Taylor, a computer science professor in the L.C. Smith College of Engineering and Computer Science and associate research director at the Center for Advanced Technology in Computer Applications and Software Engineering (CASE). "I've seen every level of computing from chip design to applications. I try to leverage the breadth of my experience in defining and coping with problems."

Taylor never hesitates to share these problems with the 14-member team of undergraduate and graduate students who maintain the lab. "They get hands-on experience with a variety of problems," says Taylor, who joined the SU faculty in 1997. "As they gradually progress through their curricula, they're assigned more and more complex tasks until they're actively involved in research projects. The intent is to form a cohesive picture of research as a continuum."

While Taylor's past work includes creating programs to predict the airflow around rockets, his current challenge centers on multi-spectral sensor analysis. The ultimate goal—one the lab team is working on with a group of CASE Center colleagues—is to produce programs that will collect information from a variety of sensors and provide real-time data analysis. One aspect of the project is multi-spectral imaging, which adds a visual component to the computer application process, so "critical information not present in a normal picture is immediately obvious," Taylor says. This developing technology can be used for tasks as diverse as spotting cancer cells or recognizing military targets like tanks or landmines. It is based on detecting the optical signatures emitted by objects when they are exposed to selective bands of light, such as ultraviolet or infrared. Doctoral student Tiranee Achalakul G'96 offers a demonstration by turning on a computer-controlled monochromator that feeds selective lights into a multi-spectral microscope to view cells. In this particular case, a sample of cervical cancer cells is captured in 40 different spectra. Through image processing, the 40 images can be fused into one, and cells can be marked. "Using this technology, we are trying to detect cancer cells and highlight them," Achalakul says. "We're working with pathologists to do that. It's exciting, especially when you come up with something useful for a real application."

For Taylor, the multi-spectral analysis project represents yet another step on the path of learning. "All the other technology we've worked on has built up to this," he says. "As the technology evolves, the big picture changes."

—JAY COX