



patient populations that could strengthen existing research projects. CS Professor Klara Nahrstedt is currently working on an NSF-funded project to determine whether 3D tele-immersion technology can improve healthcare delivery and control costs by having geographically separated people use a virtual environment to interact—as if they were in the same place. She and colleagues at the University of Texas-Dallas, University of California-Berkeley, and the Veteran’s Administration Hospital in Dallas are exploring whether this tele-immersive

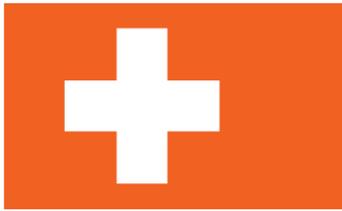
The 3D cameras render digital pixels together, giving the patients the sensation that they are in the same room with the doctor or physical therapist. UT Dallas researchers have developed sensors and explored utility of existing haptic devices that provide force feedback and a measurement of the patient’s condition.

“The big question is how much can this technology help,” said Nahrstedt. One major challenge that Nahrstedt’s group addresses is how to synchronize the

said, referring to her group’s efforts to understand how doctors assess upper body and arm injuries so they could tailor the immersive rooms and the necessary multi-modal information accordingly. As the technology matures and is clinically tested, Nahrstedt envisions physicians and therapists at major hospitals working with patients at small town health clinics.

CS Professor Wai-Tat Fu is confident that HITC can help strengthen his research, which aims to improve the usability of

# New Health Information Technology Center



## to promote CS research

BY LAURA SCHMITT

A new University of Illinois inter-campus initiative aims to develop research partnerships between CS faculty and physicians and researchers at the University of Illinois Hospital and Health Sciences System in Chicago, Carle Hospital in Urbana, and other health care providers. The Health Information Technology Center (HITC) will leverage the strengths of all the partners in an effort to help solve healthcare delivery and cost issues.

According to HITC director and CS Professor Carl Gunter, the center has four goals: generate publicity for existing health IT research, build community across the two Illinois campuses, provide access to large patient groups and data, and generate new funding and perhaps even commercial ventures.

Many peer CS departments have large medical schools and teaching hospitals on or near their campuses, giving them a potential advantage in securing health IT funding. According to Gunter, HITC will facilitate collaborations that can level the playing field. “There will be lots of funding opportunities coming down the line in health IT, and we want to be responsive to those opportunities,” said Gunter.

CS faculty look forward to the collaborations, in large part, because they may provide access to clinical research data and various

technology is a cost-effective alternative to face-to-face or 2D teleconferencing used in physical therapy sessions for wounded veterans with arm and upper body injuries.

Through HITC, Nahrstedt would like to apply tele-immersion technology to Chicago-area stroke patients with arm paralysis. “I’m absolutely excited at the prospect of working with colleagues and patients in Chicago,” said Nahrstedt, who would like to establish a satellite immersion site there.

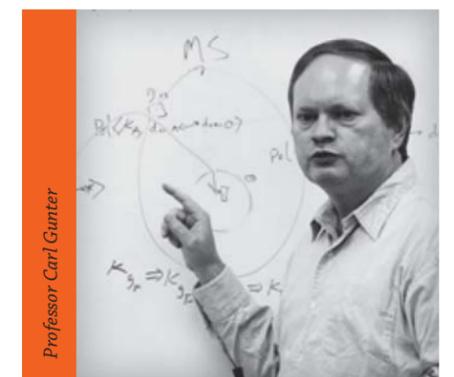
During the past two years, she and her Texas and Berkeley colleagues have established immersion spaces on their respective campuses where researchers emulate doctor-patient interactions. The spaces are equipped with several 3D cameras, microphones, and high-definition plasma displays.

massive amounts of disparate data transmitted between locations over the Internet 2, which experiences traffic congestion and may represent a bottleneck in delivery of real-time multi-modal data. In fact, the quantity of data is so large that current compression techniques are not sufficient.

“We’re exploring which streams of data are more important than others, and what information can be withheld while still providing the doctor with enough information to make sound medical judgments,” she said. In order to know this, her group studied the physiotherapy process through consultation with doctors at the Dallas VA Hospital to understand how doctors absorb the visual, acoustic, haptic and sensory data. Due to speed-of-light limits, the end-to-end delay between geographically separate sites is unavoidable but the main challenge is how to keep this delay around 80-100 milliseconds or less over general purpose Internet networks.

“Our goal is to quantify the quality of experience and map it to the quality of service aspect in the computational and networking environments,” she

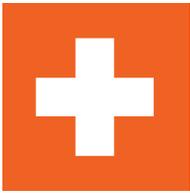
electronic health records and Internet patient portals. Fu’s research group is developing an interface system that enables patients to better understand information in their electronic health records.



Professor Carl Gunter



Professor Klara Nahrstedt



## HITC GOALS:

- generate publicity for existing health IT research
- build community across the two Illinois campuses
- provide access to large patient groups and data
- generate new funding and perhaps even commercial ventures

One aspect of Fu’s research is to understand how patients process medical information and what sources they use to supplement their health data. As such, his team has conducted experiments that record people’s Internet research actions—which sites they visit, whether they read the data on the site, and whether they understand the information to the extent that it helps them to make better health-related decisions.

“Sometimes the interface doesn’t need to have the most advanced technology, but we need to understand how people with different education levels and socio-economic backgrounds use the data,” said Fu. “Arguably those who need the most help are usually the least experienced at using the technology.”

Fu’s system could be especially useful to patients with chronic illnesses like diabetes or hypertension—conditions that require

regular monitoring of patient data. In the future, Fu hopes Chicago patients can test his interface system and provide feedback on how it behaves and which issues are most important to them. “Chicago patients would be representative of the national population as a whole,” said Fu.

The potential for collaboration with the Chicago medical campus may benefit Gunter’s research, as well. As part of a \$15 million Health and Human Services Strategic Healthcare Information Technology Advanced Research Projects on Security (SHARPS) research grant, Gunter is using an experienced-based access management approach to develop new ways for hospital’s to provide employees’ access to electronic health records.

“We’re trying to develop a continuous quality improvement process for understanding the behavior of people in



Professor Wai-Tat Fu

the hospital so you can be confident in the security that you get without interfering with the work flows that could endanger lives,” explained Gunter.

One important aspect of Gunter’s approach is its ability to enhance security over existing access technology, which is somewhat limited in discovering abuses such as identity theft or privacy breaches. By implementing machine-learning techniques to understand how the records are used, his technique can then identify anomalous behaviors that may require additional attention.

A large percentage of the Chicago hospital’s patients receive medical care through Medicare and Medicaid, two government health care funding programs that are vulnerable to fraud.

In November, HITC sponsored a daylong workshop in Urbana for researchers to learn about existing projects and discuss possible collaborations. HITC is funded by the Vice President for Health Affairs and the Center for Clinical and Translational Science on the Chicago campus and by National Center for Supercomputing Applications, the College of Engineering, the Department of Computer Science, and the College of Medicine on the Urbana campus.



More information about the center is available at: <http://healthit.illinois.edu>