

Spatial Information and Intelligence Laboratory

<http://spatial.ist.psu.edu>



Current computing systems for spatial information and spatial intelligence restrict human-computer interaction to one mode at a time and are designed with an assumption that use will be by individuals (rather than groups), directing (rather than interacting with) the system. However, there is an increasing need for systems that support geographically distributed teams and provide a more interactive experience for individuals. To support the ways in which humans work and interact, a new paradigm is required for computing.

The laboratory, located in room 102A of the Information Sciences and Technology (IST) Building, is directed by Dr. Guoray Cai, associate professor at the College of IST and an affiliate associate professor of geography in the College of Earth and Mineral Sciences.

“The overall goal of (the lab) is to make spatial information and technology more useable,” he said.

Cai is the founding director of the Spatial Information and Intelligence Laboratory and also is a member of the GeoVISTA center and the Center for Human-Computer Interaction. He conducts research in the areas of geographical information systems, geocollaboration, human-computer interaction, information retrieval, and spoken-dialogue systems. His recent work involves developing visually-mediated multimodal interactions techniques for enabling geocollaborative crisis management.

OVERVIEW

The Spatial Information and Intelligence Laboratory at the College of Information Sciences and Technology (IST) hosts research activities for the development of conceptual, computational and usability engineering approaches toward natural, multi-modal, multi-user dialogue-enabled interfaces to geographic information systems that make use of large-screen displays, virtual environment, and mobile computing technologies.

Dr. Guoray Cai, Director

cai@ist.psu.edu

Spatial Information and Intelligence Laboratory

The Pennsylvania State University
College of Information Sciences
and Technology
102A IST Building
University Park, PA 16802-6822

The Spatial Information and Intelligence Laboratory hosts computers and multimedia equipment funded by the College of IST and the National Science Foundation (NSF). The facilities include the Economic and Social Research Institute's ArcGIS software suite hosted on high-end servers and workstations, a large-screen display, cameras and wireless microphones, a Tablet PC, and three software development workstations.

The Spatial Information and Intelligence Laboratory was started in 2000, Cai said, with the initial purpose of conducting "traditional geographic information research." After the terrorist attacks of Sept. 11, 2001, the NSF undertook a "huge initiative" to support large-scale innovation in information technology research. The Spatial Information and Intelligence Laboratory received grants from the NSF that enabled "risky research" in the areas of geocollaboration—the process of working with one or more people on a project or interest that is enhanced by viewing relevant information in a geographic/map context; and geodeliberation, which refers to democratic deliberation (within local communities) on complex and controversial geographically-defined problems and involves the use of geographical information and online, asynchronous deliberative technologies.

According to Cai, emergency responders are increasingly working on teams that are geographically distributed. In addition, many people prefer to interact with computers using speech and gestures as opposed to operating a system manually with a keyboard and mouse. The technology that is being developed in the Spatial Information and Intelligence Laboratory, Cai said,

fuses speech and gestures and deals with the semantic aspect of human-computer interaction. In the case of a natural disaster or emergency, by providing more accurate geographic representations of the field and enhanced dialogue capabilities, the technology can support interactions between first responders on the field and emergency operation centers.

"There are infinite ways to use this technology," Cai said.

Cai is assisted in the Spatial Information and Intelligence Laboratory by students in the Schreyers Honors College, including Ben Dodge, a senior majoring in IST. Dodge is working on the design of a virtual model of the IST Building, which can be used to give "tours" to prospective IST students, who would be able to virtually interact with IST professors. For the purposes of his thesis, Dodge said, "I am restricting my work to designing a virtual representation of the IST Building to serve as an 'information desk' of sorts."

"One of the goals is to give (users) a sense of reality by offering a 3D experience," Dodge said.

If the concept is successful for the IST Building, he added, it can eventually be applied to the entire Penn State campus.

As part of another project supported by the NSF, Cai said, he is developing a geodeliberation system in conjunction with the State College Borough that would support a public forum, in which users could discuss community development plans. Through geographic conceptualization, the system would provide a visual representation of the plans.

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