UNIVERSITY of WISCONSIN
LA CROSSE

Distinguished Lecture Series in Computer Science

Thursday, April 22, 2004

Suzanne Weghorst, M.A./M.S.

Suzanne Weghorst is a research scientist and research director at the University of Washington's Human Interface Technology Laboratory (HIT Lab). She holds a master's in both computer science (University of Washington) and experimental psychology (University of California, Riverside), and has focused her attention in recent years on novel approaches to human-computer interaction.

Her work at the HIT Lab has included research on situation awareness in virtual environments, augmented reality technologies, assistive devices for people with disabilities, surgical simulation systems, and advanced human interfaces for medicine and molecular biology.

Weghorst is an associate editor of the journals *Presence* and *Virtual Reality*, and is active in the medical VR research community. She has served as program adviser for several medical VR conferences and as co-editor of the *Medicine Meets Virtual Reality* conference proceedings. Weghorst and her colleagues at the HIT Lab were recipients of the 2001 Satava Award for contributions to medical interface technology.

Schedule of Events

9:30 a.m. **Registration, Cleary Alumni & Friends Center**

10 a.m. **Symposium**

"Mixed Reality Tools for Teaching Molecular Biology"

Structural molecular biology forms the foundation of our understanding of life as a molecular process. The chemical structures of biological molecules and the nature of their physical interactions in the processes of life are the result of billions of years of evolution. They are highly complex at multiple levels of scale.

Physical aids such as ball-and-stick models have long been used in teaching basic chemistry and structural molecular biology. Physical models provide an intuitive representation of molecules and take advantage of our natural kinesthetic and tactile abilities in exploring molecular structure. As the size and complexity of known molecular structures increases, however, this ball-and-stick approach has become unwieldy.

Advanced automated fabrication technologies now allow the rapid production of physical models of more complex molecular structures. While these complex physical models are helpful, it is difficult, if not impossible, to show all of the known features of biological molecules and their functional interactions with physical models alone. Concurrent advances in human interface and computing technologies are providing new "mixed reality" ways of visualizing and interacting with physical models.

In a multi-institutional collaborative project with the Scripps Research Institute and the University of Utah, we are exploring novel methods of prototyping and interacting with models of complex molecules such as proteins. We are creating tools for multi-sensory enhancement of these tangible models by embedding 3D graphical (augmented reality) images within the fabricated physical models, by incorporating support for voice commands and auditory display of information, and by providing haptic (force display) interaction with molecular data. These methods are being evaluated in classroom learning situations and may provide new teaching tools for other fields of knowledge.

11:30 a.m. **Reception for Suzanne Weghorst**
Cleary Alumni & Friends Center

4 p.m. **Keynote Lecture**

"Designing Deeply Coupled Systems"

Human-computer interaction has inspired a vast literature and methodology over the past several decades. While computational performance continues to expand rapidly, the variety of uses to which computers are put and our methods of assessing their success have grown more slowly. Traditional approaches to human-computer interaction (HCI) focus on relatively simple human behavior (e.g., key strokes, mouse clicks, Web page visits), support relatively simple document-oriented tasks (e.g., word processing, spreadsheet development, graphic and mechanical design), and rely on relatively low level metrics of performance (e.g., usability, task efficiency, data throughput).

New models of HCI are emerging, as exemplified by the current emphasis on user-centered design, embedded and ubiquitous computing, and "mixed" and "augmented" reality applications. As we move toward a more intimate relationship with computers, it is appropriate (and perhaps essential) that we consider that relationship more broadly than during the "data-processing" era.

At the HIT Lab we are exploring and systematically studying an alternative approach to the notion of computer interface. Our framework (tentatively called "deeply coupled systems") proceeds from the perspective of human-computer interaction as an integrated system, and focuses on support for higher-order human activities, such as skilled performance, complex learning and creativity.

Tasks that challenge us to perform near the limits of our capabilities require deeply coupled systems. Successful engagement in a challenging activity defines one precondition for "flow," as described in the psychology literature over the past 30 years. The efficacy of one class of deeply coupled systems, may, therefore, be measured by its ability to facilitate and support flow.

5 p.m. **Informal Questions/Social**
Cleary Alumni & Friends Center

For further information about the lecture contact:

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