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Sixteen scholars representing ten schools spanning eight majors ...

Proceedings of the Second Annual Virginia Tech Center for Human-Computer Interaction Research Experience for Undergraduates (REU) Symposium

July 12, 2007
5:00 - 7:00PM

Torgersen Hall Museum, Blacksburg, VA

Research Experience for Undergraduates

REU in HCI
www.reu.hci.vt.edu

2007

Virginia Tech's Center for Human-Computer Interaction presents the project abstracts for the REU '07 symposium. The REU (Research Experience for Undergraduates) program provides undergraduate students from various universities with the opportunity to spend eight weeks at Virginia Tech, working with our faculty and graduate students on research projects using the state-of-the-art technology and laboratories assembled here. The REU program is sponsored by a National Science Foundation grant IIS-0552732.
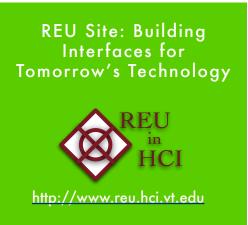
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The Teacher Factor: Exploring How Classroom Technology is Adopted

Allison Crandell <allicrandell@gmail.com>
Advisor: Dr. Deborah Tatar

In mathematics and sciences, American students score lower than their peers in other nations. To reform the teaching of these subjects, the National Science Foundation (NSF) has funded educational innovations such as SimCalc MathWorlds™ (SMW). Students use SMW to manipulate graphs of rate and change in simulation "worlds." The advantages of SMW have been well documented in small studies; however, for SMW to be "scaled up," these results must hold in real classrooms. Analyzing interviews with teachers of SMW allows us to understand classroom implementation. This research concentrated on the Year 2 interviews of the SimCalc study. We found teachers face many difficulties while teaching SMW, including time and technology shortages. Future work will include finishing the analysis of Year 2 interviews and comparing them to student's gain scores, as well as comparing Year 2's findings to previous and subsequent years.

The Role of Formative Usability Evaluation in the User-Centered Website Design Process

Ammar Poonawala <ammarp@vt.edu> & NyEsha Robinson <nmrobins@ncat.edu>
Advisors: Drs. Woodrow W. Winchester III & Brian Kleiner,

A usability study was conducted to identify usability problems as well as recommendations for improvement for the VT ISE Department website in the context of exploring and establishing the role of Usability Evaluation in the User-Centered Design Process. The usability testing consisted of two-phased process. Phase one consisted of three expert evaluators evaluating the ISE website and compiling the results under Jakob Neilson's ten heuristics. Phase two consisted of testing twelve participants recruited from the university campus of Virginia Tech consisting of current students, perspective students, faculty/staff and alumni. Each participant was given general instructions and a pre-survey to determine their demographics and level of Internet experience. The usability study tested participants on the task of finding the same issues that were discovered in the heuristics evaluation and more. During testing, the participants were under observation of the experimenters that maintained an observation log. A post-survey interview was conducted to gather additional feedback. The results of this study are presented as well as a future research discussion consisting of the development of usability guidelines for the design of Institutional Departmental Websites.

Study of P2P Techniques in Distributed Data Management

Broderick Kyle Daniels <bkyled135@aol.com>
Advisor: Dr. Ali Butt

This project was conducted at Virginia Tech during the summer of 2007. The research was an evaluation of peer-to-peer network systems. We evaluated these programs through extensive implementation and testing of commonly used client and server model in a peer-to-peer (P2P) server. P2P is a network of two or more computers connected as equal partners that are able to share processing, control and access to data. The research goal was to blend the strength of a transparent network file system such as Network File System (NFS) and a peer-to peer storage system to create a low-overhead, cheap storage solution. Another goal was to combine and harvest unused disk space on laboratory and user machines in academic environments.

Classroom Collaboration with Simple Distributed Technology

Catherine Grevet <cgrevet@wellesley.edu>
Advisor: Dr. Deborah Tatar

Teaching methods in a traditional classroom provide too few opportunities for active student participation and interaction. The lecture-based style of these methods creates learning gaps that could be avoided through collaborative activities. Introducing a distributed technology tool to support egalitarian real-time interaction could help enrich the learning experience. We propose to augment the turn-taking model with a program that allows students to participate concurrently and where cooperation is implicitly encouraged. This work presents Text Aggregator, a flexible and distributed program that promotes participation in the development of ideas, especially for location-based narrative creation. In addition to providing basic functionality for text manipulation, this program allows the possibility of adding spatial context information through the connection to a Global Positioning System. Students can thus create a text entry with location and time information, submit it to the public space, view all the contributions instantly and categorize them by drag and drop. The technology used for instant distribution is TupleSpaces, supporting "write" and "read" functionalities for simple and efficient execution. Work-to-date includes implementing the Tuple-based system, developing a user interface for a text-based tool, and integrating location-based time stamps.

Color Associations in Video Game Environments

Chloe Fan <cfan2@wellesley.edu>
Advisor: Steve Harrison

As video games become increasingly prominent and advanced in today's society, more research is being done on game design that analyzes the effectiveness of the different factors involved in game design, from interface design to human-computer interaction to visual attention, particularly in 3D game environments. This paper will focus on color associations in game environments from an art and psychology perspective, one that will offer insight into the mutability of human emotions through the use of different colors in video games. By using common cultural associations of colors to interpret color in art, the role and potential of color in game environments can be clarified, which can lead to more effective game design.

The tagIT RFID System: Sharing Knowledge by Augmenting Physical Objects with Multimedia Content

Gregory Wilson <wilsong0@gatech.edu>, Karen DelDuca <delduca2@tcnj.edu>, & Timothy Watson <tlwatson@ncat.edu>
Advisor: Dr. Scott McCrickard

Emerging mobile and ubiquitous technologies support the acquisition, capturing, and sharing of information digitally. This work considers how an important information exchange situation–interaction with research posters–can benefit from the application of two technologies: RFID, which provides opportunities to augment any object with digital knowledge, and TabletPC technology, which supports pen-based digital capture and sharing of information. Combining these two technologies, we augmented research posters with digital information so that additional multimedia content can be displayed creating an open forum for information sharing and feedback opportunities. We conducted interviews with domain and technology experts to identify key aspects that should be included in our design: rich multimedia poster overviews, easy access to prior comments, and flexible opportunities for viewers to discuss posters and exchange ideas.

Our prototype augments a Tablet PC with RFID capabilities to allow for supplemental information, such as audio and video content, about research posters to be accessed by scanning RFID tags located on each poster, permitting not only access to this data but also the ability to comment and share ideas. A history of each poster's previous locations, past comments, and other information is also accessible. Ongoing work will examine the use of the system over time, focusing on the exchange of comments and the development of ideas. Future work will explore other objects that could benefit from this enhancement, including posters (research or entertainment), paintings, sculptures, and other works of art.

Blacksburg Virtual Town Square

Jose Lombay <cheo.28@gmail.com> & Mariheida Cordova-Sanchez <mariheida@gmail.com>
Advisors: Drs. Manuel A. Pérez-Quiñones & Andrea Kavanaugh

In a Digital world, Social networks have become a melting point for our busy society, providing a new avenue of communication allowing people to express their opinions and ideas quickly and conveniently. Furthermore, social networks have had a great impact over the last few years. They have been able to attract many people for mostly social purposes. This project is focused on the town of Blacksburg, Virginia.

The Blacksburg Electronic Village (BEV) provides the citizens of the Blacksburg, Virginia a community website with many services and sources of information. One of our goals is to provide the government of Blacksburg with features to elicit citizen feedback and support citizen-to-citizen deliberation, as well as providing easily accessible information concerning town activities. For these reasons we are developing a new version of BEV, called the Virtual Town Square (VTS).

Through Really Simple Syndication, VTS provides useful information to citizens. We also extended an existing plugin to add valuable features such as ICS subscriptions. By providing these features, VTS will increase political awareness and participation resulting in a stronger voice within the community and a better resource to the government to know the community.

Creating a Portable CardTableUsing Augmented Reality Technology

Kendra Wadsworth <k.f.wadsworth@nsu.edu>
Advisor: Dr. Francis Quek

The objective of this project is to keep with the original CardTable's goal of creating a system that will enhance historians' ability to organize and sift through important historical information using digital note cards. The current system uses Vicon and is not portable; therefore, a "down-sized" CardTable was created. My research goal was to implement ARToolkit, which is used to create augmented reality applications, into the new system. Making it transportable allows it to be tested at multiple locations: Norfolk State University and Virginia Tech. My specific research goal was to integrate ARToolkit with CardTable and pass it necessary data to track the PDA. The user will navigate via a PDA being tracked using a fiducial marker and ARToolkit's tracking methods. Finger tracking methods will also be implemented to allow a person to have hands-on interaction with the card table. During this investigation it was essential that preliminary marker and camera testing occurred. The first round of results suggested that more than one marker and camera will be needed for an accurate system. This is an ongoing project and these aspects are being further tested. This poster outlines the process it will take to accomplish the goal of integrating ARToolkit with CardTable.

I-Store and Architecture

Lamar Simpson <ltsimpso@ncat.edu>
Advisor:Dr. Shawn Bohner

The implementation of an I-Store seeks to go beyond the current realm of business and how transactions are handled. Instead of having the customer search on their own for products and services the I-Store will customize itself for specific users based on their profiles. These profiles will be tailored to the individual user based on search history and the parameters that set for their own profile. This poster seeks to address the architecture design challenges for implementation of and I-store and model the interactions the user would have with such a system. The argument is that the I-store is better suited to individual needs of users over current business models.

Aural Display: Matching Sound Spatialization to Auditory Perception

Nick Winter <nwinter@oberlin.edu>
Advisor:Dr. Denis Gracanin

A range of applications, including sonification of data, virtual environments, and user interaction, could benefit from accurate aural spatialization of positional sound sources. We hypothesize that, given focus, aural information interaction could approach the importance of the visual. However, current surround sound and virtual spatialization models are too low-resolution to support this exploration, because they are not well-suited to human auditory mechanisms. We investigate the basic potential of a dense, 2D speaker array to provide a high-resolution, aural analogue to the visual display. We have prepared an extensive experimental framework to measure human auditory localization accuracy of different types of sound, and of static and moving sound sources, and of the extent of sound "shapes." If our official testing confirms our preliminary results suggesting this technology is more accurate than headphone-based HRTFs, then deeper exploration with a larger, denser array could lead to new, aural modes of computer interaction.

The Virginia Tech Group Hashing Algorithm Visualization

Robert Meeks <rmeeks@ncat.edu>
Advisor:Dr. Clifford Shaffer

Algorithm-visualizations (AV) are meant to help the user better understand the concept of an algorithm. However in the past and even now most have not allowed the user to grasp the concept very well, mainly due to lack of user control and user activity. In an attempt to prevent this problem within our on Hashing Algorithm Visualization, we have changed the design to improve its usability. We are currently adding a tutorial as well as java animation to help the user see how the algorithm works. In addition to what we currently have, we added a part that will allow the user a chance to predict what happens next in the visualization.

The Future of Multiplayer Gaming: An Exploration of Competitive and Collaborative Computing on Ultra-High Resolution Systems

Ronald Omega Forbes <ron4bz@vt.edu>
Advisor:Dr. Chris North

Recent advances in hardware have triggered a rapid increase in the display resolution of computer monitors. As this pattern continues, the way multiple users collaborate simultaneously on a single system will be revolutionized.

This study focused on exploring the benefits that very high resolution displays bring to multiplayer collaborative and competitive games. The researcher developed prototypes of different multiplayer games on the Gigapixel display, a fifty monitor display with a combined resolution of 16,000 by 6000 pixels. To support multiple players, the use of Nintendo Wii remote controls was observed and evaluated. While support for communicating with the "Wiimote" is still very scarce, the capabilities of the input device proved to work well to allow multiple users to interact with the Gigapixel at once. By using the Nintendo Wii remote control, three different games were prototyped successfully.

Additionally, the knowledge developed from experimenting with this new input device will aid future developments in the area of collaborative computing using the Wiimote as well as providing much needed support to the research community on fully understanding the device's capabilities.

The Electronic Fetal Monitor: Can Patients Interpret Information in a Heartbeat?

Sara A. Brickel <sbrickel@vt.edu>
Advisor: Enid N. H. Montague

The purpose of this study was to determine if the interface design of an electronic fetal monitor display provides comfort, for a patient, which is based on an accurate interpretation of the information being provided. Interviews with mothers indicated that there is an element of comfort provided by the display. Non-medical participants were asked to interpret information displayed on a Philip's Avalon FM20 Antepartum and FM30 Intrapartum electronic fetal monitor and determine whether contraction and fetal heart rate graphs indicated complications. The average participant scores from this cognitive walk-through proved that participants were not able to accurately interpret this information.

The 2007 REU Scholars:

Allison Crandell Hollins University	**Broderick Kyle Daniels** Jackson State University	**Catherine Grevet** Wellesley College	**Chloe Fan** Wellesley College
Gregory Wilson Georgia Tech	**Jose Lombay** Universidad de Puerto Rico	**Karen DelDuca** The College of New Jersey	**Kendra Wadsworth** Norfolk State University
Lamar Simpson North Carolina A&T State University	**Mariheida Cordova-Sanchez** Universidad de Puerto Rico	**Nick Winter** Oberlin College	**NyEsha Robinson** North Carolina A&T State University
Robert Meeks North Carolina A&T State University	**Ronald Omega Forbes** Virginia Tech	**Sara Ashworth Brickel** Virginia Tech	**Ammar Poonawala** Virginia Tech

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