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Message from the Chapter Chair

On behalf of the Mid-Southeast Chapter of the Association for Computing Machinery, welcome to the 2009 Fall Conference. Last year I asked Joe Crowell how long the chapter had been meeting. Joe responded that he first attended in the early 60s, and it had been meeting for several years before that! Actually the chapter was founded in 1959, so presumably this is the 51st year for the Fall Conference.

I am a relatively newcomer to the conference, having attended the first time in the late 1980s. There are some who have been attending 30-40 years without fail. At my first meeting, I noted how comfortable the meeting was, and how it was a place to share information with people who, for the most part, share similar problems—whether it be students of widely diverse abilities in CS1 or a student who reserves the right to turn in homework any time he or she pleases regardless of any so-called deadline. Many of us have found the perfect textbook (well almost perfect) or obtained new ideas for a course or a project at this conference.

One of the areas in which the conference has grown significantly is in the number of student presentations. It is always impressive to see the quality of our students' work. Last year we split one of the student divisions to judge all the presentations. This year there are even more! That's a nice problem to have!

There is a great deal of work behind the scenes in preparing for the conference, with the bulk of that being performed by the Conference Chair, Program Chair, Judges Coordinator and the Chapter Treasurer. Please make an effort to thank them for their hard work. If you volunteered to help as a session chair, student presentation judge, or brought students to the conference, we thank you for support.

Finally, take time to enjoy the mountains of East Tennessee. It is a fine time of year to escape our classrooms and rejuvenate ourselves at the fall conference.

Jim Clark
University of Tennessee–Martin

Chapter Officers

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Brian Toone, Samford University

Undergraduate 2-year
Ken Adcock, Cleveland State Community College

Undergraduate 4-year
Jarrett Terry, Georgia Perimeter College
Ramana Gosukonda, Fort Valley State University
Ashraf Saad, Armstrong Atlantic State University
Ambareen Siraj, Tennessee Tech University
Glenn Wiggins, Mississippi College
Melissa Wiggins, Mississippi College

Master's and Ph.D.
Shamim Khan, Columbus State University
Brian Toone, Samford University
Nabil Yousif, Fort Valley State University

Session Chairs

Azalea Room

Session I:	Joyce Crowell, Belmont University
Session II:	Ken Adcock, Cleveland State Community College
Session III:	Srinivasarao Krishnaprasad, Jacksonville State University
Session IV:	Jim Johnson, Bethel University
Session V:	Jim Johnson, Bethel University

Dogwood I

Session I:	Sylvia Colvin, Tennessee Valley Authority
Session II:	Sylvia Colvin, Tennessee Valley Authority
Session III:	Jim Vandergriff, Austin Peay State University
Session IV:	Jim Vandergriff, Austin Peay State University

Dogwood II

Session I:	Masoud Naghedolfeizi, Fort Valley State University
Session II:	Masoud Naghedolfeizi, Fort Valley State University
Session III:	Otha Britton, University of Tennessee–Martin
Session IV:	Otha Britton, University of Tennessee–Martin

Magnolia Room

Session I:	Ashraful Chowdhury, Georgia Perimeter College
Session II:	Jim Clark, University of Tennessee–Martin
Session III:	Jim Clark, University of Tennessee–Martin
Session IV:	Nancy Smithfield, Austin Peay State University
Session V:	Nancy Smithfield, Austin Peay State University

ACM Mid-Southeast Chapter
2009 Fall Conference
Gatlinburg, Tennessee
Glenstone Lodge

Thursday, November 12, 2009

4:00 – 6:00 p.m.	**Registration**
6:00 – 7:30 p.m.	**Social Meeting, Hospitality Suite**
7:30 – 9:00 p.m.	**Dinner — Individual Arrangements**
9:00 – 12:00 a.m.	**Social Gathering, Hospitality Suite**

Friday, November 13, 2009

7:30 – 9:00 a.m.	**Registration**
7:30 – 8:00 a.m.	**Morning Coffee Sponsored by Cengage Learning**
8:00 – 8:10 a.m.	**Welcome/Announcements — Azalea Room**
	Welcome Chapter Chair
	Conference Announcements Conference Chair
	Program Announcements Program Chair
8:10 – 9:00 a.m.	**Keynote Address**
9:00 – 9:15 a.m.	**Coffee Break Sponsored by Cengage Learning**

Session I	**9:15 – 10:35 a.m.**
Azalea Room:	**Doctoral Degree Presentations** Session Chair: Joyce Crowell, Belmont University
9:15 – 9:35	*Which Environment is More Suitable for Novice Programmers: Integrated Development Environment vs. Editor/Command Line/Console Environment?*, Edward C. Dillon, Jr., University of Alabama
9:35 – 9:55	*An Optimized Image Clustering and Feedback-based Retrieval Framework,* Liping Zhou, University of Alabama at Birmingham
9:55 – 10:15	*Extracting and Ranking Papers Describing Coexpression among Genes using Conditional Random Fields,* Richa Tiwari, University of Alabama at Birmingham
10:15 –10:35	*CeDAR: Unifying Clone Maintenance Processes,* Robert Tairas, University of Alabama at Birmingham
Dogwood I:	**Undergraduate 4-year Presentations** Session Chair: Sylvia Colvin, Tennessee Valley Authority
9:15 – 9:35	*Context Driven Adaptable Speech Interfaces,* Aaron Munoz and John Licato*,* University of Alabama at Birmingham
9:35 – 9:55	*High-Resolution Data Visualization Using Rocks Clusters*, Aaron Robinson, University of Maine
9:55 – 10:15	*The Auditory Graphical Analyzer: Ubiquitous Access to Graphical Information for the Visually Impaired*, Ameer Armaly and Sean Wilson, Furman University
10:15 –10:35	*Web and Database App Development Part 1,* Kyle Greer, Jacob Robertson, Rachael Tankersley, Megan Tucker and Ian Weston, University of Tennessee–Martin

Dogwood II:	**Undergraduate 4-year Presentations** Session Chair: Masoud Naghedolfeizi, Fort Valley State University
9:15 – 9:35	*RFID Trail Marker System and Trail Marker Network,* Chase Moore, Columbus State University
9:35 – 9:55	*Active Cyber Forensics using Splunk and Attack Graphs,* Chris Lanclos, Mississippi Valley State University
9:55 – 10:15	*Pictures in the Head? A Computational Model of Mental Imagery,* Chris Walling and Claire Richie, Samford University
10:15 –10:35	*Adventures in OpenGL ES and iPhone Development,* David C. Kolb, Columbus State University
Magnolia Room:	**Professional Presentations** Session Chair: Ashraful Chowdhury, Georgia Perimeter College
9:15 – 9:35	*Early Detection of Captured Sensor Node,* Wei Ding and Bireswar Laha, Austin Peay State University
9:35 – 9:55	*Computational Science from the Undergraduate Classroom to Internships,* Angela Shiflet, Wofford College
9:55 – 10:15	*Program Outcomes: Change is a Scary Thing,* Donald Sanderson, East Tennessee State University
10:15 –10:35	*Incremental Development of an Algorithm by Incorporating a Test Plan,* C. L. Chen and Cassandra Thomas, Tuskegee University

Session II	**10:40 – 12:00 p.m.**
Azalea Room:	**Doctoral Degree and Undergraduate 2-year Presentations** Session Chair: Ken Adcock, Cleveland State Community College
10:40 – 11:00	*A Relative Entropy-based Projective Clustering Algorithm,* Song Gao, University of Alabama at Birmingham
11:00 – 11:20	*Demonstration-based Inference of Model Transformations,* Yu Sun, University of Alabama at Birmingham
11:20 – 11:40	*S.P.O.T. (Surveillance Program Object Tracker),* Jason Conti and Paris Walters, Georgia Perimeter College
11:40 – 12:00	*'A.I.R.' (Aerial Imaging Robot),* William P. Howard and John W. Turner, Georgia Perimeter College
Dogwood I:	**Undergraduate 4-year Presentations** Session Chair: Sylvia Colvin, Tennessee Valley Authority
10:40 – 11:00	*Development of the Multicast Flow Oriented Routing Protocol for Mobile Ad hoc Networks*, DeMarcus Thomas and Ebony Addison, Mississippi Valley State University and Elizabeth City State University
11:00 – 11:20	*Web and Database App Development Part 2*, Brian Hawks, Ben Hollomon and Jacob Robertson, University of Tennessee–Martin
11:20 – 11:40	*A Web-based Platform for Distributed Robotics Research,* Gabriel Loewen, James Weston and Jack O'Quinn, Armstrong Atlantic State University
11:40 – 12:00	*Quantum Computation: Is RSA All Factored Out?*, J. Caleb Wherry, Austin Peay State University

Dogwood II:	**Undergraduate 4-year Presentations** Session Chair: Masoud Naghedolfeizi, Fort Valley State University
10:40 – 11:00	*Swarm Intelligence in Game AI,* Joshua Courtney*,* East Tennessee State University
11:00 – 11:20	*SeeSpeak, a Real-time Software and Hardware Architecture Providing Auditory and Spatial Feedback about Graphical Images,* John L. Nelson, Furman University
11:20 – 11:40	*Wireless Avionics Technology Evaluation,* Jenaelle Coleman*,* Mississippi Valley State University
11:40 – 12:00	*Dynamic modeling of Components on the Electrical Grid,* Bailey S. Young, Wofford College
Magnolia Room:	**Professional Presentations** Session Chair: Jim Clark, University of Tennessee–Martin
10:40 – 11:00	*Are You an EduPunk?,* David Brown, Ph.D.*,* Pellissippi State Community College
11:00 – 11:20	*Industry Needs and Computer Science Program Offerings,* James J. Johnson*,* Bethel University
11:20 – 11:40	*Keeping the Bombing Range Open: A Case for Redundant Remote Shell and Software Development Services for Student Success,* Rob Dye, Benjamin S. Holt, Jeremy Ey and Eric L. Brown*,* Tennessee Tech University
11:40 – 12:00	*When students dream about solving hard problems: It seems like an opportunity to learn*, Willard Munger and Scot Anderson, Southern Adventist University
Lunch	**Patio Restaurant 12:00 – 1:00 p.m.**

Session III 1:00 – 2:20 p.m.

Azalea Room: **Master's Degree Presentations**
Session Chair: Srinivasarao Krishnaprasad, Jacksonville State University

1:00 – 1:20 *An Adaptive Approach to Robot Learning,* Charles V. Smith III, University of South Alabama

1:20 – 1:40 *Instruction Level Parallelism: The Card Game,* Robert Lowe, University of Tennessee

1:40 – 2:00 *Mosaicing of Documents and Images,* Soma Halder, University of Alabama at Birmingham

2:00 – 2:20 *Benefits of Reverse Engineering Legacy Java Code to VDM++,* Walker Haddock, University of Alabama at Birmingham

Dogwood I: **Undergraduate 4-year Presentations**
Session Chair: Jim Vandergriff, Austin Peay State University

1:00 – 1:20 *Finding Game Strategies with Genetic Programming: Evolving a (Near) Unbeatable Poker Player,* Robert D. French, East Tennessee State University

1:20 – 1:40 *Verifying Forensic Tool Device Seizure*, Elijah Mike, Tuskegee University

1:40 – 2:00 *An Energy-aware Grid-Cluster Based Data Gathering Protocol for Wireless Sensor Networks*, Jonathan Henderson and Natarajan Meghanathan, Mississippi Valley State University, Jackson State University

2:00 – 2:20 *Automated Monitor Code Generation Using AspectJ,* Jean-Luc Rioux, Middle Tennessee State University

Dogwood II:	**Undergraduate 4-year Presentations** Session Chair: Otha Britton, University of Tennessee–Martin
1:00 – 1:20	*Implementation of Binary Tree Structures Using Binary Codes*, Pervis Fly and Natarajan Meghanathan, Jackson State University
1:20 – 1:40	*From Desktop to Web: Tomcat with a Side of Beans,* Justin Sutton, Adam Shobe, Ben Hollomon and Jacob Robertson, University of Tennessee–Martin
1:40 – 2:00	*Analysis of Student Learning using Visualization,* Mick McGrath, Middle Tennessee State University
2:00 – 2:20	*Forensic Analysis of Toolkit-Generated Malicious Programs,* Yasmine Kandissounon, Columbus State University
Magnolia Room:	**Professional Presentations** Session Chair: Jim Clark, University of Tennessee–Martin
1:00 – 1:20	*Emergence of Visual Patterns in Graphs,* Steve Donaldson, Samford University
1:20 – 1:40	*Web-based AI Agents*, Dr. Yingbing Yu and Dr. Sandip Patel, Austin Peay State University and Morgan State University
1:40 – 2:00	*Assembly on the PlayStation 3,* William H. Hooper, Belmont University
2:00 – 2:20	OPEN
Break	**Poolside 2:20 – 2:35 p.m.** **Sponsored by Cengage Learning**

Session IV 2:35 – 3:55 p.m.

Azalea Room: **Professional Presentations**
Session Chair: Jim Johnson, Bethel University

2:35 – 2:55 *From UML Class Diagrams to Code,* Jeff Roach, East Tennessee State University

2:55 – 3:15 *Network administration course redesign with MOAC Virtual Labs*, Jiang Li, Austin Peay State University

3:15 – 3:35 *Using Visual Logic with Java,* Kathy Winters, University of Tennessee – Chattanooga

3:35 – 3:55 *MAGIc: A Memetic Algorithm for Grammatical Inference*, Marjan Mernik[1,2], Dejan Hrnčič[1], Barrett Bryant[2], Alan Sprague[2] and Qichao Liu[2], [1]University of Maribor, Slovenia and [2]University of Alabama at Birmingham

Dogwood I: **Undergraduate 4-year Presentations**
Session Chair: Jim Vandergriff, Austin Peay State University

2:35 – 2:55 *To Hack or Not To Hack, That Is the Operating System?,* Samuel Eugene Blake III, Columbus State University

2:55 – 3:15 *Creating Customized Navigation Views in Three-Dimensional Space,* Robert Smyly and Oliver White, University of Alabama and Georgia Institute of Technology

3:15 – 3:35 *Game Implementation for Increasing Mental Engagement of Security Professionals,* Ross Buffington, Belmont University

3:35 – 3:55 *Development of a protocol to monitor the concentration of Edwardsiella ictaluri bacteriophages in commercial catfish ponds,* Rena Span, Rachel Beecham and Michael Mauel, Mississippi Valley State University

Dogwood II:	**Professional Presentations** Session Chair: Otha Britton, University of Tennessee–Martin
2:35 – 2:55	*Are We Succeeding: Looking Back at Retaining and Preparing Computing Majors?,* Suzanne Smith and Kellie W. Price, East Tennessee State University
2:55 – 3:15	*Engaging Computer Science Students in Engineering Projects to Enhance Career Opportunities*, Masoud Naghedolfeizi, Ramana Gouskonda, Nabil Yousif and James E. Glover, Fort Valley State University
3:15 – 3:35	*Drupal as the platform for the development of the online program for ICSE 2010*, Brian Toone, Samford University
3:35 – 3:55	OPEN
Magnolia Room:	**Professional Presentations** Session Chair: Nancy Smithfield, Austin Peay State University
2:35 – 2:55	*Exploring the Impact of Additional Variables on Scope Creep,* Denise Williams and David Williams, University of Tennessee–Martin
2:55 – 3:15	*Tech-related Community Outreach – Experiences and Opportunities*, Semmy Purewal, University of Tennessee–Chattanooga
3:15 – 3:35	*Helping Students Become Better Programmers: Pair Programming in the CS1 Lab,* Shamim Khan, Columbus State University
3:35 – 3:55	*Enhancing Computer Security Using Diversity,* Srinivasarao Krishnaprasad, Jacksonville State University

Session V 4:00 – 5:00 p.m.

Azalea Room: **Professional Presentations**
Session Chair: Jim Johnson, Bethel University

4:00 – 4:20 *A Performance Comparison between Artificial Neural Network Models and Gravity and Push-Pull Models in the Study of International Migration from South America to United States*, Masoud Naghedolfeizi, Jehad Yasin, Nabil Yousif and Ramana Gosukonda, Fort Valley State University

4:20 – 4:40 *Accelerating Lossless Data Compression with GPUs*, Robert Cloud, Matthew Curry, Lee Ward, Anthony Skjellum and Purushotham Bangalore, University of Alabama at Birmingham

4:40 – 5:00 *Database Marketing under Recessionary Conditions: Implications for IT*, Vernon L. McGlone and Teresa A. McGlone, University of the Cumberlands and Eastern Kentucky University

Magnolia Room: **Professional Presentations**
Session Chair: Nancy Smithfield, Austin Peay State University

4:00 – 4:20 *Using Early Instruction Sets to Captivate Computer Architecture Students?,* David Tarnoff, East Tennessee State University

4:20 – 4:40 *Introducing Computer Science within a Predominantly Minority Urban School System,* Dixon Shuttleworth and Jeff Gray, University of Alabama at Birmingham

4:40 – 5:00 *LabGrader 2.0 - Web Based C++ Teaching System,* Bob Bradley, University of Tennessee–Martin

5:00 – 5:30 p.m.	**Business Meeting, Dogwood II**
5:30 – 7:00 p.m.	**Social Gathering, Hospitality Suite**
7:00 – 8:30 p.m.	**Awards Banquet, Azalea Room**
9:00 p.m.	**Social Gathering, Hospitality Suite**

Notes

Keynote Address

Dr. Jesse H. Poore

Director, UT—Oak Ridge National Laboratory Science Alliance

Opportunities for Students at UT and ORNL

Abstract

The University of Tennessee and Battelle Memorial Institute joined forces in 2000 to win the contract to manage the Oak Ridge National Laboratory for the U.S. Department of Energy. The basic research mission of ORNL across several fields of science and engineering makes collaboration with university partners very natural. Opportunities for students abound. Briefly, five joint institutes between UT and ORNL, together with joint faculty and degree programs, create many openings for students to participate in leading edge research with top scientists, using some of the world's foremost scientific facilities.

About the Speaker

Jesse H. Poore is Professor of Computer Science at the University of Tennessee and holds the Ericsson-Harlan D. Mills Chair in Software Engineering. He is also director of the UT-Oak Ridge National Laboratory Science Alliance. He conducts research in the economical production of high quality software. His research has been funded through industry projects with Ericsson, IBM, and other corporations, as well as the US Military. Professor Poore was Guest Senior Scientist of the Fraunhofer IESE in 2006, working in projects with Bosch, Siemens and others in the transportation sector. Professor Poore earned his Ph.D. in Information and Computer Science at the Georgia Institute of Technology. He has held government positions including Executive Director of the Committee on Science and Technology of the US House of Representatives. He has served on many government advisory committees and panels of the National Academy of Science, most recently the NAS on "Panel on the Design of the 2010 Census Program of Evaluations and Experiments." Professor Poore is a member of the IEEE, ACM and Fellow of the American Association for the Advancement of Science. He received the IEEE Computer Society 2002 Software Engineering Award.

Student Abstracts
Undergraduate Two-Year Programs

S.P.O.T. (Surveillance Program Object Tracker)

Jason Conti and Paris Walters

Georgia Perimeter College

The students of Georgia Perimeter College's Engineering and Computer Science Club have designed an image tracking robot. Built on a Qwerk logic board, the robot was programmed using Java programming. The Robot will use Zero's Internet Communication Engine (ICE) to communicate to a workstation wirelessly by way of a WiFi network. The robot will tilt and pan to locate a designated light source, center it and keep track of it as the light source moves. The rover will move toward the light source and keep within 3 ft of any object in the direction of the light source. The building of this project uses the knowledge of Engineering, Computer Science, and Mathematics that are offered at Georgia Perimeter College. The practical application of this robot and programming is to automate cameras movements when the location of the camera is out of manual control.

'A.I.R.' (Aerial Imaging Robot)

William P. Howard and John W. Turner

Georgia Perimeter College

The objective of the A.I.R. project is to design a readily deployable and reusable system to obtain scalable aerial images of an area for a productive purpose. For this project we are focusing our efforts on a construction site. Our target location will be the proposed parking garage for GPC. The system will have to work within the following parameters:

- Be Recoverable and Reusable
- Capture a quality image of the construction site
- Be ready and easy to use and maintain
- Be transportable by people
- Provide an image that can be scaled and used with a construction design database

Design Overview:
To achieve our objective we will divide A.I.R. into 3 phases as follows:

Phase I: Rocket Development
Phase II: Parachute Control
Phase III: Wireless Data Transmission / Reception

Design Detail:
Rocket Development - We will use a rocket to deploy a camera to an appropriate altitude in order to obtain images of the site. The camera will be separated completely from the rocket in order to obtain a complete image of the site and to better ensure that it will point in the desired angle as well as reduce any unnecessary weight to maximize airtime.

Parachute Control - Once the rocket reaches altitude it will be deploy A.I.R. which will consist of a parachute with camera, servos, and other equipment to gather the images. A.I.R. will control the flight path by manipulating the tether strings connected to the parachute. This will be done wirelessly using a remote control device and will allow for greater certainty of getting images of the target location.

Wireless Data Transmission / Reception - A.I.R. will stream video images to a laptop via wireless transmitter. The footage will be saved in order to be broken up into frames that will be edited for use. The purpose for using video instead of still photos is to reduce streaking and blurred images. The edited photos will then be used in a construction program such as AutoCAD in order to assist with construction projects.

Student Abstracts
Undergraduate Four-Year Programs

Context Driven Adaptable Speech Interfaces

Aaron Munoz and John Licato

University of South Alabama

Speech interface systems tend to lack adaptability, causing them to be clumsy and difficult to use. A developer might be limited in the variety of behaviors that are considered, but when a speech system is able to adapt, trends and behaviors can be integrated that the initial analysis might not have considered. We have developed a speech-controlled interface for Veronica Jagbot, a fully autonomous tour guide robot, with this idea of adaptability in mind. This interface integrates with contextual information and adapts using machine learning techniques, allowing for an experience that we hope can increase public acceptance of robots and speech interfaces in general. Contextual information such as nearby named locations, common objects such as trash cans, and other historical information about the current location can be used to adjust speech grammars. Separately, these items are minor instances of data of minimal meaning. However, when these items are fused together they allow Veronica to truly adapt her grammars to various locations. Another great benefit of such a system is that not only does it become more accurate over time, but it also assigns a higher priority to established trends in the data. Thus, random fluctuations in data will not make a profound impact on Veronica's speech system. Veronica's target audience is not the only group to benefit from this system, the operator does as well. This system also allows for Veronica's list of grammars to dynamically change based off of changes the operator makes in the map, making the operator's job much easier. The potential benefit of this concept of learning will also be applied to Veronica's vision system in the future, hopefully making her much more capable of integration into common activities

High-Resolution Data Visualization Using Rocks Clusters

Aaron Robinson
Research Experience for Undergraduates FacultyAdvisors:
Dr. Bruce Segee and Dr. Yifeng Zhu , University of Maine

Faculty Advisor: Mr. Roger Shore, High Point University

High Point University

High-resolution data visualization is used for viewing large data sets while maintaining finer detail. The need for high-resolution arises from the generation of these immense data sets in scientific modeling and medical imagery. Current methods of creating large viewing surfaces often neglect the finer detail by simply stretching the image.

To create a high-resolution display wall, either multiple projectors or LCDs must be arranged to create a single unified display. If projectors are used, higher-resolution can be achieved with fewer displays while creating a seamless display. LCDs provide a cheaper solution but because of their bezels, the seamless appearance is lost.

Another important factor is the method used to distribute the imagery. One approach is to have a single machine render and then transmit raw images to the displays. This configuration quickly saturates the network as the display wall resolution is scaled up. However, it allows for the back-end machines to be thin clients because they do nothing but display the raw image. Another approach is to distribute the rendering so that each display does its rendering locally. Now the back-end machines need to be efficient at rendering but the bottleneck becomes the rendering algorithm instead of the network.

My research at University of Maine revolved around creating a high-resolution display with LCDs and implementing a rendering cluster to parallelize our rendering. The objective of our research was to use commodity hardware to create a relatively inexpensive high-resolution display using open-source software. This would allow the tool to become more accessible to scientists, doctors and other end-users. We were able to implement two display walls using Rocks Linux cluster distribution which provided us with a high-resolution environment.

The Auditory Graphical Analyzer: Ubiquitous Access to Graphical Information for the Visually Impaired

Ameer Armaly and Sean Wilson

Furman University

A major barrier to visually impaired workers (VIW) in scientific fields such as computer science is ready access to graphical content. Traditionally, tactile graphics must be produced using expensive Braille embossers or such documents can be outsourced to third party vendors. As a workaround, we have designed and implemented in Java a new software and hardware architecture named AGA, for interactive auditory graphical analysis of digital documents with graphics. The AGA architecture consists of: (1) a document creation/import application (DCIA) used by sighted readers, (2) a database containing a digitized document, its associated digitized graphical images, and their associated grammars and image recognizers, and, (3) an Exploratorium used by VIW, which permits interactive auditory exploration of AGA documents.

The DCIA uses a grammar-based Wizard to guide a sighted reader through the process of creating an AGA compatible document. The grammars define a hierarchical structure for interpreting a given graphical type (i.e., line graph, DFA, directed graph, etc.) and permit image recognizer creation for particular grammar elements. These are saved in the document using a tree-based XML format and processed in real-time during document exploration.
The Exploratorium operates much like a web-based browser but outputs spoken text using the JAWS or freeTTS text-to-speech renderers. When graphical elements are discovered, rather than feel an embossed graph, the VIW interactively guides image recognizers that respond auditorily. Region activation occurs when the VIW moves one or more fingers in or out of a region. Spoken region-based content includes graph type, axes, tics and values, labels, data values, etc. Primitive lines are signified by 2D tones varying in pitch and stereo intensity. A function graph can also be spoken as a table of values for VIW specified interval and range.

Web and Database App Development Part 1

Kyle Greer, Jacob Robertson, Rachael Tankersley, Megan Tucker and Ian Weston
Faculty Advisor: Bob Bradley

The University of Tennessee at Martin

In this session, we will talk about our current project of developing software for a local 911-EOC (Emergency Operations Center). The center needed some older DOS based software rewritten. The software has two modules. One keeps track of local county fire subscriptions and the other assigns (and logs) wrecker requests. We are in the process of rewriting the programs to have an Asp.Net MVC front-end and a MySql database back-end.

In part 1, our team will talk about the processes we used in finding out the center's requirements for the programs and the processes we used to develop the new programs. We will also give a brief introduction to web and DB development with Microsoft's ASP.Net MVC system and the open-source MySql database.

Development of the Multicast Flow Oriented Routing Protocol for Mobile Ad hoc Networks

DeMarcus Thomas
Mississippi Valley State University

Ebony Addison
Elizabeth City State University

Research Experience for Undergraduates Advisor:
Dr. Natarajan Meghanathan
Jackson State University

Various stable path routing protocols have been proposed for both unicast and multicast communications in Mobile Ad hoc Networks (MANETs). In a unicast communication, a source node communicates with a particular destination node; whereas, in a multicast communication, a source node communicates with a group of receiver nodes. In this research, we develop the multicast extension of FORP (referred to as M-FORP) for MANETs. M-FORP was implemented in a centralized fashion using a modified version of the Dijkstra algorithm to solve the Largest Bottleneck Path Problem. M-FORP predicts the lifetime of a link (called the LET) between two nodes using the velocity and direction of movement of the two nodes. The expiration time of a route (called the RET) is the minimum of the LETs of the constituent links of the route. M-FORP connects the source with each of the receivers on paths that have the maximum RET. The set of all such paths constitute the multicast tree. We implemented the Largest Bottleneck Path algorithm for M-FORP in Java. We compared the performance of M-FORP with that of the Multicast extension to the Node Velocity-based Stable Path (M-NVSP) routing protocol and the Bandwidth Efficient Multicast Routing Protocol (BEMRP). The code for BEMRP was provided by our research mentor. We measure the three critical multicast performance metrics: lifetime per tree, number of edges per tree and the hop count per source-receiver path. The transmission range per node is 250m. We observe a tradeoff between the performance metrics and none of the three protocols could simultaneously optimize them. M-FORP yields the most stable sequence of long-living multicast trees; M-NVSP incurs the smallest hop count per source-receiver path and BEMRP incurs the smallest number of edges per multicast tree. This NSF-sponsored REU research was conducted at Jackson State University during Summer 2009.

Web and Database App Development Part 2

Brian Hawks, Ben Hollomon and Jacob Robertson
Faculty Advisor: Bob Bradley

The University of Tennessee at Martin

In this session, we will talk about our current project of developing software for a local 911-EOC (Emergency Operations Center). The center needed some older DOS based software rewritten. The software has two modules. One keeps track of local county fire subscriptions and the other assigns (and logs) wrecker requests. We are in the process of rewriting the programs to have an Asp.Net MVC front-end and a MySql database back-end.

In part 2, our team will talk about more advanced topics such as data conversion, server installation and using JQuery and/or Silverlight plug-ins to produce nice AJax enabled web 2.0 interfaces. We will also talk about our efforts to port our Asp.Net MVC programs to run on Linux using the Mono system.

A Web-based Platform for Distributed Robotics Research

Gabriel Loewen, James Weston and Jack O'Quinn

Armstrong Atlantic State University

We present a web-based platform and simulation system for IntelliBrain robots. The IntelliBrain is a small Java-programmable robot which has a set of attached sensors. These sensors utilize the IntelliBrain to navigate and provide feedback about the robot's environment. The platform takes advantage of these sensors and provides a rich web-based experience for developing behaviors for the robots. Behaviors control a robot or swarm of robots within a grid environment. Algorithms implemented by the behaviors simulate either inter-robot communication, in the case of a swarm behavior, or singular behaviors. By enabling the service over the web, users are able to load behaviors into the robots and observe behavior, using live streaming video or by using a virtual environment embedded within the web application. In addition, users can develop more complex environments using the virtual environment which acts as a virtual behavior simulator. Behavior simulations, either virtual or actual, are advantageous for gathering data which can be used to identify patterns within the IntelliBrain's environment allowing for data classification and pattern recognition to be possible. Further research objectives include biologically and evolutionary inspired algorithms which produce behaviors that are closely mapped to those in nature. For instance, dead reckoning is a behavior which is observed within populations of bees and involves being able to return to a point of origin after long distance travel. This platform is ideal for solving problems, such as dead reckoning, and provides an opportunity for computer science research and education.

Quantum Computation: Is RSA All Factored Out?

J. Caleb Wherry

Austin Peay State University

RSA has long been one of the most widely used public key encryption algorithms to secure information. The relative security of this algorithm is based on the fact that no known classical computing algorithm can factor large numbers in polynomial time. Worst case scenario, it takes an exponential amount of time to break an RSA key by classical computing means.

Quantum computers will be able to factor large numbers exponentially faster than classical computers, and thus pose a major threat to RSA encryption. The audience will be introduced to the topic of quantum computation with a focus on its potential advantages over classical computation. The information will be presented in a fashion such that no prior knowledge of quantum mechanics will be necessary.

Finding Game Strategies with Genetic Programming: Evolving a (Near) Unbeatable Poker Player

Robert D. French

East Tennessee State University

One area of interest in Artificial Intelligence is Game Strategies, which are algorithms for playing and hopefully winning a finite game based on either the entire history of moves, or the current state of the game. Discovery of perfect game strategies, those which cannot lose, is a formidable computational challenge [1]. However, evolution of approximate strategies, those which make difficult -- but imperfect -- opponents, by way of genetic programming has been shown by Koza and others [2]. Such a system will be demonstrated here as a means of introducing the audience to Genetic Programming.

1. Discover Magazine, July 2007, "The Next Jump in Artificial Intelligence"
2. Koza, John R. Genetic Programming: On the Programming of Computers by Means of Natural Selection

Verifying Forensic Tool Device Seizure

Elijah Mike

Tuskegee University

Before any mobile forensic tool can be used there must be documented proof verifying that it can accurately and completely acquire data from mobile devices. This paper will discuss the findings on the accuracy and completeness of cellular device data acquisition by Paraben's Device Seizure (PDS). The presence of features that allow for logical data acquisition is also discussed. This experiment was conducted by comparing what PDS acquired from several devices to the actual content of those devices.

Out of the ten mobile devices available for verification purpose, Blackberry 7290, LG KG800, Samsung M520, and Samsung M300, was supported by PDS. Device Seizure 3.2 was used to investigate these phones. The acquisition of the Samsung devices bore very similar results. PDS claimed to be able to acquire the File system, ToDo, Phonebook, and SMS History. The result of both acquisitions yielded success in all areas but the logical acquisition of the ToDo, Phonebook, and SMS History were all empty. The data acquired from the other two devices, Blackberry 7290 and LG KG800, was incomplete. PDS acquired only the data from the Blackberry device and nothing from the SIM card. In contrast, only the data from the SIM card was acquired from the LG KG800.

This experiment is inconclusive because only four devices, of the couple thousand that PDS supports, are analyzed. According to the observations from these devices, the data that PDS did acquire was relatively accurate with minimal discrepancies. On the other hand, none of the acquisitions were complete with logical data.

An Energy-aware Grid-Cluster Based Data Gathering Protocol for Wireless Sensor Networks

Jonathan Henderson
Mississippi Valley State University

Natarajan Meghanathan
Jackson State University

We propose an energy-aware grid-cluster based data gathering (GCDG) protocol for wireless sensor networks. GCDG works as follows: The sensors are uniform-randomly distributed throughout the network area. The network area is divided into grid blocks of uniform size. Each grid block constitutes a cluster of sensors. For each round of data communication, the Local Cluster Leader (LCL) node of a cluster is the node with the highest energy among the cluster nodes and the Global Cluster Leader (GCL) node for the network is the LCL node with the highest energy. Data gathering for a round occurs in three stages, in sequence: (i) The sensor nodes in each cluster forward data to their LCL node, (ii) Each of the LCL nodes aggregate its own data with the data collected from all the sensors within the cluster and forwards the aggregated data to the GCL node and (iii) The GCL node aggregates the data from all of the LCL nodes with the data collected from its own cluster and forwards the single aggregated data packet to the sink node. For each round, a representative aggregated data is sent to the sink.

We implemented the GCDG protocol on a discrete-event simulator implemented in C++. The performance of GCDG was compared with the classical LEACH (Low Energy-Adaptive Clustering Hierarchy) data gathering protocol. Simulation results show that, compared to LEACH, GCDG yields a larger network lifetime (time of first node failure), lower delay (time units per data aggregation) and lower energy consumption per round of data aggregation. With regards to the impact of block size on GCDG performance, we observe that the GCDG protocol yields the largest network lifetime, lowest delay and lowest energy consumed per round when the grid block size is 1/3rd of the one-side length of the square network field.

Automated Monitor Code Generation Using AspectJ

Jean-Luc Rioux
Faculty Adviser: Dr. Zhijiang Dong

Middle Tennessee State University

There is no way to guarantee the correct implementation of a well-defined software design. However, we can improve the quality of the implementation through debugging and testing. This presentation will present a tool monitoring the code execution to program bugs. The monitor code, generated automatically by the tool as aspects of original source code, will verify the pre-conditions, post-conditions, invariants of functions and objects. While still in its early stage, this project has birthed a program that, using a property specification, generates aspects to be compiled with the original source code. The user of the program needs no knowledge of how AspectJ works and no modifications to the original source need to be made. Currently, the property specification is described in a separate file. But in the future, it will be embedded in the original source code as comments. As a program enters a function or creates a class, these aspects can be used to check constraints, verify status, and print out any indiscrepancy notated in function comments or (currently) the configuration file. As the project develops, properties that can be verified by the generated monitor code will grow.

To Hack or Not To Hack, That Is the Operating System?

Samuel Eugene Blake III

Columbus State University

With the expansion of wireless networks, the threat of wireless vulnerabilities being exploited is an ever growing threat. It is now a well-known fact that Wireless Encryption Protocol (WEP) secured wireless networks does not provide any protection against hacking. There are various WEP cracking software tools available on the market. All of these tools are designed mainly to be used with Unix-based operating systems. This paper investigates whether these tools can be used successfully in a Windows based environment. As part of this investigation, an experiment of cracking a WEP secured wireless network was done with a majority of these tools from a Windows platform. Although each tool has a Windows compatible version, none of these could be successfully launched from Windows. Further research was performed to find out what features of Windows prevented these tools from being successful. This paper describes the results of that study. This paper further indicates how the existing WEP cracking tools can be modified to be compatible with the Windows platform.

Creating Customized Navigation Views in Three-Dimensional Space

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Oliver White
Georgia Institute of Technology

Faculty Mentor: Dr. Jeff Gray
University of Alabama at Birmingham

Many navigation utilities, such as Google Street View, provide users with an interactive three-dimensional environment that represents visual certain attributes of predetermined locations. This type of utility has an advantage over traditional two dimensional maps in that it allows users to see the locations as if they were actually there and recognize landmarks that will help them navigate with a greater degree of confidence. However, current systems only work within a specific context and only the program's creators are able to add content to the maps. The This project that we describe in this presentation addresses this problem by allowing end-users to create and customize their own virtual environments in a very flexible and expandable way. The software developed through this investigation provides a way to easily map an area of any type (e.g., the inside of a large building, an external venue like a zoo or amusement park, or a series of convoluted trails in the wilderness). The maps can then be exported into a viewer, which enables users to navigate through any area in a natural and intuitive way. Several algorithms were developed for this project, allowing users to accomplish such tasks as clicking on the part of the map they want to explore or loading prebuilt maps from configuration files. For experimental assessment, we applied our system the program was used tto map several locations in the McWane Science Center in Birmingham, Alabama.

Game Implementation for Increasing Mental Engagement of Security Professionals

Ross Buffington

Belmont University

Security professionals are required to monitor video feeds for long periods of time in order to detect crimes. This task is both tedious and repetitive, and therefore cognitively dissuasive (boring). Furthermore, the very act of sitting for extended periods of time is physically unhealthy.

To address these issues, a game prototype was developed within the guides of three specific rules. The game should be overlaid on top of security footage, thus allowing gameplay and video monitoring to occur simultaneously. Additionally, the game should be entertaining enough to increase cognitive engagement but should avoid distracting the player from the video feed. Lastly, the game should introduce some degree of physical activity.

The game was implemented on the Macintosh OS X platform with a simple two-dimensional concept. It uses client/server architecture, in conjunction with TCP/IP sockets and Wi-Fi, to facilitate connection with the wireless controller: the iPhone. Accelerometer data from the iPhone is used to introduce the physical action of tilting the device as a means of game control.

Development of a protocol to monitor the concentration of Edwardsiella ictaluri bacteriophages in commercial catfish ponds

Rena Span, Rachel Beecham, and Michael Mauel

Mississippi Valley State University

One of the most important diseases of farm-raised channel catfish (Ictalurus punctatus) is enteric septicemia of catfish (ESC), which is caused by the gram-negative bacterium Edwardsiella ictuluri. Infected catfish tend to have red and white ulcers on their skin, there is often a white spot on the fish forehead and the abdomen is often swollen. Internal signs in the body cavity can include: swollen kidney, ascites (fluid in the abdomen), hemorrhage in the gut tissues, nodules in the liver and conjested spleen. ESC is typically diagnosed by culture and isolation of the causative bacterium from the internal organs or brain tissue on tryptic soy agar (TSA) with 5 % sheep's blood or brain heart infusion (BHI) agar. An early diagnosis is possible if pond managers make daily observations on feeding response, behavior and mortality. Currently, only three antibiotics, Romet 30®, Romet B® (Hoffmann-LaRoche, Inc.), Terramycin ® (Pfizer, Inc.) and Aquaflor (Schering-Plough Veterinary Corporation) are approved by the U. S. Food and Drug Administration (FDA) to treat food fish. Bacteriophages are viruses that infect bacteria and have been utilized in the past to treat bacterial diseases. The purpose of this project is to develop a procedure to monitor the levels of bacteriophages that infect E. ictaluri in catfish ponds. If the concentration of bacteriophage increases it may indicate that there is more E. ictaluri host present in the pond water and a greater chance for ESC to develop in the catfish population. This project is the first step toward using bacteriophages to treat ESC and/or to use the bacteriophage concentration to monitor the levels of E. ictaluri in the pond water. Plaque assay, utilizing the agar overlay method, is the oldest but still common and useful method for enumerating phages. We have developed the protocols to collect catfish pond water samples and process the samples to quantify Edwardseilla ictaluri bacteriophages. This is an ongoing project that will continue on through out the fall and through next summer.

RFID Trail Marker System and Trail Marker Network

Chase Moore

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Radio frequency identification (RFID) is one of the newest MOST (Mobility, Organizational and Systems Technologies) technologies that enable an information system to acquire a vast array of data about location and other different properties of a physically tagged entity that can be scanned wirelessly. RFID technology consists of two devices: an RFID tag and a tag reader. An RFID tag helps identify any object or person uniquely by transmitting data over the air in response to a quarry made by an RFID reader. We have designed a project named "RFID Trail Marker System Investigation Project" to develop a novel RFID trail marking system that will equip trails in wilderness or in places difficult to penetrate (such as mines) and flawlessly mark and identify milestones for benefits of a wide range of people e.g., rescuers, miners, hikers, rangers etc. This project consists of investigation and analysis of a de-centralized trail marker system in a small setting. We have built a de-centralized prototype of this system. Our prototype system contains 5-10 passive RFID tags that could be embedded in mile posts established in a specific trail and one RFID reader. In this paper, we describe the experimentation of our RFID Trail Marker System and the results obtained. We also propose the design of a novel Trail Marker Network that integrates the RFID Trail Marker System and a wireless sensor network to further add to the safety of corresponding people. While a person with a reader will get trail information from RFID tags, the tags will be able to retrieve information about that person's location and send it to the Internet via the wireless sensor network. This novel technology will enable us to rescue a person in danger very quickly and thus save lives of people.

Active Cyber Forensics using Splunk and Attack Graphs

Chris Lanclos

Mississippi Valley State University

Anti-forensics has become an issue in the world of cyber security. Anti-forensics is the removal of data to hide illegal activity. Cyber forensics, the counter part of anti-forensics, is being overrun by the constant growth of anti-forensics. It seems like there is a new anti-forensics tool being developed or modified daily. This research combines a newly developed IT search engine called Splunk, with a widely used attack graph theory to monitor USB (Universal Serial Bus) activity. With the combination of the two, it will allow the notification of an attack. The focus on USB is the stepping-stone for a network wide capability using this combination to detect other intruders. Splunk is a constant running database that has the capability to recording almost every action of a computer or network. In addition to recording the data, it has the ability to organize it in a way that can be beneficial to the cause of cyber forensics. Splunk's real time capability gives cyber forensics an upper hand. The ability to record the activity of a computer or network in real time does not allow the use of anti-forensics tools and/or techniques without them being record already. The result is to have the required data to seize and prosecute hackers. This research is a step in the transition from retro-forensics to pro-active forensics.

Pictures in the Head? A Computational Model of Mental Imagery

Chris Walling and Claire Richie

Samford University

Mental imagery is the ability to visualize and manipulate visual and spatial data in the service of task specific objectives. One of the major points of contention in the philosophical debate about mental imagery is whether images are stored as pictures or propositional information. We present a model that combines both forms of representations to simulate several imagery tasks in which people routinely engage. In our model, images are normalized and saved in an artificial neural network. Corresponding size and color information are stored as relative values based on the hypothesis that people make size and color judgments relative to themselves. Multiple objects in an image can be extracted as unique entities, stored as above, and related to one another spatially. These representational features make it possible, even in the absence of further external stimuli, to

1. Compare the size and color of learned objects.
2. Rotate previously learned objects, combine them, and then recognize the internally generated image as an example of a (different) previously learned object (e.g., recognizing the combination of a counterclockwise rotated "D" on top of a "J" as an umbrella).
3. Construct composite spatial layouts of non-adjacent items and perform spatial reasoning tasks.

The model thus suggests potential mechanisms for mental imagery in more sophisticated systems (such as humans) and provides insight into promising directions for future research.

Adventures in OpenGL ES and iPhone Development

David C. Kolb

Columbus State University

The iPhone and iPod Touch have become a highly relevant gaming platform since the release of iPhone OS 2.0 on July of 2008, which enabled the installation of third-party applications. (Apple, Inc., 2008) This small device, with 3D graphics capabilities, Internet connection, and a blank slate for controls in the form of an accurate and easy to use touch screen all synthesized to become the target of many a game developer. In fact, Apple's marketing materials for the fall of 2009 specifically spin the iPod Touch as a gaming device with music and web browsing added on. (Apple, Inc., 2009) With all of this excitement, what exactly goes into developing a game with 3D graphics on the iPhone? This presentation will cover the pitfalls, advantages, and experiences of one beginning iPhone developer and his attempt to develop a game for the iPhone. The emphasis will be on coding for OpenGL ES in an object-oriented environment, and interfacing with Cocoa Touch to track touches and monitor the accelerometer. Finally, there will be a review of the necessary skills and knowledge to work in the iPhone's OpenGL ES environment.

Works Cited

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Swarm Intelligence in Game AI

Joshua Courtney

East Tennessee State University

Controlling game difficulty is an important gameplay issue. If game difficulty is not properly balanced, it can allow the player or computer controlled elements to gain unintended advantages. Balancing game difficulty should make a game challenging but still give the player the ability to win and to have fun.

The most common way of managing difficulty is to have multiple difficulty settings (easy, hard, impossible, etc.) which remain constant throughout the game. However, this does not take into account a player's ability to learn and improve. As a result, there is now a trend towards making games with dynamic difficulty or games that adapt to the player's skill level. This way of designing games has not been greatly explored although some tools such as reinforcement learning have been used.

This talk will propose the use of swarm intelligence algorithms to control game difficulty and adapt gameplay to a player's skill level. Specifically, the use of ant colony optimization (ACO) will be proposed. ACO works by leaving 'pheromone trails' along the paths of 'ants' that have successfully completed a goal. By manipulating the properties of the pheromones ACO can be used to enhance communication and cooperation between NPCs effectively altering game difficulty.

SeeSpeak, a Real-time Software and Hardware Architecture Providing Auditory and Spatial Feedback about Graphical Images

John L. Nelson

Furman University

SeeSpeak is a software and hardware architecture designed to dynamically create and perform real-time control of image processing recognizers. SeeSpeak is a component of the Auditory Graphical Analyzer (AGA) system. The AGA system permits visually impaired readers access to documents that contain graphical information. SeeSpeak has three main functions: (1) interactive definition of image recognizers, (2) interactive exploration of graphical features of a document guided by a multi-touch controller, and (3) conversion of recognized components into auditory elements. Any input device that supports TUIO can be used as the front end. In my research, an inexpensive web camera was mounted in a box under a glass panel. Gloves with LEDs attached to the finger tips were used to obtain interactive positional input using motion tracking software. The SeeSpeak/AGA interface makes use of a positional grammar to control the types of recognizers active at any particular moment. The color-aware image recognizers are based on an extension of Marr and Hildreth's research on human visual responders. Arbitrary chaining and dynamic rotation and of primitive recognizers can be performed through the use of grammars, which permits higher order recognition.

My initial work on SeeSpeak used a dual core Intel processor based computer. However, to permit SeeSpeak to work more quickly when processing complex images, I have designed and built a Nvidia Tesla GPU-based computer. I will discuss my experiences creating a parallel implementation of the SeeSpeak recognizer architecture in Nvidia's CUDA environment. I will conclude by demonstrating how SeeSpeak extracts a directed acyclic graph from an image. The example shows that to function, SeeSpeak requires only a high-level grammar definition (which specifies that the image contains vertices and edges) and a simple recognizer, which defines a short line segment in the image.

Wireless Avionics Technology Evaluation

Jenaelle Coleman

Mississippi Valley State University

In many cases, wireless networks are now replacing wired networks. This research explores the use of wireless links in place of traditional wired connections on spacecrafts avionics systems. The use of wireless technologies has the potential to enhance the robustness, fault tolerance, testability, and extensibility of avionics systems while decreasing launch weight. The Optimized Link State Routing (OLSR) ad hoc protocol and ZigBee were the candidates of wireless technologies to be used. Four laptops were updated with OLSR. Each laptop represented a node. The research was experimented using Ubuntu. The operating system was first run using D-Link Wireless XtremeTM Notebook Adapter (DWA 625). However, the wireless adapter created a problem and the built-in Wi-Fi had to be used. The packets were sent to each node using the ping command line. Ping is a computer network tool used to test whether a particular host is reachable across an IP network. The results after each ping command reported valuable information. The results included the number of packets transmitted, the number of packets received, the packet loss percentage rate, and the round-trip time. The time is measured in milliseconds. There were a few problems that occurred during this project. This caused some of the nodes to become unreachable. The results then displayed, "Destination Host Unreachable". On the other hand ZigBee produced more reliable results. The ZigBee hardware where connect to a control node which allowed each node to connect to one another. This project requires additional work. Another software, ISA 100, will be tested to obtain the results. The results will then be compared to the results obtained from OLSR and ZigBee. If it is discovered that ISA 100 works and can return better results, this will be the next project to study.

Dynamic modeling of Components on the Electrical Grid

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The modeling of critical subnetworks of the national power grid conducted at Oak Ridge National Laboratory (ORNL) is building a computational simulation of the electrical grid. The possibility of evaluating the effect of intrusions on these subnetworks will create better emergency responses and protection for this critical infrastructure. The VERDE system at ORNL was created to visualize the health of the electrical grid and receive the results of models and simulation. As part of this effort, conversion of population information to electric power customers is required to predict areas for additional power capacity. Conversion factor data was developed from a model of households and business firms for each county in the United States using Census 2000 data and implemented into the VERDE system for callable predictions of customer outages from population data. To interface with VERDE, the service area/outage area program module was rewritten into the Java programming language. MATLAB code was converted to Java to create a graphical representation spatial distributions prediction of substation service/outage areas. Inputs include electrical substation geo-location data, electricity consumption data, and population data from LandScan USA to determine the range, magnitude, and priority of risks involved with intrusions of many critical substations. Upon refactoring output results are compared with MATLAB output from known Michigan data supplied by Consumers Energy. Further work on the service area/outage area program is needed before implementation into the VERDE system on a national scale.

Implementation of Binary Tree Structures Using Binary Codes

Pervis Fly and Natarajan Meghanathan

Jackson State University

The run-time complexity for tree traversal is typically O(n) where n is the number of nodes in the tree. Our proposed implementation for binary trees using binary codes has a O(1) run-time complexity to determine the depth of the tree as well as ancestor-descendant relationships. Each node in the tree is assigned a unique binary code. The root node of the tree is assigned the code 0. Child nodes are assigned a code that corresponds to the code of the parent node concatenated with a binary value of 0 if that value is not taken or with a value of 1 if the value 0 is taken. Thus, the child nodes of root node 0 will have binary codes of 00 and 01 respectively and the child nodes of 00 will have binary codes of 000 and 001 respectively. With this implementation, the depth of the binary tree is simply the maximum number of bits found in the bottommost leaf node of the tree. If the bottommost leaf node has a value of 001011, then the depth of the tree is six, the number of bits that this code holds. For any two nodes I and J, if the binary code of node I is the same as the leftmost bits of the binary code of node J, then node J is said to be a descendant of node I. For example, if 00001 and 0000101 are the binary codes of two nodes I and J respectively, since the binary code of node I (00001) is the same as the 5 leftmost bits of the binary code of node J, node J is said to be a descendant of node I. The programming language used for this implementation is C++.

From Desktop to Web: Tomcat with a Side of Beans

Justin Sutton, Adam Shobe,
Ben Hollomon and Jacob Robertson
Faculty Advisor: Otha Britton

University of Tennessee at Martin

This presentation will demonstrate the process of converting a desktop Java application to a web-based implementation using the NetBeans IDE, Java Server Pages and a MySQL database and highlight some of the benefits of using a web implementation vs. a desktop one. We will also be discussing the process we went through to set up a webserver running Apache Tomcat to host the database, and if time allows, we will adapt our program to be used with UT Martin's production SunGard Banner Student Information database.

Analysis of Student Learning using Visualization

Mick McGrath
FacultyAdvisor: Jungsoon Yoo

Middle Tennessee State University

Algorithm development is an important problem solving skill in computer science. The AlgoTutor, a web-based algorithm tutor, has been developed with the goals of teaching students algorithm development in top-down approach while introducing correct terminologies used in conventional pseudo codes. When students develop an algorithm using the algorithm tutor, all students' activities are recorded in a database.

It would be beneficial for teachers to monitor student behavioral patterns to identify potential problems, student progress, or desirable strategies. In addition, teachers can also identify difficult problems which may need more practice and/or supplemental exercises.

I have developed statistical and visual tools that use the collected information to analyze student behavior. This tool includes a filter which can be used to narrow search results to a more specific set of data. The results are formatted and displayed with line and bar graphs which allow teachers to visualize behavioral patterns. This tool also features a data grid view with which a teacher may view many graphs at once as well as navigate through filtered data in a simple, intuitive way. The data grid view makes it easier to view patterns and relationships between problems and students.

The system also provides the capability to display statistical information in a table format online or to export data as a text format for further analysis.

By using the tool, we have verified/identified several student behavioral patterns which can be used to develop more personalized pedagogical strategies. We are also using the findings to adjust the lesson plan to account for unusually difficult concepts.

Forensic Analysis of Toolkit-Generated Malicious Programs

Yasmine Kandissounon
Faculty Advisor: Mohamed R. Chouchane

Columbus State University

Engine-generated malware is a malicious software that is generated by another program (engine) that specializes in making malware. Engines typically work very quickly at producing new never-before-seen malware for which no detection methods have been devised, overwhelming existing malware detectors and challenging anti-virus researchers. Interested in the subject of detecting this sort of malware, many scholars have proposed some solutions which unfortunately are often not satisfactorily efficient or accurate. We argue that existing authorship attribution methods of English documents to their human authors can be used to link engine-generated malware to engine that has produced it. One reason we feel that this is the case is because engines are less likely than human programmers to change their writing/coding styles.

Based on an assumption that the authorship process of this sort of malware can be modeled as an n-th order Markov chain, for some positive integer n, we successfully built a detector for 4 different families, of 100 members each, of engine-generated malware (namely, W32.Evol, W32.Simile, VCL, and NGVCK). For n=1, The detector was able to correctly attribute instances of these samples to their corresponding engines with an accuracy rate of 96%. The proposed method uses only the engine's transition matrix, a 30 by 30 array of doubles, to link a suspect program it.

The proposed method may be used by existing malware detectors (virus scanners) to serve as a quick decision procedure that they can use to determine whether a never-before-seen suspect program is likely to have been generated by a known malware generating engine, before running full-fledged, potentially useless or time-consuming, program analyses on the suspect program.

Student Abstracts
Master's Degree Programs

An Adaptive Approach to Robot Learning

Charles V. Smith, III

University of South Alabama

Robotics is becoming less of an art of constructing tools to perform specific jobs and more of an art of generalizing tasks. Thus, the construction of custom designed machines to perform tasks is an idea that will eventually fade to more general robots, which are able to learn and adapt. Humans base their abilities heavily on experience. Most humans can pick up a ball and throw it, however few of these individuals play professional sports. The key lies in experience which relies heavily on the ability to master a set of tasks. So how might a robot gain experience? Can a robot even be constructed on a scale that would be capable of mastering a number of diverse tasks? How do machines today fail to meet these specifications? The knowledge and computing ability is considered by most to be insufficient for answering the harder question: How do robots think like humans and reason more like humans? There are a number of techniques which will allow computers to obtain knowledge. Research in the area of machine learning and artificial intelligence continues, as new ways to store and recognize information are developed. This information can be stored and transferred in many ways. Humans transfer information to one another through speech, writing, and images. The way information is stored by one human is different from another. This is why a robots ability to learn and communicate what has been learned is so valuable. Thus Robots could learn from humans and humans could learn from robots in much the same way. Proposed are a number of techniques for both robot learning and sharing information between robots and humans which answer many of these questions.

Instruction Level Parallelism: The Card Game

Robert Lowe

University of Tennessee

Studying instruction level parallelism in computer architecture courses can be difficult for both instructors and students. One possible reason for this difficulty is that true hands-on practical demonstrations of ILP are very difficult to construct. Presented here is a way to demonstrate and experiment with ILP through means of an entertaining card game. The game is constructed in a way that allows for study of multiple ILP schemes, and is played in two modes. The first mode is purely demonstrative play where students construct programs against a simple instruction set and play out the execution of the programs on an imaginary CPU. The second mode is a competitive environment where students attempt to finish the execution of their instructions while inhibiting the instructions of the other players. By first understanding various ILP schemes, and then purposely attempting to break them, students gain a better understanding for the strengths and weaknesses of various ILP designs.

Mosaicing of Documents and Images

Soma Halder

University of Alabama at Birmingham

Image Mosaicing is the way to obtain a wide area field of view of image of any scene. The basic idea is to collect a bunch of images and to combine them to form one composite image. It addressess the fundamental problem of increasing the field of view. However the images need to have some overlapping region for the images to mosaic. Here we carried out this by Euclidean Warping as called the Euclidean Similarity Transform. We take common points from the two images and estimate the parameter vector for the two images. The transformation matrix is calculated from it. We warp incoming corners to determine the size of the output and do backwards transform. Finally we re-sample pixel values with bi-linear interpolation and offset and copy original image into the warped image. The final result is the mosaic-ed image.

Benefits of Reverse Engineering Legacy Java Code to VDM++

Walker Haddock
Faculty Advisor: Dr. Jeff Gray

University of Alabama at Birmingham

Refactoring an existing application can benefit from techniques of Model-Driven Engineering. The use of UML models to visualize the objects, relationships, interfaces and patterns in a legacy application can assist the developers in understanding the existing architecture of a legacy application. Reverse engineering code to higher level models can aid the engineer to verify the correctness of the current design and to enhance the maintenance and extension goals through refactoring. In this presentation, we describe the benefits of using a formal approach, such as VDM++, which provides tools for checking syntax, type, constraints and for generating UML diagrams using IBM Rational Rose.

The presentation is driven by a case study that describes the use of VDM++ to reverse engineer SpeechClipse (a voice enabled extension to Eclipse) and to extend its features. The VDM++ tool support provides the capability to generate UML models of the classes in the application that show the inheritance, composition, and interfaces of the classes. The visual model reveals the architecture of the application clearly. The VDM++ tool also provides the capability to transform changes made in the UML model back to the VDM++ formal specification language; a bidirectional process that can be repeated as often as necessary. The paper discusses the advantages and disadvantages of generating UML artifacts by hand, compared to transforming the existing Java source code automatically into VDM++. Quantitative and qualitative comparisons are provided to show the benefits of the approach.

Student Abstracts
Doctoral Degree Programs

Which Environment is More Suitable for Novice Programmers: Integrated Development Environment vs. Editor/Command Line/Console Environment?

Edward C. Dillon, Jr.

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The University of Alabama Computer Science Department decided to change the introductory course curriculum for majors. The original course sequence began with C++ in Microsoft Visual Studio. The new sequence teaches Python in a command line environment (vi/vim) in Linux.

When novice programmers begin programming, they face many problems learning. Integrated Development Environments are used as a way to help novices become better programmers. One question asked is whether an IDE is a more effective teaching environment when compared to the newer teaching environment. This study investigated this question by surveying students from the old and new sequence.

Group one consisted of students who were involved in the course sequence that used Microsoft Visual Studio, then used a command line environment for later courses. Group two was comprised of students who started programming with the newer environment. Interviews were conducted with the first group while a questionnaire was given to the second group in order to obtain both qualitative and quantitative information about these environments.

The data information showed that Microsoft Visual Studio was favored. However, the students' preferences alone were not enough to indicate that one environment was better than the other. This information will be used as a basis for further research and studies in this area with the intent that it serves as foundational evidence for determining the more suitable environment.

An Optimized Image Clustering and Feedback-based Retrieval Framework

Liping Zhou

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Most object-based image retrieval systems are based on single object matching, with its main limitation being that one individual image region (object) can hardly represent the user's retrieval target especially when more than one object of interest is involved in the retrieval. Integrated Region Matching (IRM) has been used to improve the retrieval result by evaluating the overall similarity between images and incorporating the properties of all the regions in the image by a region matching scheme. However, IRM does not take users' preferred regions into account, leading to undesirable query results frequently. Another issue with IRM is the time complexity because there are a huge number of image regions and their pair-wise comparisons involved, which increases the search complexity by a factor of at least 7-8. This work presents an innovative image retrieval system which improves the image retrieval accuracy and efficiency by using a novel image clustering algorithm and integrating it with Integrated Region Matching (IRM) and relevance feedback (RF). In the proposed framework, images are first segmented into objects (regions/segments). The proposed clustering algorithm is then applied to clustering image segments, resulting in clusters of images with similar segments, to reduce the search scope and, therefore, reduce the time-complexity in the subsequent retrieval step. The Integrated Region Matching is then adopted with a new region-matching scheme that is suitable for relevance feedback, which measures the overall similarity between two images based on weighted region similarities. In addition, relevance feedback is adopted in this framework to reduce the semantic gap, which helps to progressively learn the user's preferred query regions based on the user-selected positive images in the query results. The performance of the system is evaluated on a large image database, showing improved accuracy and Normalized Modified Retrieval Rank (NMRR) when compared with IRM without feedback.

Extracting and Ranking Papers Describing Coexpression among Genes using Conditional Random Fields

Richa Tiwari

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There is vast amount of information in the form of published papers, in the field of biomedical research, available on the internet. Computer science researchers have been developing sophisticated information management and retrieval tools to organize such a large corpus for ease of use of the researches in the biomedical field. Advance techniques in the area of Information Retrieval, such as machine learning, graphical models, etc., have become very popular and rewarding in extracting implicit and explicit information from text. In this work we present a framework for extracting information about coexpression relationship among genes from text using a graphical model, Conditional Random Fields. We train and test a Conditional Random Fields model on full-length papers downloaded from PubMed, to identify the predicates that talk about coexpression of genes. The classification results of our model have been first compared with the classification results of Support Vector Machine, Nearest Neighbor with generalization and Neural Networks algorithms and seen to outperform them both. In our second experiment, we evaluate our ranking results against the search results of Google and PubMed. Our ranking method is observed to outperform both in distinguishing a positive paper from a negative paper, with negative papers being the ones that do not talk about any particular genes being coexpressed. In conclusion, we propose a specialized search engine framework that can retrieve papers that talk about coexpression between and among genes based on semantics which goes beyond purely lexical search.

CeDAR: Unifying Clone Maintenance Processes

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The removal of duplicated sections of code, called code clones, results in a reduction of the amount of code that needs to be maintained in the future. The identification of clones can be automated with the use of clone detection tools. However, after the clones have been selected for removal, the task of refactoring the clones to eliminate the duplication still contains several manual steps, which can introduce errors during the process. A gap can be seen between the detection and analysis of the clones and their actual refactoring. This presentation will discuss our effort to unify the processes involved in the maintenance of clones through a tool we developed as an Eclipse plug-in called CeDAR (Clone Detection, Analysis, and Refactoring).

CeDAR focuses on centralizing representation and maintenance of clones. Clone representation is centralized through the display of properties of clones in a clone group in one location without the need for the programmer to observe every instance of the duplicated code, which may be scattered over numerous files. This representation utilizes suffix trees on the abstract syntax trees of the clones in a clone group to identify specific differences among clone instances. Clone maintenance is centralized through extensions of the refactoring engine available in Eclipse. The refactoring capabilities are extended to allow simultaneous refactoring of multiple clone instances on clones reported by third-party clone detection tools. This reduces the need for a programmer to manually feed clone-related information between the detection tool and refactoring engine. In addition, extensions allowing for the refactoring of clones containing specific variabilities are identified, which increases the types of clones that can be refactored.

A Relative Entropy-based Projective Clustering Algorithm

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Technology advances have made data collection easier and faster, resulting in large volume, complicated datasets with high dimensions. Traditional clustering algorithms have difficulties in processing high-dimensional data because of the curse of dimensionality caused by the exponential increase in volume associated with adding extra dimensions to a space. . Consequently, index for high-dimensional data is not efficient; irrelevant dimensions exist in clusters; and distance measure becomes ineffective. In addition, high time complexity also limits the use of distance measures in a high-dimensional space. There is a high demand for efficient and effective clustering algorithms in a high-dimensional space.

To discover clusters existing in different subspaces is known as the projective clustering problem. Based on an existing projective clustering algorithm EPCH (Efficient Projective Clustering Technique by Histogram), we present an improved algorithm REPCH (Relative Entropy based Projective Clustering by Histograms) for identifying projected clusters in a high-dimensional data space. A new density measure, namely Relative Entropy, is proposed to distinguish dense areas from sparse areas. Relative Entropy reflects the similarity between the actual data distribution in a subspace and the corresponding uniform distribution with the same number of data objects and range of values. It increases monotonously toward 1 along with iteratively removing dense areas. The remaining areas are mostly sparse areas which approximate uniform distribution gradually. A cutoff percentage value is set to terminate this iterative procedure.

Our algorithm requires fewer user input parameters when compared to existing algorithms, and the clustering process is automatic. The output of our algorithm includes a detailed description of projected clusters. Our experiments on different datasets show that the Relative Entropy is more robust than the density threshold used in EPCH. Comparison is also implemented between REPCH and EPCH on clustering quality, scalability, efficiency, and memory cost.

Demonstration-based Inference of Model Transformations

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Domain-Specific Modeling (DSM) is a new software engineering methodology that generates customized modeling languages and environments from metamodels that define a narrow domain of interest. DSM supports higher level abstractions, as opposed to implementation concerns typically expressed in a general-purpose programming language. The capabilities provided by DSM offer specific technical advantages in supporting rapid evolution of computer-based systems using customized languages related to the work tasks of an end-user.

In the process of DSM development, model transformation plays an important role in supporting model evolution, model refactoring, and code generation. A number of model transformation languages have been developed to realize model transformation tasks, such as ATL and C-SAW. However, writing model transformation rules often requires a great deal of knowledge about the metamodel and mapping relations; such knowledge is only known by modeling experts, not general end-users. The current manner in which model transformations are defined exerts a negative influence on DSM development and application. For instance, the level of expertise needed to specify model transformation rules prevents domain experts from contributing to certain model transformation tasks for which they have much domain experience.

In order to simplify model transformation tasks, our research focuses on realizing model transformation by allowing users to demonstrate how the model transformation should be done. Instead of writing model transformation rules, users directly edit (e.g., add, delete, connect, update) the model instance and simulate the model transformation task. By recording user operations, an inference engine may analyze a user's intention and generate model transformation rules automatically. Our initial work has demonstrated improvement in the efficiency and simplicity of implementing model transformations. This demonstration motivates the need for model transformation by demonstration and provides a case study that illustrates the advantages using the tool support that we have developed.

Professional Abstracts

Early Detection of Captured Sensor Node

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The node capture attack in wireless sensor networks can be decomposed into three stages: physical capture of node, redeployment of compromised node, and rejoining the network for insider attacks. A well accepted belief that the attack of physical node capture is easy to implement and that the detection of this kind of attack is difficult has directed majority of research effort to defense measures in stage three and two. The belief was recently proved false by Alexander Becher et al. The discovery made first stage detection an attractive tactic to counteract the node capture attack. This paper proposes a new approach to defend sensor networks from the node capture attack at the first stage. The detection is based upon the discovery of missing and/or malfunction of nodes due to the physical capture and removal by the adversary. The approach is distributed, simple, reliable, energy-efficient, and completely local. It has wide range of application. It can also be used along with other approaches at stage two and stage three. A simulation result has proved that our approach is effective and efficient for common attack models.

Computational Science from the Undergraduate Classroom to Internships

Angela Shiflet

Wofford College

Many significant scientific research questions are interdisciplinary in nature, involving science, computer science, and mathematics in an area called "computational science"; and much scientific investigation now involves computing as well as theory and experiment. Consequently, a critical need exists for scientists to know how to use computation in their work. With an appropriate foundation in computer science and mathematics, science majors can perform meaningful interdisciplinary research in internships, graduate school, and post-graduate positions. Internships involving computation in the sciences can expose undergraduates to many new ideas, techniques, and applications that can greatly enhance their knowledge, make their classroom education more meaningful, involve them in research on significant scientific problems, and expand their opportunities. Working at various laboratories, students have applied techniques of modeling and simulation to significant scientific problems, such as determining biochemical pathways associated with vascular disease, correlating birth defects to diet, discovering heart mechanics in order to treat cardiac disease, tracking asteroids, and developing strategies to combat Chagas' disease.

Program Outcomes: Change is a Scary Thing

Donald Sanderson

East Tennessee State University

Over time most programs will revise their student outcomes due to external and/or internal motivations. The task can seem daunting, but breaking it down into motivation, process and implementation phases can make it a lot easier. It is often possible to modify existing processes to serve new purposes. This can also be an ideal time to cast a broader net, and examine assessment activities at the college or university level that may already exist and can be modified to supply the data needed.

The talk is a summary of the author's experiences that revised its outcomes to align with the new A to I criteria of ABET's CAC. Both the techniqes that did and did not work will be discussed.

Incremental Development of an Algorithm by Incorporating a Test Plan

C. L. Chen and Cassandra Thomas

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In this paper a new method, teaching problem solving and algorithm development using a different approach: developing an algorithm incrementally by using a test plan, is proposed. In the beginning of the CS0 course at Tuskegee University, the focus is on problem solving and algorithm development without coding. This is done to ease the learning difficulties that students encounter when they start programming without having the proper problem solving skills needed in programming.

The proposed approach starts by identifying the input and output requirements. The initial test plan is designed based on input requirements to validate input processing. The initial algorithm is developed using the initial test plan. From this point the solution is developed backwards in stages. The output requirements are analyzed to identify all the components that contribute to the solution. The test plan is revised in stages to address one contributing component at a time. The algorithm is updated based on the revised test plan and the input test data is used to verify the current algorithm. This process continues until the full solution is completed. This approach has the following potential advantages:

- The emphasis on validating the input requirements first will help students prevent garbage-in/garbage-out problems.
- The students develop and revise the test plan and algorithm incrementally.
- The algorithm is verified each time after it is revised.
- Students improve their algorithm and test plan development.
- Students understand how control structures work in stages through the verification process.

Are You an EduPunk?

David Brown, Ph.D.

Pellissippi State Community College

Taking inspiration from the Punk movement, EduPunks are educators rebelling against the corporate, cookie-cutter educational system in favor of new and progressive learning strategies. EduPunks seek to overturn the established order by discovering for themselves what works in the classroom. Eschewing traditional techniques, they seek inspiration from games and popular media in order to create radically new kinds of educational environments.

Industry Needs and Computer Science Program Offerings

James J. Johnson

Bethel University

A report of a study of the requirements of computer background for industry that are hiring at this time will be presented. For instance, over 5000 of the recent job openings requiring computer background show the need of Java. Over 20 different types of computer background needs will be looked at the level of nationally and some surrounding states.

Keeping the Bombing Range Open: A Case for Redundant Remote Shell and Software Development Services for Student Success

Rob Dye, Benjamin S. Holt, Jeremy Ey
and Eric L. Brown

Tennessee Technological University

Computer science curricula continue to increase expectations of student software development skills. The IT environments required to support this skill development are more complex. The complexity to meet these requirements stands in direct contradiction to new budgetary guidelines imposed by a challenging economic environment. How can budget-strapped CS departments continue provide the necessary services with aging equipment and limited funds? The Computer Science Department at Tennessee Tech University is experimenting with the repurposing of aging equipment with redundant software configurations to address the problem of 'generally' available remote services.

Budgets in most state-funded higher education systems are strained. Many CS programs must look to soft money to maintain the same level of IT service to their student populations or simply cut services such as after-hours access to laboratories, software offerings, or service agreements creating a possibility of longer downtimes during failures. Looking at established models like RAID, the case has been made that redundancy can compensate for possible failures in aging hardware. Based upon this model, we propose a Redundant Array of Software Services (RASS).

RASS will not only provide a budgetary solution; it will provide the opportunity for students to develop software projects in a redundancy-aware paradigm. Additionally, RASS compensates for student programming errors that can create a loss of service for larger groups in shared, remote service environments. Our project will focus on the redundant offering of database, shell, and web development services using open source projects, languages, and foundational elements such as DHCP and DNS. Commercial products available through discount academic agreements could be used in this model; however, such elements will not be included in this project. Once fully operational, evaluations will be performed in the Spring 2010 semester to determine the effectiveness of the project.

When students dream about solving hard problems: It seems like an opportunity to learn.

Willard Munger and Scot Anderson

Southern Adventist University

Great students invariably get excited about hard problems in computer science. With little thought to looking back at what others have done, they charge out to solve difficult problems. We examine the problem of factoring products of large prime numbers using three approaches that students take. Following these ideas to their logical conclusion, shows how each method leads to other "great ideas" in computer science that ultimately help students understand such complex subjects as search trees, pruning, number theory, approximation and data analysis.

Emergence of Visual Patterns in Graphs

Steve Donaldson

Samford University

Systematic circular arrangement of vertices in a fully connected graph results in the visual perception of a collection of concentric circles formed by the intersection of the edges. These circles represent an emergent property of the graph (as they are not explicitly specified in the construction parameters). The phenomenon raises a number of interesting questions about emergent features in such an environment, including: (1) What visual patterns will emerge under a given set of graph configuration parameters? (2) What mechanisms (computational , analytic, etc.) exist for detecting such emergent patterns? (3) Can rules be obtained for predicting the emergence of meaningful patterns? (4) How does one solve the reverse-engineering problem (which asks how, given a visual pattern, connections can be generated for a specified arrangement of vertices such that a desired pattern emerges)? Besides the purely theoretical interest such questions generate, one can reasonably suppose that finding suitable answers to them (e.g., via simulation and mathematical analysis) will improve understanding of real-world analogs (e.g., as perceived in nature and/or human artifacts).

Web-based AI Agents

Dr. Yingbing Yu
Austin Peay State University

Dr. Sandip Patel
Morgan State University

The recent emergence of the World Wide Web and e-commerce makes the topic of implementing AI technology on the Web interesting. Particularly, for the success of an e-commerce system, successful information access via the World Wide Web is crucial. An AI-based search engine can come to the aid of corporations that want to provide an effective tool to help their customer find the exact product or the information match with what they are looking for. Non-commercial users such as government agencies can also take the advantage of combining the AI technology with the Web. For example, by using a planner with AI that works on the Web can let the dispersed army units plan collaboratively. A common user can also take an advantage of the deployment of AI technologies over the Web. For example, a user surfing on the Internet looking for a subject matter with any general interest will probably not have a specific knowledge about the contents of the collections on the Internet. The AI agent can help user navigate through the jungle of hyperlinks helping her/him as a guide to bring her/him to the desired sites. In short, the AI technology has a very good scope of being an indispensable part of this fast growing field of the World Wide Web.

This paper discusses implementations of AI technologies over the World Wide Web. The implementations include a pilot agent with natural language processing and rule-based AI that recommends IBM products, a planning agent that can be used by dispersed Army Small Units, and a learning apprentice for Web that can help users locate desired Web sites. Be it a corporation or a common user, the potential for the use of the AI technology in the field of World Wide Web is promising.

Assembly on the PlayStation 3

William H. Hooper

Belmont University

The Sony PlayStation 3(PS3) contains the Cell microprocessor, the same processor used in advanced supercomputers such as IBM's Roadrunner. Loaded with the Linux operating system, the PS3 offers an inexpensive and appealing environment in which to program the Cell. This fall, we are using the PS3 as the assembly language platform for a course in Computer Organization.

This talk offers pointers for setting up the PS3, example tutorials in Cell processor assembly, and suggestions for supporting curricular material.

Exploring the Impact of Additional Variables on Scope Creep

Denise Williams and David Williams

The University of Tennessee at Martin

The goal of this research-in-progress is to further the authors' prior research concerning scope creep in information system software projects. This work builds on an earlier model which explored relationships between project characteristics such as project size and industry on scope creep. Our prior model is extended to further inquire into the potential impact of CASE tools and certain development techniques. After applying linear regression, we anticipate that our model will be improved and that the coefficients for the new independent variables will be significant and negatively signed. This work seeks to add additional independent variables to the model to learn more about their impacts on scope creep in software projects.

Tech-related Community Outreach – Experiences and Opportunities

Semmy Purewal

University of Tennessee at Chattanooga

Computer Science departments have an opportunity to initiate positive social change while increasing student engagement through tech-related community outreach. In this presentation I'll describe my experiences doing this in Georgia and South Carolina. Specifically, I'll elaborate on three ongoing projects -- Free IT Athens, based out of Athens, GA; the Gussie Greene Community Technology Center in North Charleston, SC; and the Free Linux PC project in upstate South Carolina.

Helping Students Become Better Programmers: Pair Programming in the CS1 Lab

Shamim Khan

Columbus State University

The idea of pair-programming comes from eXtreme Programming (XP), an emerging software development methodology in which two programmers work collaboratively. Studies conducted in the past on the use of pair-programming in the classroom pointed to its beneficial effects including improved learning and better performance. Investigation of this approach at Columbus State University (CSU), Georgia is motivated by attempts to find ways of improving student retention and success rates in CS1. Two objectives of this experiment are to determine if pair-programming is beneficial to student learning of programming skills, and whether it helps them achieve better grades. In addition, the project aims to evaluate student perception of pair-programming with the intention of using this information in possible future adaptation of this approach..

This paper gives an account of the initial experience with a continuing pair-programming trial for the CS1 lab class. It describes the model used for pair-programming and discusses a number of issues encountered during this trial. Among these are: formation of programming pairs, assessment of student work and student perception of pair-programming. The feedback received so far indicates that, although the students thought it helped them become better programmers, they had some reservations about its benefit. Overall, students appeared to like the idea of pair programming more than the actual experience, and there is a tendency to work cooperatively rather than collaboratively.

Enhancing Computer Security Using Diversity

Srinivasarao Krishnaprasad

Jacksonville State University

Standardization, uniformity, and cloning of design of computing systems have many obvious benefits such as cheaper systems, ease of use and maintenance, and productivity gains. But, all these also make each of the millions of identical systems vulnerable to attacks and security risks. A single attacking technique or code developed for one system can easily be used against millions of other systems effortlessly thus rapidly spreading the attack. Researchers have investigated the effect of diversity on security by introducing uniqueness or variations via randomization in the computing systems. Diversity seems to improve security and make systems less vulnerable.

In this talk we present an overview of strategies that employ diversity to improve the security of a computing system. Forrest et al [1] have discussed several methods of achieving software diversity. These are based on randomization, thus avoiding unnecessary consistency, with minimal impact on convenience, usability, and efficiency. Some of the techniques discussed in [1] include adding or deleting nonfunctional code, reordering code, randomizing memory layout, and permuting arguments of system calls. Barrantes et al [2] have studied ways to combat binary code injection attacks using randomized instruction set emulation (RISE). A unique and private instruction set for each executing program will make devising an attack code for it very difficult. Address obfuscation strategies that randomize the absolute location of code and data have been studied by Bhatkar et al [3].

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Using Early Instruction Sets to Captivate Computer Architecture Students

David Tarnoff

East Tennessee State University

Motivating computer science students to learn concepts of computer architecture can be difficult, especially when complex, modern architectures such as the Intel® Core™ i7 or the MIPS64® are being held up as examples. The solution presented here is to introduce computer architecture by first teaching students how to program simpler, historic machines such as Konrad Zuse's Z1, the IBM ASCC, the Manchester Baby, and the Princeton IAS machine. The limitations of these machines can then be used to motivate students to learn the principles of addressing modes, instruction set architectures, and CPU register design. These early architectures can also be used to show students how much, and how little, has changed in the science of computer architecture. They might be surprised, for example, to learn that Konrad Zuse's 1938 Z1 utilized a floating-point representation that is remarkably similar to today's widely used IEEE 754 standard or that Babbage's design for his Analytical Machine included a two-stage instruction pipeline.

This presentation serves two purposes. First, it presents the results of research into the machine language instruction sets of the Zuse Z1, the IBM ASCC, the Manchester Baby, and the Princeton IAS machine. Second, it shows how these instruction sets were used to introduce students in a senior-level computer architecture class to the fundamental concepts of computer architecture. Also covered is the array of existing tools for these machines such as simulators and assemblers that allow the students to experience history first hand.

Introducing Computer Science within a Predominantly Minority Urban School System

Dixon Shuttleworth and Jeff Gray

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This presentation summarizes three years of effort in introducing computer science into the Birmingham City Schools (BCS), which is 98% African-American. The presentation describes our interaction with students and teachers in the BCS system as part of the Aladdin project, which is funded by the National Science Foundation. The Aladdin project represents a collaboration between the UAB Center for Community Outreach Development (CORD), Department of Computer and Information Sciences, Department of Mathematics, Department of Education, and Department of Mechanical Engineering.

Aladdin consists of five phases that stretch across several years beginning in the sophomore year:

1. Alice - An introduction to design concepts and computer programming of animated movies and game design.
2. Mathematizing Alice's World – Provides an understanding of the linear algebra of moving objects in 3D space.
3. Robotics Challenge - Students learn to use Java to control Lego NXT robots and to create their own programs to perform real-time tasks across several design challenges.
4. Advanced Information Technology (2 classes) - Students develop simple visualization algorithms to design a computer visualization project learning advanced skills in programming, logical concepts, computer graphics, and 3D geometry.

This presentation will focus on items 1 and 3 from above. Our evaluation has shown that Aladdin rewards students with increased confidence, potential and competitiveness for entering college programs in science related fields. Our first group of students has shown an increased interest in computer science and mathematics professions. Student's families are rewarded by activities and incentives to improve the success rate of students progressing to college programs and pursuing a STEM career after graduation.

LabGrader 2.0 - Web Based C++ Teaching System

Bob Bradley

The University of Tennessee at Martin

In this session, I will be demonstrating the latest version of LabGrader. LabGrader 2.0 is a totally web based system for the teaching and grading of introduction C++ programming classes. Students can log into LabGrader from their browser, view the list of assignments, start assignments, type in (or paste in) code, compile code, debug code, test code and submit their code. Instructors can create short assignments or longer assignments that can be broken up into short testable parts. The test system allows students to test their program as they go and receive positive feedback that they are producing the correct output in iterative steps. Version 2.0 includes many new features including a cleaner interface, a new web based IDE with line numbers, syntax highlighting, Active Directory integration, and much more. LabGrader 2.0 is built using many open source components, including MVC, JQuery and MySql. I plan to release LabGrader as an open source project soon.

From UML Class Diagrams to Code

Jeff Roach

East Tennessee State University

Empirical classroom observations have revealed that the implementation of UML class diagrams poses a challenge to students. This challenge is not about coding the attributes and operations but about coding the relationships between classes. There are three important relationships in class diagrams: dependencies, generalizations, and associations (Booch, Rumbaugh, & Jacobson, 2005). The most challenging relationship for students to implement is the association relationship. An association is a structural relationship between classes and there are three forms: association, simple aggregation, and composite aggregation (Booch, Rumbaugh, & Jacobson, 2005). The subtle semantic difference between the three is what poses the challenge during implementation.

This presentation will try to clarify the semantics of the three forms of association and then present a methodology for implementing the three forms using the Java programming language.

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Network administration course redesign with MOAC Virtual Labs

Jiang Li

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A local area network was designed for teaching networking courses such as Windows networking operating system administration. Virtualization tools that allow the students to use multiple operating systems simultaneously were utilized and students were able to complete administrative labs on the virtual servers. However, with increasing enrollment, we find it difficult to add more computers and devices to the network due to the limited space and resources. Also the Window Server 2008 version of our current lab exercises, which are based on Windows Server 2003, is not yet available. As there is no indication that these issues will be resolved in the near future, course redesign using alternative resources is in progress. Currently, we are evaluating Virtual Labs' the latest innovation from Microsoft Office Academic Course (MOAC) that offers an online computer environment within which students perform lab exercises using actual Microsoft software. First, we like the idea that Virtual Labs runs real software, not a simulation, on hosted servers, and students may carry out the labs exactly as if they were working in a physical network lab environment. Secondly, lab screens can be captured with a unique identifier for assessing students' progress and skills. Finally, the cost for the students is lower compared to similar packages. Most of the lab exercises in our current networking administration course are available in Virtual Labs with Windows Server 2008. Students will configure key server roles including Active Directory with Group Policy, DHCP, DNS, FTP, and Web Services. They will also be able to work on some new exercises like Routing and Remote Access (RRAS), Terminal Services, and security. We will continue using our current network for network Infrastructure labs that are designed as group projects, for example, creating subnets, switch configuration, and router configuration.

Using Visual Logic with Java

Kathy Winters

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Retention in Computer Science is a problem for all programs and the University of Tennessee is no exceptions. Most of our students are lost in or immediately after the first programming course. The problem then becomes how do we retain those students while maintaining high standards, teaching what is necessary, and meeting other academic requirement? At the University of Tennessee we have tried several approaches to this problem. We considered changing our first language from Java to C++, C#, or other language. We tried paired programming in our Java class. This semester we are trying a different approach using Visual Logic as an introduction of four weeks followed by Java. This presentation will briefly discuss our findings on alternatives to Java with a detailed discussion on Visual Logic and its usage this semester.

MAGIc: A Memetic Algorithm for Grammatical Inference

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University of Maribor
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Grammatical inference (grammar induction, language learning), a subfield of machine learning, attracts researchers in diverse domains such as pattern recognition, computational linguistics, natural language acquisition, and software engineering. The goal of grammatical inference is to find a structure expressed as a grammar from positive (and negative) language examples. The inferred grammar can then be used for automatic generation of different tools for language processing (e.g., parser) or be further examined by a software language engineer with the aim to further enhance the design of the language. In this talk MAGIc, an evolutionary algorithm that uses local search for inference of context-free grammars from positive language samples will be presented. The main parts of new algorithm are: initialization, local search, mutation, generalization, and selection. In the initialization phase grammars are not created randomly as is the usual case in evolutionary algorithms, but the more sophisticated Sequitur algorithm is used. In the local search from a current grammar and two samples (one is recognized by this grammar) the differences between the two samples are identified and the current grammar undergoes changes so that both samples will be recognized. In the mutation phase grammar symbols are chosen randomly and are mutated by iteration (allowing repetition) and allowing deletion. In the generalization phase we further generalize the grammars and identify recursive structures. At the end, deterministic selection is used based on the fitness function that simply counts the number of positive samples that are parsed. We have applied MAGIc to infer Domain-Specific Language (DSL) grammars for DSL programs. Such a scenario is feasible when domain experts can provide complete DSL programs or excerpts of such programs. We will show several examples of DSLs (e.g., DESK, WHILE, FDL, HYPERTree) for which grammars have been successfully inferred using MAGIc.

A Performance Comparison between Artificial Neural Network Models and Gravity and Push-Pull Models in the Study of International Migration from South America to United States

Masoud Naghedolfeizi, Jehad Yasin, Nabil Yousif and Ramana Gosukonda

Fort Valley State University

The purpose of this research was to develop both traditional and artificial neural network (ANN) models and compare their abilities to forecast the migration patterns from South American countries to the United States. The migration data for twelve South American countries were collected and compiled from 1991 to 2001. The data include number of migrants; population sizes at origin and destination countries, distance, and per capita incomes for both origin and destination countries. The data contains a total of 132 observations.

The migration data was partitioned into two sets. The first set that contained 108 observations (from 1991 to 1999) was utilized to develop four models: Gravity, Push-Pull, and two ANN models. The second set (from 2000 to 2001) was used to evaluate the performance of the models in forecasting.

The independent (input) variables to the gravity model included distance, population in origin, and population in destination. The independent variables used in the Push-Pull model were the same as in the gravity model plus per capita income at origin and per capita income at destination. Same input data were used in the two ANN models; one corresponded to the gravity and the other to Push-Pull model. The dependent variable (output) for all models was the number of migrants.

The statistical analysis of the results obtained from the above models indicated that the ANN models outperformed Gravity and Push-Pull models. For example, the coefficient of determination for the Gravity, Push-Pull, and two ANN models are 0.54, 0.62, 0.92, and 0.94, respectively. This could be attributed to the neural network capabilities in capturing nonlinearities and complex patterns from data used in building the neural network models.

Modern data analysis techniques such as neural network models to more accurately forecast the future influx of immigrants to the United States.

Accelerating Lossless Data Compression with GPUs

Robert Cloud, Matthew Curry, Lee Ward,
Anthony Skjellum and Purushotham Bangalore

The University of Alabama at Birmingham

Huffman compression is a statistical, lossless, data compression algorithm that compresses data by assigning varying length codes to symbols, with the more frequently appearing symbols given shorter codes than the less. The work to be presented is a modification to the Huffman algorithm which permits data to be decomposed into independently compressible and decompressible blocks, permitting concurrent compression and decompression on multiple processors. We implemented this modified algorithm on a current NVIDIA GPU using the CUDA API as well as on a current Intel chip and the performance results are compared, showing favorable GPU performance for nearly all tests.

Database Marketing under Recessionary Conditions: Implications for IT

Vernon L. McGlone
University of the Cumberlands

Teresa A. McGlone
Eastern Kentucky University

The application of database-driven marketing techniques has increased rapidly in recent years as associated technology costs have continued to drop. There are a number of names used to describe this approach, including customer relationship management (CRM), database marketing, customer optimization, and customer-centric marketing. All refer to utilizing data from an organizational database as a means of connecting with customers in a way that is meaningful to them, thus creating value for the business. This requires an integrated view of customer data through linked database platforms and a data quality process to insure clean data for data integration.

Two problems may be preventing effective implementation of database-marketing. One is data quality, which has been an issue from the beginning; research indicates that up to 40% of an average company's data is bad. As a result, many companies have increased or are planning to increase resources devoted to data cleanup and data quality maintenance. A second and more urgent issue is the effect of the economic recession. There is evidence that consumer behavior may have been drastically altered, perhaps so much so that it renders historical data less valuable or even useless. If this is true, databases need to change if they are to be of value in marketing.

We present a set of options for database revision to deal with changes driven by the economic environment. These range from relatively minor data updates to deleting the old database and starting over from the beginning with current data. One option worth exploring is a revised form of CRM known as Prospect Relationship Marketing (PRM), which uses a pipeline of data from multiple sources, both current and historical.

Are We Succeeding: Looking Back at Retaining and Preparing Computing Majors

Suzanne Smith and Kellie W. Price

East Tennessee State University

In 2005, researchers from the Department of Computer and Information Sciences at East Tennessee State University (ETSU) presented a course that was developed at ETSU in an effort to retain and prepare students as computing majors. The course was intended for students with limited or no programming background. ETSU, as did most universities and colleges, faced the common problem of first-year retention among computing majors. In the years since then, the course has been refined, and the use of the course has varied.

The researchers plan to evaluate the effectiveness of this course and the effectiveness of the different uses of the course. The course has been required by all majors for several year; but due to budget constraints, it has only been suggested to majors who appear to lack an adequate background in programming and problem solving. Enrollment statistics, student feedback on course student assessment tools, and subsequent grades in computing courses will be used to analyze the retention and preparation of students as computing majors. As part of this evaluation, the researchers also plan to develop a survey instrument to gather data about the perceptions and experiences of the students who have taken the course in recent years.

Engaging Computer Science Students in Engineering Projects to Enhance Career Opportunities

Masoud Naghedolfeizi, Ramana Gouskonda, Nabil Yousif and James E. Glover

Fort Valley State University

Today's competitive job market demands college graduates to be able to function in a multi-disciplinary environment more than ever. In response to this demand, many colleges and universities have offered interdisciplinary courses or activities across curriculum. The Fort Valley State University computer science program decided to conduct a pilot test of interdisciplinary, engineering-based projects that require both computer skills and engineering knowledge in the capstone course. With the help of faculty with engineering background, two projects with real-world applications and hands-on activities were designed. The first project consisted of a data acquisition system for condition monitoring of industrial machineries. The data acquisition system records both time and frequency domains of vibration signatures of rotating machineries. It also records three temperature signatures. The entire software development was in LabVIEW programming environment, which is industrial standard software. The student who worked in this project needed to learn programming in LabVIEW and gain basic knowledge of data acquisition systems (concepts such as Nyquist sampling rate, anti-aliasing filtering, pre-filtering, and signal to noise ratio).

The second project was related to the application of a data acquisition instrument (LAbQuest from Vernier) designed for academics to record time domain vibration signatures of devices with rotating components (such as cooling fans, hard disks, CD/DVD ROMs within computing systems such as desktop computers, servers, printers, and copying machines). The student who worked in this project used the equipment at various computer labs on FVSU campus to record data and then to analyze the data utilizing, Excel Spreadsheet software. The analysis included obtaining frequency domain signatures using fast Fourier transforms and power spectrum and auto/cross correlation calculations.

In both projects, students had hands-on activities, gained new knowledge and skills, and went beyond the initial scopes of projects. This indicated the student motivation and keen interest in working on engineering based projects. We are hoping to offer more of similar opportunities in coming years.

Drupal as the platform for the development of the online program for ICSE 2010

Brian Toone

Samford University

Drupal as the platform for the development of the online program for ICSE 2010

The International Conference on Software Engineering is a major annual conference with many research presentations, workshops, tutorials, and co-located conferences. This year's conference will be held in Cape Town, South Africa May 2-8, 2010. I have volunteered to produce the online advance program and schedule for the conference. In this presentation I discuss the usage of Drupal as a platform for the design, development, and maintenance of a widely used, frequently updated academic program.

Drupal is an open-source content management system for collaborative website development. Drupal is designed to be extended via a variety of themes and modules which add functionality to the core features provided in a default installation. In this talk, I describe the customizations that I have made to adapt Drupal for the specific task of producing an online program [1] that can be edited by many different members of the conference and program committees, session chairs, and administrators.

[1] http://icse2010.cs.ucdavis.edu

Conference at a Glance

	Azalea Room	Dogwood I
7:30 AM	**Morning Coffee–Poolside**	**Morning Coffee–Poolside**
8:00 AM	**Welcome and Keynote Address**	
9:00 AM	**Coffee Break–Poolside**	**Coffee Break–Poolside**
	Session I–PhD	**Session I–Undergraduate 4**
	Chair: Joyce Crowell	Chair: Sylvia Colvin
9:15 AM	Dillon, Jr.	Munoz and Licato
9:35 AM	Zhou	Robinson
9:55 AM	Tiwari	Armaly and Wilson
10:15 AM	Tairas	Greer, Robertson, et al
	Session II–PhD & UG 2	**Session II–Undergraduate 4**
	Chair: Ken Adcock	Chair: Sylvia Colvin
10:40 AM	Gao	Thomas and Addison
11:00 AM	Sun	Hawks, Hollomon and Robertson
11:20 AM	Conti and Walters	Loewen, Weston and O'Quinn
11:40 AM	Howard and Turner	Wherry
12:00 PM	**Lunch–Patio Restaurant**	**Lunch–Patio Restaurant**
	Session III–Masters	**Session III–Undergraduate 4**
	Chair: S. Krishnaprasad	Chair: Jim Vandergriff
1:00 PM	Smith III	French
1:20 PM	Lowe	Mike
1:40 PM	Halder	Henderson and Meghanathan
2:00 PM	Haddock	Rioux
2:20 PM	**Break–Poolside**	**Break–Poolside**
	Session IV– Professional	**Session IV– Undergraduate 4**
	Chair: Jim Johnson	Chair: Jim Vandergriff
2:35 PM	Roach	Blake III
2:55 PM	Li	Smyly and White
3:15 PM	Winters	Buffington
3:35 PM	Mernik et al	Span, Beecham, and Mauel
	Session V– Professional	
	Chair: Jim Johnson	
4:00 PM	Naghedolfeizi, Yasin et al	
4:20 PM	Cloud, Curry, Ward et al	
4:40 PM	McGlone and McGlone	
5:00 PM	**Business Meeting–Dogwood II**	
7:00 PM	**Awards Banquet–Azalea Room**	

	Dogwood II	Magnolia Room
7:30 AM	**Morning Coffee–Poolside**	**Morning Coffee–Poolside**
9:00 AM	**Coffee Break–Poolside**	**Coffee Break–Poolside**
	Session I– Undergraduate 4	**Session I–Professional**
	Chair: Masoud Naghedolfeizi	Chair: Ashraful Chowdhury
9:15 AM	Moore	Ding and Laha
9:35 AM	Lanclos	Shiflet
9:55 AM	Walling and Richie	Sanderson
10:15 AM	Kolb	Chen and Thomas
	Session II– Undergraduate 4	**Session II–Professional**
	Chair: Masoud Naghedolfeizi	Chair: Jim Clark
10:40 AM	Courtney	Brown
11:00 AM	Nelson	Johnson
11:20 AM	Coleman	Dye, Holt, et al
11:40 AM	Young	Munger and Anderson
12:00 PM	**Lunch–Patio Restaurant**	**Lunch–Patio Restaurant**
	Session III– Undergraduate 4	**Session III–Professional**
	Chair: Otha Britton	Chair: Jim Clark
1:00 PM	Fly and Meghanathan	Donaldson
1:20 PM	Sutton, Shobe, Holloman et al	Yu and Patel
1:40 PM	McGrath	Hooper
2:00 PM	Kandissounon	OPEN
2:20 PM	**Break–Poolside**	**Break–Poolside**
	Session IV–UG 4/Professional	**Session IV–Professional**
	Chair: Otha Britton	Chair: Nancy Smithfield
2:35 PM	Smith and Price	Williams and Williams
2:55 PM	Naghedolfeizi, Gouskonda et al	Purewal
3:15 PM	Toone	Khan
3:35 PM	OPEN	Krishnaprasad
		Session V–Professional
		Chair: Nancy Smithfield
4:00 PM		Tarnoff
4:20 PM		Shuttleworth and Gray
4:40 PM		Bradley
5:00 PM	**Business Meeting–Dogwood II**	
7:00 PM	**Awards Banquet–Azalea Room**	

Notes