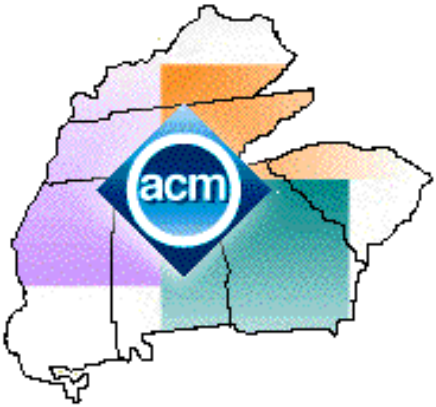
Fall Conference Proceedings

Mid-Southeast Chapter

of the ACM

Gatlinburg, Tennessee
Nov. 10-11, 2011

Mid-Southeast Chapter



of the ACM

For information on the 2012 Fall Conference, select the conference link from the official chapter website:
www.acmmidsoutheast.org

A special "thank you" goes to Cengage Learning for lending financial support to this year's conference.

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Message from the Chapter Chair

Welcome everyone to the Association for Computing Machinery (ACM) Mid-Southeast Fall 2011 conference in beautiful Gatlinburg, Tennessee.

The 2011 conference brings an all-time high in abstract submissions. The conference has expanded to five concurrent sessions accommodating over 80 presentations. This 53rd Annual ACM Mid-Southeast Conference hosts participants from the east coast of Georgia to west of the Mississippi River, from the sandy beaches of the Gulf Coast to the beautiful mountains of Appalachia.

Whether this is your first time to the conference or you are an old-timer like me (first attended in 1997), you will find great fellowship, new pedagogy, and the brightest students in the Southeast enthusiastically presenting cutting-edge research. It is these three pillars that provide the longevity and continued vitality to this conference. The fellowship of colleagues with names like Britton, Clark, Adcock, Smithfield, Wiggins and many others nurture and support inquisitive students and fledgling faculty. Pedagogical insight "from the trenches" ranging from the contemporary issues of gaming, mobile devices and security, to the classical pontifications on language choice, retention and inclusion are just a few of the varied topics so very relevant to computing faculty and students. Outstanding student involvement is the third pillar supporting the continued success of this conference. From ping pong ball throwing robots, to cameras that can find open parking spaces, to the latest in bioinformatics, the student presentations are inspiring to all.

The full day of conference presentations is preceded by a year's worth of considerable effort by your Conference Chair, Greg Kawell, your Program Chair, Kathy Winters, the Chapter Treasure, Bob Bradley, and the Judges Coordinator, Brian Toone. Please thank them for their effort and support of the conference. Please also extend a hearty thank you to our session chairs and student presentation judges. They do yeoman's work keeping the conference on schedule and making difficult decisions.

To all, welcome and enjoy.

Randy K. Smith - University of Alabama

Chapter Officers

Chair
Randy Smith
University of Alabama
rsmith@cs.ua.edu

Vice Chair
Greg Kawell
Samford University
gakawell@samford.edu

Secretary
Melissa Wiggins
Mississippi College
mwiggins@mc.edu

Treasurer
Bob Bradley
University of Tennessee–Martin
bbradley@utm.edu

Webmaster
Bob Bradley
University of Tennessee–Martin
bbradley@utm.edu

Conference Committee

Conference Chair
Greg Kawell
Samford University
gakawell@samford.edu

Program Chair
Kathy Winters
University of Tennessee—Chattanooga
kathy-winters@utc.edu

Student Paper Competition
Brian Toone
Samford University
brtoone@samford.edu

Hospitality Suite
June West
Spartanburg Community College
westj@sccsc.edu

Kathy Winters
University of Tennessee—Chattanooga
kathy-winters@utc.edu

Student Paper Competition Judges

Chair

Brian Toone, Samford University

Undergraduate 2-year

Jim Clark, University of Tennessee - Martin
June West, Spartanburg Community College

Undergraduate 4-year

Jim Clark, University of Tennessee - Martin
Ramana Gosukonda, Fort Valley State University
Jeffery Galloway, University of Alabama
Shamim Khan, Columbus State University
Rodigo Obando, Columbus State University
Semmy Purewell, University of North Carolina - Asheville
Randy Smith, University of Alabama
Nancy Smithfield, Austin Peay State University
Monica Trifas, Jacksonville State University
June West, Spartanburg Community College
Glenn Wiggins, Mississippi College
Kathy Winters, University of Tennessee – Chattanooga

Masters

Ashraf Saad, Armstrong Atlantic State University
Randy Smith, University of Alabama
Melissa Wiggins, Mississippi College
Denise Williams, University of Tennessee - Martin

Doctoral

Srinivasarao Krishnaprasad, Jacksonville State University
Randy Smith, University of Alabama
Brian Toone, Samford University

Session Chairs

Azalea

Session I:	Denise Williams, University of Tennessee - Chattanooga
Session II:	Denise Williams, University of Tennessee - Chattanooga
Session III:	Randy Smith, University of Alabama
Session IV:	Denise Williams, University of Tennessee - Chattanooga
Session V:	Brian Toone, Samford University

Dogwood I

Session I:	Randy Smith, University of Alabama
Session II:	Shamim Khan, Columbus State University
Session III:	Rodigo Obando, Columbus State University
Session IV:	Rodigo Obando, Columbus State University
Session V:	Semmy Purewall, University of North Carolina - Asheville

Dogwood II

Session I:	Brian Toone, Samford University
Session II:	Brian Toone, Samford University
Session III:	Jeffrey Galloway, University of Alabama
Session IV:	Jeffrey Galloway, University of Alabama

Highlander I

Session I:	Rodigo Obando, Columbus State University
Session II:	Jeffrey Galloway, University of Alabama
Session III:	Brian Toone, Samford University
Session IV:	Jim Clark, University of Tennessee - Martin

Highlander II

Session I:	Semmy Purewall, University of North Carolina - Asheville
Session II:	June West, Spartanburg Community College
Session III:	Shamim Khan, Columbus State University
Session IV:	Semmy Purewall, University of North Carolina - Asheville

Notes

ACM Mid-Southeast Chapter
2011 Fall Conference
Gatlinburg, Tennessee
Glenstone Lodge

Thursday, November 10, 2011

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 – 11:00 p.m.	**Social Gathering, Hospitality Suite**

Friday, November 11, 2011

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**
	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:	**Masters Degree Presentations** Session Chair: Denise Williams
9:15 – 9:35	*The Mouse, the Maze and the Robot: Application of a Genetic Algorithm in Solving a Maze by a Robotic Mouse*, John King and Shamim Khan - Columbus State University
9:35 – 9:55	*Using Gamification to Engage Generation X and Y CS Students in PeerSpace,* Michael Chasteen and Chelsea Rath - Middle Tennesse State University
9:55 – 10:15	*Opa: A New Web Development Platform for the Cloud,* Jan Durand - Louisiana Tech University
10:15 –10:35	*Compressive Sensing Based Imaging Via Belief Propagation,* Preethi Ramachandra and Mina Sartipi - University of Tennessee - Chattanooga
Dogwood I:	**Undergraduate 4-year Presentations-Computer Science Education** Session Chair: Randy Smith
9:15 – 9:35	University*How to Keep Graphical CS1 Learners Happy in Data Structures*, Lucia K. Dale - Sewanee: The University of the South
9:35 – 9:55	*"Computer Science And Critical Thinking"*, Jim Johnson and Jesse Turner - Bethel University
9:55 – 10:15	*Observations of Beginner Programming Students from the Student Perspective,* Mark Philip Plagge and Malika L. Harris - Columbus State University
10:15 –10:35	*Developing a Pre-Assessment Instrument to Measure Readiness of Students in a Data Structures Course,* Nabil Yousif, Masoud Naghedolfeizi, Xiangyan Zeng, and Ramana Gosukonda - Fort Valley State University

Dogwood II:	**Doctoral Degree Presentations** Session Chair: Brian Toone
9:15 – 9:35	*Partitioning of Cloud Databases: Horizontal or Vertical*, Md Ashfakul Islam and Dr. Susan Vrbsky - University of Alabama
9:35 – 9:55	*Locating Dominating Sets for Tumbling-block Graphs*, Xiao Liang - Middle Tennessee State University
9:55 – 10:15	*Imputed Value of IT Certification Using Unobtrusive Measures,*Robert A. Fleck, Jr. and Ruth Ann Fleck - North Central University and Col State U-Global
10:15 –10:35	*Power Efficient Persistent Cloud Storage Balancing,* Jeffrey M. Galloway and Susan S. Vrbsky - University of Alabama
Highlander I:	**Professional Presentations** Session Chair: Rodigo Obando
9:15 – 9:35	*Hurdles in Implementing CS0*,Dr. Suzanne Smith and Kellie Price - East Tennessee State University
9:35 – 9:55	*Crafting Sustainable Assessment Programs*, Tony Pittarese and Karen Tarnoff - East Tennessee State University
9:55 – 10:15	*A Virtual Instruction Lab -- An Update,* Willard Munger - Southern Adventist University
10:15 –10:35	*STEMming the K-12 Link: Asynchronous Technology Instruction for High School Students,*Eric L. Brown, Jeremy Ey, and Summer-Mistine Olmstead - Tennessee Tech University
Highlander II:	**Professional Presentations** Session Chair: Semmy Purewall
9:15 – 9:35	*Redesigning CS1*, Jim Vandergriff and Nancy Smithfield - Austin Peay State University
9:35 – 9:55	*Revisiting RCC Spatial Relations for the Purpose of Anatomical Ontologies*, Alton B. Coalter - University of Tennessee - Martin
9:55 – 10:15	*Incorporating the Microchip PIC32 Development Board into a Computer Architecture Course,* Tarnoff, David L. - East Tennessee State University
10:15 –10:35	*An Inference-Based Super-Resolution Approach,* Monica Trifas - Jacksonville State University

Session II: 10:40 – 12:00 p.m.

Azalea:	**Masters Degree Presentations - Security** Session Chair: Denise Williams
10:40 – 11:00	*Mobile Devices Policy Issues for a Secure Workforce*, Dr. Michael R. Lehrfeld - East Tennessee State University
11:00 – 11:20	*Password Complexity Technique to Reduce Efficiency of Dictionary Attacks and Brute-force Attacks*, Juan Flores - Louisiana Tech University
11:20 – 11:40	*Wireless Network Data Encryption,* Christopher Howard and Yu Cao - University of Tennessee - Chattanooga
11:40 – 12:00	*Rotation of Geometrically Transformed-Nearest Neighbor Data Substitution Algorithm and Its Application to Patient Privacy Protection,* David Bishop and Yu Cao - University of Tennessee - Chattanooga
Dogwood I:	**Undergraduate 4-year Presentations-Computer Science Education** Session Chair: Shamim Khan
10:40 – 11:00	*Robotics as a Stimulus to Computational Thinking: A Move to Academic Savvy*, Virginia S. Bailey - Jackson State University
11:00 – 11:20	*Cheating Versus Bootstrapping: How can we determine which is which?*, Lucia K. Dale - Sewanee: The University of the South
11:20 – 11:40	*Using Math to teach Computer Programming,* Elizabeth Wright - Tusculum College
11:40 – 12:00	*What I Have Learned from Teaching Computer Repair and Maintenance,* Max Li - Union University

Dogwood II:	**Doctoral Degree Presentations - Software Eng.** Session Chair: Brian Toone
10:40 – 11:00	*Collaboration in Open Source communities*, Amiangshu Bosu - University of Alabama
11:00 – 11:20	*Application for Emergency Travel Support and Roadside Assistance using V2V Communication,* Mohammad A Hoque - University of Alabama
11:20 – 11:40	*Impact of Agile Practices in Industrial Projects,* Kazi Zunnurhain - University of Alabama
11:40 – 12:00	*Towards A Generic Developer Model,* Zachary Smith - University of Alabama
Highlander I:	**Professional Presentations** Session Chair: Jeffery Galloway
10:40 – 11:00	*So You Think You Want To Teaching Mobile Computing*, Kathy Winters - University of Tennessee - Chattanooga
11:00 – 11:20	*The Influence of Stereotypes on STEM majors in a Problem Based Curriculum Innovation: Computer Science vs. Mathematics Majors*, Cynthia Stenger, James Jerkins, and Jessica Stovall- University of North Alabama
11:20 – 11:40	*From Programming Blunders to Teaching Moments,* Jim Clark - University of Tennessee - Martin
11:40 – 12:00	*ICoRD: a Study in Program Growth through Collaboration,* Glenn Acree and William H. Hooper - Belmont University
Highlander II:	**Professional Presentations** Session Chair: June West
10:40 – 11:00	*Finding 'parallel universes' in 1-D Cellular Automata Rule Spaces*, Rodrigo A. Obando - Columbus State University
11:00 – 11:20	*Multi-Core Design and Performance Issues: Some Recent Adaptations of Amdahl's Law*, Srinivasarao Krishnaprasad - Jacksonville State University
11:20 – 11:40	*Parallelism, Concurrency, Actors, and Fork/Join: Thoughts on Programming in the Multi-core World,* Ken R. Adcock, Jr. - UPS
11:40 – 12:00	*Is 80% the Limit of Prediction Accuracy for Protein Secondary Structure Prediction?,* Leong Lee - Austin Peay State University

Lunch **Patio Restaurant 12:00 – 1:00 p.m.**

Session III 1:00 – 2:20 p.m.

Azalea: **Masters Degree Presentations - Computer Science Ed**
Session Chair: Randy Smith

1:00 - 1:20 *Innovating Reconfigurable Computing In Education Using FPGA and YouTube*, Samuel James and Andrew Scott - Alabama A&M University

1:20 - 1:40 *A Case Study on Learning Patterns of CS1 Students*, Stacey Watson and Dr. Lydia Ray - Columbus State University

1:40 - 2:00 *The Challenges of Implementing a STARS Leadership Corps Program at Columbus State University,* Stacey Watson and Dr. Radhouane Chouchane - Columbus State University

2:00 - 2:20 *Automatic Photographic Shelf Reading in Libraries*, Andrea Schurr and Yu Cao - University of Tennessee - Chattanooga

Dogwood I: **Undergraduate 4-year Presentations- Computer Science Education/Miscellaneous**
Session Chair: Rodigo Obando

1:00 - 1:20 *Attracting Students to Undergraduate Computer Science with Robotics*, Travis Shuff, Dakota Brown, and Ryan Kroutil - Armstrong Atlantic State University

1:20 - 1:40 *Development of a Web-based Application to Remotely Access the Computer Network Systems and Security Research and Education Modules at Jackson State University*, Abduaziz Komilov - Jackson State

1:40 - 2:00 *OMIT: The Ontology for MicroRNA Target - A Framework For Unifying Diverse Biological Data,* Adam Moore - University of South Alabama

2:00 - 2:20 *Using Bump Technology in an Economics Simulation Tool,* Christian Weigandt and Thomas Langford - High Point University

Dogwood II:	**Undergraduate 4-year Presentations- Programming** Session Chair: Jeffrey Galloway
1:00 - 1:20	*MTSU Mobile Application development project for NSF-CPATH*,Christopher Johnson - Middle Tennessee State University
1:20 - 1:40	*Cross Platform Development Using the Monkey Programming Language and Mojo Module*, Aman Alshurafa - University of Tennessee - Martin
1:40 - 2:00	*"Using Python to Enhance Mathematical Exploration",* Tyler Bright and David Frazier - Tusculum College
2:00 - 2:20	*A Boolean Algebra Simplification Tool for Students,* Adam Moore - University of South Alabama
Highlander I:	**Doctoral Degree Presentations** Session Chair: Brian Toone
1:00 - 1:20	*A Design Pattern Discovery Tool for FORTRAN*, Aziz Nanthaamornphong - University of Alabama
1:20 - 1:40	*The Transformative software engineering framework: Using collaborative social computing to build virtual communities for transdisciplinary research*, Jerry A. Higgs - University of Alabama - Birmingham
1:40 - 2:00	*Model Evolution in Agile Software Development,* Qichao Liu - University of Alabama - Birmingham
2:00 - 2:20	*A Graphical Network Simulator for Evaluation of CRN Routing Protocol,* Mohammad A Hoque - University of Alabama
Highlander II:	**Professional Presentations** Session Chair: Shamim Khan
1:00 - 1:20	*Frameworks vs. Textbooks: Teaching How ORM Frameworks Change Database Design*, Scot Anderson - Southern Adventist University
1:20 - 1:40	*What Are the Basic Spreadsheet Skills Needed by Business Majors?*, Denise Williams and David Williams - University of Tennessee - Martin
1:40 - 2:00	*Using Processing.js to Introduce Programming in Digital Media Courses,* Semmy Purewal - University of North Carolina - Asheville
2:00 - 2:20	*Writing Apps - From C# to Objective-C to Monkey*, Bob Bradley - University of Tennessee - Martin

Break	**Poolside 2:20 – 2:35 p.m.** **Sponsored by Cengage Learning**

Session IV 2:35 – 3:55 p.m.

Azalea:	**Masters & Doctoral Degree Presentations** Session Chair: Denise Williams
2:35 - 2:55	*Mobile Evaluation of Well-Being for Post-Stroke Patients Using Compressive Sensing*, Robert Derveloy and Mina Sartipit - University Tennessee - Chattanooga
2:55 - 3:15	*Intelligent Search Engine for Medical Imaging,* Nabin Shrestha and Yu Cao - University of Tennessee - Chattanooga
3:15 - 3:35	*Abstract GPU programming using CUDACL*, Ferosh Jacob - University of Alabama
3:35 - 3:55	*The Turtle Project: Stress Testing With Power State Transitions*, Karl Smith - University of Alabama
Dogwood I:	**Undergraduate 4-year - Networking & Security** Session Chair: Rodigo Obando
2:35 - 2:55	*A Strong Neighborhood based Algorithm to Determine Stable Connected Dominating Sets for Mobile Ad hoc Networks*, Michael Terrell - Grambling State University
2:55 - 3:15	*A Link Distance Ratio based Unicast Routing Protocol for Mobile Ad hoc Networks*, Khalyle Hagood - Jackson State University
3:15 - 3:35	*A Performance Study of the Sink Mobility Models for Wireless Sensor Networks,* Richard Fletcher - Mississippi Valley State University
3:35 - 3:55	*Computing in Archaeological Field Work,* Thomas Olsen - Southern Adventist University

Dogwood II:	**Undergraduate 4-year Presentations - Sec. & Misc.** Session Chair: Jeffrey Galloway
2:35 - 2:55	*Evaluation of Different Feature Selection Strategies in Attributing Morphing Malware to its Engine*, Patrick Hill, Steven Holder, Rodrigo Sardinas, and Dr. Radhouane Chouchane - Columbus State University
2:55 - 3:15	*Avoiding Cyber Threats through Port Hopping*, Robert Plummer - Louisiana Tech University
3:15 - 3:35	*Study of Firefox in Private Browsing Session through Memory Acquisition,* Darquavis D Palmer - Tuskegee University
3:35 - 3:55	*Evolving Neural Architectures for Locomotion,* Chris Walling - Samford University
Highlander I:	**Professional & Undergraduate 2-year Presentations** Session Chair: Jim Clark
2:35 - 2:55	*Physical Computing with the Arduino Microcontroller,* David Brown - Pellissippi State Community College
2:55 - 3:15	*Computer Science Perspectives on Transhumanism*, Steve Donaldson - Samford University
3:15 - 3:35	*The Future of Computers is Here, If you Want It,* Jason Cobble - Northeast State Community College
3:35 - 3:55	*Underwater Robotic Retriever aka UR Retriever,* Richard Quaicoe, Jose Orozco, and Demetrius Harrell - Georgia Perimeter College
Highlander II:	**Undergraduate 4-year Presentations** Session Chair: Semmy Purewall
2:35 - 2:55	*Remote Recognition of Objects Using an Off-the-Shelf Drone*, Lucas Randall Flores and Mark Philip Plagge - Columbus State University
2:55 - 3:15	*Multi-Agent Collaboration on the Nao Platform*, Jesse Kawell - Samford University
3:15 - 3:35	*Practical Application of Software Engineering to Health Care Providers: CHATS,* Ervin C. Williams and Michael D. Weaver - University of South Alabama
3:35 - 3:55	*Testing Online Character Recognition Algorithms,* Aman Alshurafa, Jeffrey D. Arndt, Matthew A. Culp, Steven A. Dannelley, Joshua D. Pullen, and Michael J. Tutor - University of Tennessee - Martin

Session V **4:00 – 5:20 p.m.**

Azalea:	**Doctoral Degree Presentations** Session Chair: Brian Toone
4:00 - 4:20	*Towards Better Data Security in the E-Health Cloud*, Gabriel Loewen - University of Alabama
4:20 - 4:40	*FAPA: A model to prevent Flooding Attack in Cloud*, Kazi Zunnurhain and Dr. Susan Vrbsky - University of Alabama
4:40 - 5:00	*Detecting the Presence of Undesirable Nodes in Layer 3 Virtual Networks,* James A. Jerkins - University of Alabama
Dogwood I:	**Undergraduate 4-year Presentations** Session Chair: Semmy Purewall
4:00 - 4:20	*Real-Time Physics Simulation in a Cube-Based Game World*, Zachary Shore - High Point University
4:20 - 4:40	*Procedurally Creating 3-D Glyphs Using Unity Game Engine,* Jessica Kennemore - Columbus State University
4:40 - 5:00	*Parallel Computing of Free Distributive Lattices Part 2,* Janice Hill - Columbus State University
5:00 - 5:20	*Improving the Ranking System for the U.S. Census Bureau,* Samantha Allen - High Point University

5:00 – 5:30 p.m. **Business Meeting, Highlander I**

5:30 – 7:00 p.m. **Social Gathering, Hospitality Suite**

7:00 – 8:30 p.m. **Awards Banquet, Azalea**

8:30 – 11:00 p.m. **Social Gathering, Hospitality Suite**

Keynote Address

Dr. Allen Parrish

Professor of Computer Science and Director of the Center for Advanced Public Safety (CAPS)

University of Alabama

Novel Technology Applications to Law Enforcement

Abstract

This presentation provides an overview of state-of-the-art and state-of-the-practice technologies that are currently being applied in the general areas of public safety and law enforcement. In particular, we present a broad overview of several technologies that are commonly applied in these areas – including areas like role-based authentication, facial recognition, license plate recognition and geographical information systems. We then discuss how technologies such as these have been implemented in Alabama over the past 10 years to revolutionize the practice of law enforcement and dramatically increase the productivity of the typical police officer. We also provide an overview of the Center for Advanced Public Safety and how it aligns with the mission of The University of Alabama in teaching, research and service in the areas of information technology and computer science.

About the Speaker

Dr. Parrish is a Professor of Computer Science and Director of the Center for Advanced Public Safety (CAPS) at The University of Alabama. CAPS is an organization of 50 people (including 30 full-time software developers) that has developed a number of cutting edge software systems in public safety, traffic safety, homeland security as well as health and human services. Their portfolio includes electronic traffic citation and crash reporting systems, information sharing systems, and data analysis systems, and they have developed a track record of recognized innovation in a number of areas. Their sponsors have included the US Departments of Transportation, Justice and Homeland Security, and they have partnered with approximately 15 Alabama state agencies, as well as states from all over the U.S., including recent collaborations with Wyoming, Nevada, New Mexico, Arkansas, Mississippi and Georgia. Dr. Parrish received a B.S. from The University of Tennessee at Martin, and received his Ph.D. from The Ohio State University.

Student Abstracts
Undergraduate Two-Year Programs

The Future of Computers is Here, If you Want It.

Jason Cobble

Northeast State Community College

IBM is working on Watson, which is an artificial intelligence computer system capable of answering questions posed in natural language. Watson is built on IBM's DeepQA technology for hypothesis generation, massive evidence gathering, analysis, and scoring. Watson uses the new IBM POWER7 processor. POWER7 is a Power Architecture microprocessor released in 2010.

Google is planning to build and test 1Gbps broadband networks in a small number of trial locations across the United States, the first being Kansas City, Kansas.

Cloud computing services or "The Cloud" is providing a new way to back up, store and access data like a computer within a virtual computer, within a virtual computer.

Lockheed Martin Corporation has entered into an agreement to purchase the world's first commercial quantum computing system from D-Wave Systems Inc.

The Defense Advanced Research Projects Agency (DARPA) and Zebra Imaging have designed a real-time, 360-degree 3D holographic display to assist battle planners.

Moore?s Law predicts nano neural networks will be the standard. Our brains will be connected directly to this vast future quantum computer technology that has been miniaturized, broadened and made to be more powerful.

Quadriplegics have been fitted with microelectrodes in the motor cortex of their brains, just by thinking, they can move robotic arms.

Sony filed a patent earlier this year for ultrasonic technology that will beam videogames into our brains.

People will wear quantum computers in a headband. They will have direct coupling into the right side of the brain allowing them to see in their head, similar to a dream.

By thinking they will be able to connect with networks. By thinking about logons, passwords, text, photos, music and whatever their heads hold they'll be able to navigate, communicate socially from miles away, Tweet just by thinking and do work on the run.

Underwater Robotic Retriever aka UR Retriever

Richard Quaicoe, Jose Orozco, and Demetrius Harrell

Georgia Perimater College

The project is based on a remotely operated underwater vehicle that will have the ability to go at least 20 to 30 feet under water. The tethered underwater robot will be equipped with a robotic arm with two degrees of motion. The robot would also have the ability to move, and see with the help of thrusters, camera, and lights. This will allow us to reach a certain depth, monitor the robot actions, look for objects and bring them up to surface. The robot solves the problem of lost keys or valuable Items in local pools or lakes. Usually when items are lost in pools it is very difficult to retrieve it. Some of the difficulties include, constantly and periodic come up for air which can cause loss of position and time. Visibility is very low in deeper depths and it is very hard to see at nightfall especially in cloudy waters. Our remotely operated underwater vehicle eliminates these difficulties and gets the job done with ease. The robot could also be used to pick up unwonted debris from the bottoms of pools and lakes.

Notes

Student Abstracts
Undergraduate Four-Year Programs

How to Keep Graphical CS1 Learners Happy in Data Structures

Lucia K. Dale

Sewanee: The University of the South

Many successful first year programming textbooks are available which present a first taste of some programming language in the context of a manageable graphical programming environment. Most of these texts depend on downloadable "sandbox" graphics classes aimed towards enriching the student experience while maintaining the sophisticated foundation of a "real programming" environment. From all reports these texts are succeeding at attracting more students and inspiring them to take a follow on course such as data structures. How are they doing there?

Here we present our on-going classroom experiences with what happens as these students attempt to progress through a data structures course having come from a graphical sandbox'ed world. Some students become disenchanted with computer science in general by what they perceive as 'bait-n-switch' in the apparent fun factor of the material. Some are disenchanted but perceive themselves as less capable than their peers. Others take on the challenge and try to make their own fun -- at which only some succeed. What can we as their instructors do to get more students in the latter category? How successful have we been?

At our university, students take a CS1 course using a text called Java:An Eventful Approach. Our CS2 (data structures) course builds on this material. Students in our data structures course use packages of simple graphical objects which they and their peers created while satisfying the requirements for their CS1 course. They build on these classes extending and combining them in various ways while building and learning the more powerful data structures and the theory behind in their second course. What works and what doesn't is discussed.

Computer Science And Critical Thinking

Jim Johnson
Jesse Turner

Bethel University

Principles of critical thinking applied to computer science are developed. It is shown how those principles may be applied in a course in computer programming. The theory developed here will be useful to faculty who wish to participate in the development of a quality enhancement plan used to satisfy the SACS Accreditation requirement 2.12 in the Principles of Accreditation.

Observations of Beginner Programming Students from the Student Perspective

Mark Philip Plagge and Malika L. Harris

Columbus State University

The continuing strong demand for computer science and information technology graduates in the US is projected to grow over the coming years as the gap between the demand for graduates and the rate at which institutions produce them is expected to increase. One major problem facing institutions in recent years has been the low retention and graduation rates of students in computer science. Colleges and universities routinely report that 50% or more of those students who initially choose CS study soon decide to abandon it. The main factor contributing to this is the large number of students who either drop out of or fail in courses that involve computer programming for problem solving ? CS1, CS2 and data structures. The objective of this NSF REU grant funded research project was to carry out a peer investigation of why so many students find computer programming difficult. Our investigations show that comfort level, time management and difficulty with abstract thinking play a major role in student success. Through the analysis of surveys and interviews, we found that students have difficulty separating abstract problem solving and implementation of coding. In most cases students started coding without a predetermined starting point. Our investigation also demonstrated that in order to address this difficulty, more emphasis should be put on training students in abstract problem solving and programming language syntax. Teaching programming using pseudo code may also be beneficial to introductory level students.

Developing a Pre-Assessment Instrument to Measure Readiness of Students in a Data Structures Course

Nabil Yousif, Masoud Naghedolfeizi, Xiangyan Zeng, and Ramana Gosukonda

Fort Valley State University

Data structures course is a junior level computer science course and is regularly offered during fall semesters at Fort Valley State University. The summer break between programming II and data structures course often causes students to forget some basic programming knowledge and skills that are needed in this subject. To identify the preparedness level of students in the course, we have designed a pre-assessment instrument to help measure the readiness level of students in major topics of programming. In this respect, we identified 5 topics: data types, selection, looping, arrays, and object-oriented programming. Ten programs were designed for these topics. Logical, syntax, and run-time errors were intentionally placed into the programs. Students were asked to debug the programs to obtain the requested results. Some programs contained both logical and syntax/run-time errors while some others had only logical errors. There were two main reasons for choosing this method. Research shows that students often spend more time in debugging a program than writing one. In debugging process, students often have to carefully examine every line of program for various possible errors. Thus, it forces students to review and study the programming concepts for the problem on hand systematically. Secondly, it teaches them the importance of programming documentation and its role in programming life cycle.

After collecting the pre-assessment results, the performance of each student was evaluated in all 5 programming topics. The passing score on scale of 100 was set at 85 and approximately 75% of students were able to pass the assessment. The results obtained from the assessment indicated that nearly 60% of students had problems with object-oriented programming concepts. Although the results are not statistically conclusive due to a small class size, it provides an indication of what topics are most likely have short retention rates in students memories so that remedies can be planned in programming I and II. Additionally, students realized the role of documentation in programming by commenting program documentation ease the process of debugging.

Robotics as a Stimulus to Computational Thinking: A Move to Academic Savvy

Virginia S. Bailey

Jackson State University

Many incoming freshmen students majoring in computer science are not prepared for the stringent analytical components they are faced with early in their matriculation. Factors contributing to this void include lack of adequate preparation at the k-12 levels, lack of exposure to the material, lack of interest, etc. A computational thinking model represents a solution to this problem. We in the department of Computer Science adopted the Computational Thinking model in one of our courses to enhance the problem solving skills of our students, increase student interest in pursuing a Computer Science degree, increase the retention rate of Computer Science majors, introduce computational thinking knowledge sets, and exposure the students to cutting-edge research topics. The course was taught in Spring 2011 and was funded through an Advancing Computational Thinkers and Computing Innovators Cyber-Enabled Community project. This course consisted of five units, each three-week in duration. The units covered 1) Robotics for Societal Impact, 2) High Performance Computing: Modeling, Simulation, & Visualization, 3) Data, Data Analysis, & Visual Analytics, 4) Virtual Organizations for Distributed Communities and 5) Mobile Computing Environments for Learning. Here we report the impact of implementing the Robotics for Societal Impact components of this project. Using the robots as an educational tool proved to be highly effective to toward creating an atmosphere of excitement in the field. Without the inclusion of routine core computer science requirements, this component of the course introduced students to the concepts of object-oriented programming, looping methods, problem solving and analytical thinking. An additional benefit of participation was social interaction within a collaborative team, utilizing analytical skills to program robots to perform specific tasks. As a result of continuation of the course, we expect enhanced achievement and better preparations for the rigors elements ahead.

Cheating Versus Bootstrapping: How Can We Determine Which Is Which?

Lucia K. Dale

Sewanee: The University of the South

Academics deal with suspect homework submissions on a regular basis. We consider various options when faced with what appears to be an inappropriate level of sharing and mutual support among students: confront, report to some authority, as well as attempt to determine if this is a teachable moment or one can be salvaged from the situation. How can this be done?

One graduate instructor, 'Chris' is not his real name, chose another route. He spent an entire semester grumbling to himself and anyone else who would listen about the situation and the complex and intricate software he immediately began to write which would process all the homework submissions and then calculate the degree to which each fell into a statistically similar category of resemblance. He was astounded at how much illegal collaboration between students appeared to be common. He worked on and polished his software to the exclusion of all other activities for the next couple of months. In the end, he contacted the course instructor and gave the professor a detailed printout of his software's output -- statistical evidence of the probability of widespread plagiarism and cheating.

Consider the effort and time often devoted to prove and document various situations. Sometimes we too lean heavily on our strengths -- computing and mathematics -- to the exclusion of other viable response. How can be address the problematic behavior of student? What would keep them from cheating? Why is cheating sometimes more desirable than doing the assignment themselves? For which students? Are they incapable of the the work or simply disinclined to the effort? Do they learn anything by "cheating"? How do we distinguish between a low-level copy or a sincere effort to understand and then an inability to put that shaky into their own code, -- "use their own words"?

~

Using Math to Teach Computer Programming

Elizabeth Wright

Tusculum College

I intend to show how math is used to teach computer programming. Math concepts provide the logic and analytical skills required to program. Many teachers find math to be an easy way to get their students to think logically about how a computer works and how we can manipulate it with programs. A computer uses math to process code, so programmers need to use math to tell the computer what to do through their code. Some of the different types of math recommended for computer programming students to have been exposed to are basic algebra, linear algebra, and discrete mathematics. Not all teachers focus on math when teaching programming. Some use different languages to make programming easier for students at first and allow a better transition into harder programming languages. Some teachers use a combination of mathematical logic and easier programming languages, which is extremely effective because it allows for the best adjustment for the student. Math is not the only method of teaching computer programming, but it is a common method because the logic employed in mathematics and computer programming is so closely related. Many colleges and universities recognize this by tying their computer science and math departments together.

What I Have Learned from Teaching Computer Repair and Maintenance

Max Li

Union University

Computer Repair and Maintenance is a popular course at Computer Science Department of Union University. Over the years, we have educated students about all aspects of computer repair and maintenance. In this talk, we are going to talk about lessons that we have learned from teaching this course. We are going to talk about the differences between this course and digital systems and computer architecture. More importantly, we are going to discuss lessons that we learned about how to fix computers for students, staff members and faculty members at Union University.

Attracting Students to Undergraduate Computer Science with Robotics

Travis Shuff, Dakota Brown, and Ryan Kroutil

Armstrong Atlantic State University

This summer we began working with local high school and middle school teachers to attract students into computer science programs using robotics clubs and robotics research classes. Teachers in these clubs and classes are using the Intellibrain-Bot to teach students the Java programming language and introductory computer science concepts. These clubs and classes use learning modules, developed by their teachers, to guide students in developing programs to use specific Intellibrain-Bot hardware and features.

Ultimately, the students will compete in a final showcase testing their problem solving skills. In this competition students will be given a task for the robot to perform, such as have the robot travel across a grid using line sensors to find a specified point, or navigate an obstacle course using IR and sonar sensors. This showcase is to take place at the end of the 2011 school year with the teams from each school competing.

The only issue frequently encountered in using the Intellibrain-Bots is setting up the computer to robot connection to transfer programs from the computer to the robot?s memory. The connection uses a serial connection over Bluetooth which has shown to be quite troublesome and sometimes require restarting all equipment to get a successful connection.

Currently, students have shown a desire to learn to program these robots. They are completing learning modules one per week while some students have progressed to the advanced modules and show potential to pursue computer science degrees after secondary school. Students in the robotics clubs who are also taking the research class have even begun assisting other students with troubleshooting their programs whenever problems or errors occur. Overall, students are showing a strong interest in programming and potential to enroll in computer science programs in college.

Development of a Web-based Application to Remotely Access the Computer Network Systems and Security Research and Education Modules at Jackson State University

Abduaziz Komilov

Jackson State University

The web application that is being developed (http://www.jsums.edu/cms/seclab) gives the user an opportunity to remotely access any information related to Computer Network Systems and Security research and education like, the modules, laboratory projects, courses, statistics, feedback, and last but not least, the ability to download the content of all of the above mentioned information. The application is a web-based representation of the information from a Database Management System (DBMS). As a core of the DBMS, MySQL open-source database is used along with Apache web server, and Hypertext Preprocessor (PHP) a server-side scripting language for building dynamic web application. As of now, the basic layout of the application is ready for use; these include the access to the downloadable files from all the modules, courses and labs, general information about the research, people involved in the research and development processes, and surveys and statistics from and for users. The current in-progress developments include:

1. Graphical changes that will make the interaction more user-friendly like the addition of download button instead of a hyperlink, drop-down lists instead of a clickable texts, and clickable survey results where the user can get more in-depth information about feedbacks.
2. Moving some parts of the database, like the feedback from users, into separate files for easy write-and-read process as well as to ensure the normalization of the database.
3. Addition of administrator mode, where the responsible person can log-in and make necessary changes to the application through a Graphical User Interface instead of developing through code.

Completed tasks include:

1. Integration of the survey results into the web application.
2. Changes to the User Interface of the web application to look more professional.
3. Pages with implementation of secure log-in for the administrator.

The above project is being funded through the NSF-TUES grant DUE-0941959.

OMIT: The Ontology for MicroRNA Target - A Framework For Unifying Diverse Biological Data

Adam Moore

University of South Alabama

MicroRNAs (miRNAs) are a class of non-coding RNAs believed to play critical roles in human disease such as cancer. An important aspect of miRNA research is target prediction and its verification by biologists.

Information regarding miRNA target genes is distributed throughout various miRNA prediction databases around the world. Different databases are maintained by different groups of scientists. As a result, the nature and format of the information contained in each database varies. It is difficult for biologists to utilize heterogeneous information in their research. Finding useful information among scattered databases is a tedious and error-prone task.

The South Biomedical Informatics group poses a solution to this challenging problem. The main idea is the design of a computational framework based on the Ontology for MicroRNA Target (OMIT), a domain ontology developed for the field of miRNA. An ontology is a formal representation of knowledge in computer systems. The interactions among miRNAs, their respective targets, and anatomical processes and features are encoded in the ontology, which organizes information into a set of concepts and relationships (properties) among concepts. This organization of knowledge is the ontology schema. In addition, instances of classes can be populated into the ontology.

The design of the OMIT is a combined effort between computer scientists and domain experts. Relevant information from existing databases is encoded in the ontology schema. For example, the sequence of amino acids that compose a particular miRNA is modeled as a data property for the MiRNA concept. The object property MiRNABinding encodes the binding between a miRNA and its target gene.

Future work includes fine-tuning the ontology schema and tagging data sets contained in source databases with OMIT concepts and their respective properties. The result will be a centralized miRNA target prediction database that will provide biologists with insights in their research.

Using Bump Technology in an Economics Simulation Tool

Christian Weigandt and Thomas Langford

High Point University

An application, Pit Market, was developed for the Economics department to simulate a closed commodity trading market. An economics professor can set the conditions for a trading session via a website. During the simulation, iPads are distributed to students. When a trade takes place between two students, Bump technology is used to exchange data and confirm the trade. Each iPad sends the trade data to a centralized database.

When we were initially handed the application, trades were not being sent to the database. Our task was to analyze the problem and find a solution. This presentation will outline the communication issues that existed in the original application and how the problems were resolved.

MTSU Mobile Application development project for NSF-CPATH

Christopher Johnson

Middle TN State University

This paper presents Android mobile application development experience for the CPATH project. Through this project students mentor one another and apply what they?ve learned in the classroom to solve real-world challenges. All of team members had completed visual programming class in previous semester. Android was chosen as our development platform because Java was used in Visual programming class. Android is open source platform and many help was available from Android community. We started with a small UI design and worked on functionality from there. The difficulties we encountered were mainly caused by our lack of knowledge involving android's language. Through trial and error we achieved an end result that we are very pleased with. The most difficult thing in developing this software was coordinating with each other's code and coding style. Main features of the application were: Access campus calendar, checking class schedule, finding teacher?s contact information. Touring campus with building map with current location will be especially useful for new students and guests. Application program also display building information and campus shuttle bus route map. These are examples of location based service using GPS on a smart phone. Google Maps API made this process simple and fun process. Access to the campus LDAP server required permission from campus ITD office. The application provides dining facility information with building and operating hours. It provides RSS reader, event viewer and campus alert display for campus community safety. Other popular features on the mobile application is displaying bus schedule. However our campus shuttle buses are not equipped with GPS and real time bus schedule could not be displayed. Our application is on the market and has gotten excellent feedback from users. We are currently working on developing the Application on iPhone. This project provided valuable experience in team project development and significant research experience.

Cross Platform Development Using the Monkey Programming Language and Mojo Module

Aman Alshurafa

University of Tennessee - Martin

In the past, Microsoft Windows was the only platform applications were likely to target. But today, mobile devices and even the web has become an important target for developers. For mobile, there is Android which runs programs written in java, Apple iOS which runs programs written in Objective-C, and Windows Phone which runs programs typically written in C#. In addition, the Apple Mac and Linux share are growing and they are becoming more appealing to developers as well. Even web programs are now split between Adobe Flash and the new HTML5. With all of these platforms and perhaps even more, programming for every platform is getting more expensive and time consuming.

This session will present a useful tool that can translate code written in a Basic-like programming language into a native program for various platforms. Monkey is a new programming language with a powerful tool called Mojo that translates a program written in monkey to other programming languages like C#, C++, Java, Javascript, and Actionscript. It can then compiles the translated program to work as a flash or html5 web application, android or iOS mobile application, XNA program or game that runs on Windows phone, Zune, and Xbox 360, and Windows, Linux or Mac OS application. Optionally, more targets and features can be added by the community. For example, I added support for the gamepad on the Sony Ericsson Xperia play and took advantage of a code posted on official forum to add Nintendo DS as a target. I was also able to play with the generated project of the code to add additional features not supported by default in monkey.

There will also be a comparison between monkey, other similar tools, and some native programs. There will be a demo of a game that I have fully developed in monkey and have working on all of the targets supported by monkey as well. Finally, I will talk about the difficulties I faced during the development of this game.

"Using Python to Enhance Mathematical Exploration"

Tyler Bright and David Frazier

Tusculum College

I have found an alternate method to finding the difference between two consecutive numbers to the same power. I have also found an efficient method of finding Pythagorean triples with the use of my previously mentioned discovery. I spent several days of experimenting in order to test and refine my observations until I noticed patterns within my work. Since I am currently learning Python, I decided to write a program detailing my mathematical discoveries. Thanks to the efficiency and numerous processes which can be accessed by using Python, I was able to write separate functions which covered each aspect of my findings. Python?s ability to allow the users of its programs to enter their own individual inputs assisted me in my steps to check that each line of my code was doing the correct job. I did not perfectly program any of my four functions on the first try, however. Each time that I thought my function was in perfect working order, even though it wasn?t, Python would always send me an error, detailing where my mistakes were, down to the precise line.

My presentation will focus on using Python to test and develop mathematical hypotheses. During my presentation, I will include the operations of Python that were used to incorporate fail-safes into each program. The Python programming language has shown me how useful and efficient computer science can be. While it would be possible for me to test my methods by hand, the speed and accuracy of Python, when I make no mistakes that is, amazes me and is completely trustworthy.

A Boolean Algebra Simplification Tool for Students

Adam Moore

University of South Alabama

Computer Science (CS) students normally take a course in Digital Logic during the second year of the CS education. The study of Boolean Algebra and its relationship to combinational logic circuit description is a major part of that course. A study of the "Boolean Theorems," which are rules that define the behavior of Boolean algebra operators, is part of the coursework. These rules can be used to algebraically simplify the equation of a circuit. A solid understanding of Boolean Algebra concepts is likewise needed to understand the more complicated aspects of combinational logic circuits. Additionally, students taking college-level mathematics and philosophy courses typically study Boolean Algebra.

An interactive program that displays the steps in the simplification of Boolean Algebra expressions would aid in students' understanding. The Object-Oriented-Design (OOD) paradigm will be used to implement such a program. A well-designed class hierarchy can represent the parts of a Boolean Algebra expression. These include Symbols, AND expressions, and OR expressions. Classes representing these parts are organized in a sub-class hierarchy.

A properly organized hierarchy would allow for the Boolean Theorems to be expressed using the principles of inheritance and operator overloading. A common convention in Boolean Algebra is using the '+' and '*' signs to represent OR and AND, respectively. The interactions between Boolean objects are specified by how each object should behave as an operand of these operators.

A module is currently being built in Python which will be similar to SymPy (a Python module that includes support for derivative and integral operations) when it is completed. Future work in the project includes testing and improvement of the simplification and display algorithms based on input from students. A GUI will be developed to enhance the user experience.

A Strong Neighborhood Based Algorithm to Determine Stable Connected Dominating Sets for Mobile Ad hoc Networks

Michael Terrell

Grambling State University

We propose an algorithm to determine a stable connected dominating set (CDS) for mobile ad hoc networks based on the notion of ?strong neighborhood? (SN) of a node. The nodes that are within the transmission range of a node form the neighborhood of that node and are partitioned into two distinct sets: strong neighbors and weak neighbors. We use an operating parameter called the ?Threshold Neighborhood Distance Ratio,? (TNDR) that delineates the strong and weak neighbors of a node. If R is the transmission range of a node i and r is the distance between node i and its neighbor node j, then node j is a strong neighbor of node i if the ratio r/R is less than or equal to the TNDR. Our hypothesis is that smaller the TNDR, the longer is the lifetime of a CDS. The proposed SN-CDS algorithm prefers to include nodes with a larger number of strong neighbors to be part of the CDS. If TNDR equals 1, then SN-CDS behaves like a Minimum CDS (MCDS) algorithm. We study the performance of SN-CDS for TNDR values ranging from 0.5 to 1.0 for network connectivity of 0.5 or above under different conditions of network density and node mobility. We observe that the SN-CDS determined with TNDR values of 0.5 to 0.9 have a significantly longer lifetime (the lower the TNDR, the larger the lifetime) compared to the MCDS (when TNDR equals 1.0). The SN-CDS lifetime is about 4 to 12 times the lifetime of a MCDS. The tradeoff is a low to moderate increase in the hop count per path (by at most 30%) and the CDS Node Size (by at most a factor of 2.5). This research was conducted as part of the NSF-REU program (Summer 2011) at Jackson State University.

A Link Distance Ratio Based Unicast Routing Protocol for Mobile Ad hoc Networks

Khalyle Hagood

Jackson State University

In this research, we address the problem of minimizing the stability-hop count tradeoff among the routing protocols for mobile ad hoc networks (MANETs) so that we have a routing protocol to determine minimum hop stable paths. Our hypothesis for this research is that stable paths in MANETs can be formed by including links whose constituent end nodes are closer to each other and at the same time, the hop count of the stable paths could be reduced by taking into consideration the number of links that are part of these paths. We propose a new optimization parameter for MANETs called the ?Link Distance Ratio? (LDR) defined as the ratio of the physical Euclidean distance between the constituent nodes of the link to that of the transmission range of the nodes. During route discovery, the proposed routing protocol uses a ?threshold? value for the LDR (LDR-threshold) and considers those links with LDR values less than or equal to the LDR-threshold. The route with the lowest value for the sum of the LDRs of the constituent links is chosen as the desired route and is used as long as it exists. When a route breaks, we use the above methodology to determine a new route. When implemented in a discrete-event simulator developed in Java, we observe the LDR routes have a 25-75% longer lifetime than that of the minimum-hop routes (determined using the Dynamic Source Routing protocol, DSR) for the various simulation conditions without any significant increase in the hop count compared to that of DSR. We thus conclude that the LDR-based routing protocol has substantially neutralized the stability-hop count tradeoff seen among the routing protocols and is a valuable addition to the MANET literature. This research is funded through the NSF REU program, conducted during Summer 2011 at Jackson State University.

A Performance Study of the Sink Mobility Models for Wireless Sensor Networks

Richard Fletcher

Mississippi Valley State University

To reduce the energy wastage and extend the lifetime of the sensor nodes, recent studies on wireless sensor networks have considered deploying one or more mobile sinks. In this research, we evaluate the performance of three sink mobility models for wireless sensor networks that differ from each other based on the criterion used to decide the next stop for the sink node. A round of data collection is equivalent to the sink collecting data from all the nodes in the network, making one or more stops. During each stop, a sink node collects data from a sensor node (selected based on the criterion of the mobility model) and its neighbor nodes. These nodes are not considered to select the subsequent stops (i.e., sensor nodes) during the particular round. Upon completion of a round, the next round of data collection starts, involving all nodes in the network. The above procedure is repeated for several rounds until there is a first node failure due to exhaustion of energy.

Under the Random mobility model, the sink randomly selects a sensor node that is not yet covered, visits the chosen node and collects the data from the node and its uncovered neighbors. The other two mobility models studied are based on visiting a node with the largest number of uncovered neighbors (MaxDensity) and visiting a node that has the largest value for the product of the number of uncovered neighbors and available energy (MaxDensityEnergy). Through an extensive simulation analysis conducted under networks of various density, we observe that the MaxDensityEnergy and Random sink mobility models yield the largest time for first node failure and this is significantly larger than the sensor node lifetime obtained with the MaxDensity approach. This research was conducted as part of the NSF-REU program (Summer 2011) at Jackson State University.

Computing in Archaeological Field Work

Thomas Olsen and Scot Anderson, Ph.D.

Southern Adventist University

The Institute of Archaeology at Southern Adventist University brought to the School of Computing a request for a system of entering, managing, and reporting the high volume of data collected on an archaeological site. In the past, supervisors typically collected data by hand-writing information at the time of discovery. During the dig, this process took time away from the primary focus of excavation, and after the dig, cost the site coordinators time in preparing the hand-written material for publication. Our software solution provides supervisors the ability to enter information into an EeePC Netbook in the field and aggregate the data to a central database at the base camp. At the end of each season, the program generates reports of all data collected for the different agencies involved. A secondary consideration involved collecting and representing spatial data using newer, more accurate tools. The new tools relieve the supervisors from maintaining reference points and measuring positions with levels, plumb bobs and measuring tapes. The software keeps this spatial data organized and accessible, where previously, supervisors read through their notes to find past data. Having access to this information on-demand saves time in placing new finds in the context of previous ones, and keeps the focus on moving further into the past. The more accurate spatial data also aided with the generation of daily top plans for each supervisor. In conjunction with overhead photos taken of each square, the spatial data allowed for georeferencing of the photos in relation to each other to minimize the amount of distortion in the final image. These images, when overlaid on an Adobe Illustrator template of each square, allowed for the generation of near-publication quality top plans every night, a process that previously took days.

To provide the software and IT infrastructure needed on location the Center for Innovation and Research in Computing (CIRC) at Southern provided a student to manage the IT infrastructure, troubleshoot software bugs, and print reports at the end of the season. This presentation will describe the planning, implementing, and maintaining of the IT infrastructure at an archaeological site. This includes the transportation of IT equipment versus purchasing equipment in the destination country, operating and maintaining the equipment in a desert environment without air conditioning, and managing dust accumulation as the equipment is used in the field on a daily basis.

Evaluation of Different Feature Selection Strategies in Attributing Morphing Malware to its Engine

Patrick Hill, Steven Holder, Rodrigo Sardinas, and Dr. Radhouane Chouchane

Columbus State University

In the past, the fight against "malware" has been mostly a reactionary one; once a piece of malicious code is discovered, a "signature" must be constructed for it in order for it to be identified in the future. We use the term malware to refer to any of the family of malicious software, including but not limited to viruses, trojans, and worms. "Morphing malware", however, uses an "engine" to change the malware code with each iteration in an attempt to prevent signature-based antivirus software from detecting it. The term engine refers to a program that is able to generate variants of malware with little to no human intervention. Our goal is to create a method to aid in attributing morphing malware to its engine. Our work evaluates different feature selection and classification techniques for matching morphing malware to a known engine. We will be disassembling known malware and examining the frequency, sequence, and unique combinations of attributes. Through techniques such as the Naive Bayes classifier, and Hidden Markov Models, we hope to match previously unseen variants of malware to their engines with a reasonable level of accuracy and without incurring a prohibitive resource overhead.

Avoiding Cyber Threats Through Port Hopping

Robert Plummer

Louisiana Tech University

Today, throughout the globe, cyber attacks are prevalent. These threats are everywhere, whether they are against the military such as unmanned US drones this summer, or industrial base such as the International Monetary Fund in June. Currently, the accepted theory to combat these attacks/threats are all based on the fact that first they have to be detected. In general, to detect a cyber attack it must be occurring or have already occurred. Detection by its nature is reactive, and we feel that a proactive approach that avoids the threat altogether is better. In this effort, we are researching proactive avoidance techniques and methods for changing or 'morphing' a target system. The goal is to enable a machine to 'change properties' about itself thus allowing it to avoid the threat entirely instead of simply defending against it. Since the machine is 'morphing' the target environment, any reconnaissance that is gathered would be rendered useless and make the attack ineffective. In other words, even though an attack may still be launched, the attack will have no effect on the target system because the system has changed. There are several methods to accomplish this 'target morphing.' In this presentation, we will present one of our techniques for target morphing called port hopping. Port hopping is a method that allows a service to periodically change ports based on an algorithm that is known to the client and server. By enabling the service to modify what port it is using, it nullifies a subset of information that attackers use to attack a system. Utilizing this strategy of constantly 'morphing' the target environment will force an attacker to gather new reconnaissance to proceed and eventually move the attacker to abandon the attack.

Study of Firefox in Private Browsing Session through Memory Acquisition

Darquavis D Palmer

Tuskegee University

According to Mozilla, ?Firefox will not keep any browser history, search history, download history, web form history, cookies, or temporary internet files in private browsing sessions?. This study examined the behavior of private browsing sessions (PBS) in Firefox 6.0.2. The goals are two folds: Confirming that browsing session data is not stored on the local PC and investigating the memory content used by Firefox in PBS.

The study utilized the flexibility of virtual machines (VM) as the base for experiments. A clean Windows XP professional based VM was created. All experiments in this study were based on the clones of the original VM. The initial experiment launched a regular browsing session (RBS) in Firefox to visit certain selected websites. Identical websites were visited in PBS using a different VM. File systems of both VMs were compared and the memory contents of the VM used by PBS were saved to files. Memory contents used by Firefox were extracted from the VM. The entire memory used by the VM was also extracted from the host side for further analysis.

The examination of the PBA VM local files confirms that Firefox does not store browser data in its usual locations and session information was not retrievable using this method. Analysis of the memory dumps shows that session data is kept in memory. Furthermore, the data is still kept in the memory even after the browser has been closed. Preliminary findings reveal that the session data can be used to track sites visited and extract limited data within those sites. Research is ongoing into the extent of data that can be carved out of the memory dumps and used for investigative purposes.

Evolving Neural Architectures for Locomotion

Chris Walling

Samford University

Genetic algorithms are powerful tools designed to mimic nature?s impressive ability to solve complex problems. Not only can they unravel some of the most multifaceted problems, they can observe intricate systems in a tractable way. For example, neural architectures sometimes fall into that area of intractable problems that can be discerned by genetic algorithms. Looking at neural networks through the scope of genetic algorithms is interesting in itself; however, we took that idea a step further by creating modules that can interact with one another in a population over many generations. Using this design, we aimed to construct centipede-like organisms that can perform simple locomotion, walking in a straight line. Each network module would work to solve smaller problems, in our case leg movement. Then the modules can combine, solving larger problems like synchronizing the leg movement to create straight forward motion with a pair of legs. Finally, those blocks combine to construct four and six legged organisms with the same locomotion in mind. We believe that this implementation allows us to evolve higher fitness individuals in a shorter amount of time in a more biologically consistent manner.

Remote Recognition of Objects Using an Off-the-Shelf Drone

Lucas Randall Flores and Mark Philip Plagge

Columbus State University

Unmanned Aerial Vehicles (UAVs) have been in use by governmental bodies for some time now. There are semi-autonomous drones, manual drones, and even some fully autonomous drones currently in use. However, these drones are extremely complex and expensive. This project set out to investigate the possibility of using an inexpensive drone to recognize objects remotely. Using consumer grade technology, our project wrote software that analyzed images from a quadricopter then processed these images. The quadricopter was an off-the-shelf machine from Parrot that was originally flown via an iOS device. We customized the flight software to allow flight via computer. During flight, the drone would record a video stream that we were able to parse into images. We then used a semi-automatic image segmentation process to prepare the images for analysis, and then analyzed them through an image identification algorithm. As a proof of concept, our algorithm counted cars in nearby parking lots. However, with some more algorithm design, this drone could easily be configured to count other objects. The drone seemed almost ready for this type of flight, as the onboard computer system kept the machine stable and relayed telemetry back to our computer. Throughout multiple flights, we found that the quadricopter was quite suited for this type of work with minimal modifications. This research shows the potential of inexpensive off-the-shelf drones for performing aerial observation tasks.

Multi-Agent Collaboration on the Nao Platform

Jesse Kawell

Samford University

RoboCup is an international research initiative with the stated goal of creating a team of humanoid robots to beat the human soccer champion team by the year 2050. The robot soccer domain poses a multiagent collaboration challenge wherein individual robots in a team must work together towards the common objective of winning soccer matches. Given the hardware specifications and computational constraints of the Aldebaran Nao humanoid robot used in the Standard Platform League of RoboCup, this project (an NSF sponsored research project) developed adaptive strategies to improve the collaboration capabilities of ?IT-UT Austin Villa?, a joint team comprising Texas Tech University and The University of Texas at Austin. Fundamental aspects of soccer strategy and teamwork such as positioning, passing, and scoring are addressed, and the associated algorithms were implemented on Nao robots.

Multiagent collaboration may be defined as the cooperative interaction among two or more agents working towards a specific goal or task. Although individual agents are capable of scoring goals, the probability of successfully scoring is improved through cooperation. In this project, the team of robots was programmed to organize themselves on the field to implement a particular team-based soccer strategy.

The fundamental aspects of soccer include positioning, passing, and scoring goals. The robotic players were made to evaluate their positions on the field through cameras and then position themselves on the field using this visual knowledge. During the game, the players communicate to each other over wireless connection. They work together to pinpoint the ball and decide who should pursue it and where they should pass. While human players might take for granted the thought process involved in deciding how to handle the soccer ball, the soccer playing robots had to be carefully programmed to dynamically make decisions based on their current and subsequent environments, in real time.

Practical Application of Software Engineering to Health Care Providers: CHATS

Ervin C. Williams and Michael D. Weaver

AL, University of South Alabama

Community Health Advocates (CHAs) are the Center for Healthy Communities? (CHC) trained volunteers. They travel to various rural surrounding neighborhoods to inform at-risk populations about various health disparities and promote healthy habits. The target population is informed via seminars. To gauge the effectiveness of these seminars, the CHAs administer verbal or printed format surveys. These surveys gathered much needed data, but were flawed. These methods were time consuming and difficult to organize for both administrators and data collectors. The Center decided that to more effectively utilize this data they needed to integrate appropriate technology.

Having just completed a course in Software Engineering, this project proved to be a realistic endeavor. Nevertheless, we were able to identify and carry out each development task by recalling key concepts of project management (e.g. Polya?s approach to problem solving and the effective use of necessary technology). An added challenge was utilizing Android tablets as the application platform. Our assignment was to engineer a more streamlined way of administering surveys than the previous paper methods. Once we understood the problem our next step was to devise and implement a plan.

As development proceeded we were immersed in a participatory process with the CHAs and the Center administrators. With this firsthand knowledge we were able to adequately understand the user, client, and analysis needs. This included the requirements to provide GUI, mySQL database, communications, reports, web site and server capabilities.

Before this project we had no experience with programming handheld devices. However, by employing the fundamentals learned within the Computer Science curriculum we were able to extend our programming knowledge. For example, the concepts learned in both networking and databases proved to be integral project pieces.

Testing Online Character Recognition Algorithms

Aman Alshurafa, Jeffrey D. Arndt, Matthew A. Culp, Steven A. Dannelley, Joshua D. Pullen, and Michael J. Tutor (Advisor: Bob Bradley)

University of Tennessee - Martin

In this presentation, we will discuss our efforts to develop and test online character recognition algorithms. Online character recognition algorithms can be used by devices to allow users to input letters and symbols in a natural handwritten way. One of our goals was to create a simple program that could recognize handwritten characters with a high degree of accuracy. The other goal was to develop a framework that could compare the accuracy of various recognition algorithms. The testing program we developed contains a library of digitized versions of the alphabet as written by several different people. This library can be used to both train and test the different algorithms, to see which algorithm is the best at learning a new alphabet, and to see which algorithm is the best at recognizing letters from a sample it has not seen before. In this talk, we will demonstrate both the algorithms and the testing program. And we also hope to show versions of the algorithms running on some mobile devices such as the iPad, iPhone and Droid.

Real-Time Physics Simulation in a Cube-Based Game World

Zachary Shore

High Point University

Minecraft is a widely popular game that takes place within a world constructed entirely of uniform cubes. The basic goal of the game is to construct objects using blocks. The only physical property of these blocks is a hardness factor. The hardness factor can be seen while mining for blocks with different tools inside the game. So what if the same game was built, but with each block possessing additional properties? Suppose we include such properties as rigid-body dynamics and energy loss. If a block was displaced, the block could display realistic physics as it fell, and it could exhibit energy loss upon hitting a solid surface and rebounding. Collision detection could also occur between blocks, be they moving, placed, or part of the original terrain.

This talk will explore the development of a physics game engine incorporating these properties. Implementation of this engine will be done using OpenGL and C++. The talk will include a demonstration of the current engine. Once completed, this engine could be easily modified to include additional physical properties for blocks.

Procedurally Creating 3-D Glyphs Using Unity Game Engine

Jessica Kennemore

Columbus State University

Visualization is a helpful part of understanding what data has to tell us. The aim of this research is to procedurally create geometry using the Unity Game Engine in order to produce a three-dimensional glyph that represents a collection of data. The overall goal is to be able to explore, manipulate, and break apart the glyph into smaller sub-collections of data that can be represented by the same glyph. There are many other tools that one could use to accomplish this goal to include: OpenGL, VTK. So, why use a game engine? When considering OpenGL even the base functionality will have to be built from the ground up and everything else built off of that. VTK is a useful step up but is geared towards having modules that will present the data in a specific way; this will require more additions in order to make the glyphs interactive and create special effects. With these goals in mind it makes the most sense to use a game engine with such functions built in.

Unity is a good tool where existing knowledge of the engine and computer graphics will make the process much faster. The next decision is choosing to procedurally create geometry for the glyph as opposed to modeling a base glyph in a 3-D software, dropping it into Unity, and then modifying it based upon the given data set. Since anything created in a 3-D software is static this will make it much harder to manipulate. Unity has a built in Mesh class that provides the structure for geometry. One can create vertices, normals, and UV's based upon the data set and store them into their respective places in the data structure in order to create the geometry at runtime. This will provide the basis for future activity in data visualization of glyphs.

Parallel Computing of Free Distributive Lattices Part 2

Janice Hill

Columbus State University

In 1897, Richard Dedekind asked how many monotone boolean functions existed for a particular number of variables. The sequence of numbers he discovered, {2, 3, 6, 20,...}, would later be named the Dedekind numbers. The Dedekind number of M(n) counts the number of monotone boolean functions of n variables. Dedekind discovered that these numbers were related to the nodes of a free distributive lattice of n generators. While there is an algorithm for finding the next lattice, it is time consuming and difficult to get from one free distributive lattice to the next free distributive lattice in a sequence. In 2010, research began at Columbus State University to use Wolfram Mathematica to parallelize the algorithm for finding the next free distributive lattice in a series. The algorithm for finding this lattice is not balanced, meaning one core is consistently performing more calculations than the other cores. The goal is to parallel compute the portions of the algorithm that are causing a core to run out of memory and causing the computation to fail. By using Mathematica 8 and a local network, we are taking specific sections of the algorithm and parallel computing them in an effort to find larger free distributive lattices. Finding more lattices in the sequence should not only allow us to study their construction and perhaps allow for a new way to build them but also lead to an answer to Dedekind?s problem.

Improving the Ranking System for the U.S. Census Bureau

Samantha Allen

High Point University

The U.S. Census Bureau (USCB) assists the federal government in distributing approximately $400 billion of aid by providing a complete ranking of the states according to certain criteria, such as average poverty level. It is imperative that this ranking be as accurate as possible in order to ensure the fairness of the allocation of funds. Currently, the USCB ranks states based on point estimates of their true poverty level. Dr. Klein and Dr. Wright of the USCB have compared the performance of this method against more sophisticated procedures in simulation trials, but have found that they do not consistently outperform the existing method. We investigate this phenomenon by revisiting some of these procedures, and we expand on this work to produce new ranking algorithms. The new algorithms were implemented using R, a statistical programming language, in a parallel environment. Combining R's parallel computing package SNOW and MPI (Message Passing Interface) communications, we were able to significantly speed up the computing time. Finally, we found that our new ranking algorithms performed excellently when compared to the current ranking system.

Notes

Student Abstracts
Master's Degree Programs

The Mouse, the Maze and the Robot: Application of a Genetic Algorithm in Solving a Maze by a Robotic Mouse

John King and Shamim Khan

Columbus State University

In psychology labs one of the basic methods used since the early 20th century to measure intelligence was the mouse maze experiment. It was used to measure how a particular element or variable impacts a mouse's learning skills, memory or intelligence by measuring the rate at which it learns a maze. The goals of our investigation were twofold: emulating the behavior of a real mouse using artificial intelligence and demonstrating the feasibility of employing low cost/low capability robotics in a relatively complex application. The form of artificial intelligence used was genetic algorithm, which is based on evolution in nature. A chromosome represented the solution consisting of the commands to navigate the maze and the fitness of a solution was given by the maze completion time. Due to the time limitations of battery life an optimal solution was not achieved, but the time taken by the best solution obtained was approximately 13% slower than the optimal time. In comparison to the most common method used in robotic maze navigation based on mapping, the speed with which the genetic algorithm could find an optimal solution is slower. However, an inherent weakness of the mapping technique is in distinguishing loops in the maze from spirals, and most demonstrations deal with this by omitting them from their maze. Genetic algorithm does not suffer from this limitation, and loops were purposely employed in this maze experiment to demonstrate this. Since any real-world application such as navigating the halls of a building would require navigating loops, the method presented in this project could be the basis for such an application.

Using Gamification to Engage Generation X and Y CS Students in PeerSpace

Michael Chasteen and Chelsea Rath

Middle TN State University

Introductory computer science (CS) courses suffer high drop out and failure rates that reach up to fifty percent nation-wide. The causes of these events can be attributed to students? unwillingness to support or aid others, disdain for working in groups, and a lack of motivation. A key factor in solving these issues may lie in the generation gap that is present between instructors and students. If this is not carefully considered when addressing the previously mentioned problems, then students may not be interested in any proposed solutions, even if they are required to participate. This could prove to be less productive in the effort to raise success rates in any CS course. The goal of PeerSpace is to promote peer collaborative learning by providing carefully designed peer collaborative exercise within a friendly, peer-supportive online social network environment. To attract students to be more active in PeerSpace social activities, the idea of gamification has been explored by adding online social games, point based level systems, and individual and group rankings.

PeerSpace provides tools, such as discussion forums, blogs, and an online chat mechanism that facilitates social interaction among students. Students are encouraged to participate in this community by being rewarded with contribution points that allow them further advance in a leveling system that displays their rank to other users. A new Games module has been implemented to act as a magnet application and construct new social connections between students in order to provide the students with a larger support network. This module features several games including ?Four in a Row? and ?Who am I?? which is based off an identity guessing game and designed for users to learn about fellow class members and professors. The system has been launched in fall 2011 with positive initial response and feedback from the students.

Opa: A New Web Development Platform for the Cloud

Jan Durand

Louisiana Tech University

Web applications are becoming more popular as the Internet matures and becomes more ubiquitous. With the investment of companies like Google, Apple, Microsoft, and Amazon, cloud-based services are becoming viable replacements for traditional desktop applications and are also offering new features made available through the Cloud Computing paradigm. Despite these advancements in web applications, the typical web application development process is still a convolution of discrete technologies including web servers, database management systems, and client-side scripting languages which were not necessarily designed to cooperate or be used outside a given context. The mediation of these orthogonal components can be a difficult and often daunting task to new developers exploring the web application arena. One possible solution to this problem is the Opa programming language developed by Henri Binsztok. Opa is not just a language but a web development platform which seeks to simplify the web application development process by providing one API through which an entire web application can be developed. Opa provides its own client-side and server-side frameworks, database management system, web server, distribution middleware, and security audit tool, and manages the details of administration and deployment to the Cloud. In addition to offering transparent load balancing, scalable storage, and concurrent data manipulation, Opa ensures cross-browser compatibility by compiling into JavaScript using JQuery on the client-side. Opa also emphasizes security and takes precautions against attacks such as cross-site scripting and SQL injections. In this presentation, I will give an overview of the Opa development platform and describe my experience with developing a web application using Opa.

Compressive Sensing Based Imaging Via Belief Propagation

Preethi M. Ramachandra

Univ of Tennessee - Chattanooga

In this paper, we present an imposing technique named multiple description coding using compressive sensing for image compression, which mainly aims at restoring the image from a small subset of samples with reasonable accuracy. The decoder will employ the belief propagation algorithm in order to reconstruct the image. The main advantage of this algorithm is that, the decoding complexity is greatly reduced and also the performance is superior compared to other algorithms that have been put forward. In addition to the proposed algorithm, in addition to the existing approach of using the transforms (DCT/wavelet) we can also consider an alternative approach to retrieve the original image from the descriptions that are generated. The alternative approach proposed uses the transform (DCT or wavelet) sparsity matrix to generate the sparse signal. This procedure does not comprise of any transform method to obtain the sparse signal. Thus, it further condenses the decoding complexity and also inexpensive compared to other techniques.

Mobile Devices Policy Issues for a Secure Workforce

Dr. Michael R. Lehrfeld

East Tennessee State University

The pervasiveness of portable mobile devices has forced many organizations to support connectivity of both corporate and private devices. Corporate devices have a high degree of configurability regarding user authentication, data encryption, and remote wiping capabilities. For example, BlackBerry mobile devices can be fully deployed and managed using a centralized Blackberry BES server. User owned devices present a new challenge for the enterprise. When a user configures their mobile device to sync with enterprise servers, data security now becomes a concern. iPhones, Windows Mobile 7, Android, and others now have the ability to use Microsoft Exchange push capabilities for data. Data is sent directly to the device regardless of who is using it or physically has it. Document editing abilities have been vastly improved to the point of complete document creation and editing abilities that mimic their desktop systems. Mobile devices now have the potential to be extremely productive in a today?s 24x7 connected world.

Introduce a litany of complex legislative rulings and laws concerning protected data across various business domains, and now the highly pervasive personal mobile device becomes a security risk. The problem that will be addressed in this paper is how does the enterprise protect its data on a mobile device that is not owned by the institution? The once simple process of enforcing a complex password now becomes more difficult on an iPad that the employee paid for.

This presentation will discuss current issues in securing personal mobile devices and the technology behind it. Also, an examination of what may happen if proper precautions are not implemented will also be investigated to present a basis for risk vs. reward for entities desiring to invoke a personal mobile device policy.

Password Complexity Technique to Reduce Efficiency of Dictionary Attacks and Brute-force Attacks

Juan Flores and Travis Atkison

Louisiana Tech University

Historically, passwords have been used as a first line of defense against unauthorized access to online accounts, operating system accounts and encrypted data. Although a proper password can effectively protect user data and information, most users tend to select common or easy to remember passwords. The simplicity of these passwords allows them to be easily cracked using traditional attack methods such as dictionary lists or brute-force. To prevent attackers from obtaining passwords in clear text, most online services and operating systems encrypt passwords; however, attackers can still perform traditional attacks on recovered hashes to reveal passwords and compromise users' accounts. For instance, Windows systems store user account passwords in hashes. An attacker can easily obtain the hash values and use a dictionary full of common passwords with tools such as Cain or John the Ripper to perform an attack. Traditional attacks are very effective when common and/or easy passwords are used. In this presentation, I will present a technique that increases the complexity of a password, therefore, making it harder for an attacker to crack its hash using traditional attack methods. Even when a user does use a common password, this technique will increase the password's complexity by transforming all characters dynamically. This increase, which goes unnoticed by the user, exponentially effects the time a brute-force attack would take and renders common dictionary lists virtually obsolete.

Wireless Network Data Encryption

Christopher Howard and Yu Cao

University of Tennessee - Chattanooga

Because wireless device usage has exploded in the last few years it is important to discuss wireless data encryption technologies that are currently available. This paper discusses a few available encryption algorithms (AES, DES, and Blowfish) in terms of execution speed. First, a theoretical analysis in Big-O theory will be performed. This will be accomplished by examining the source code of the libtomcrypt library, which implements a wide variety of different encryption algorithms. Second, a real life analysis will be performed. A program written C++ will accept blocks of code and/or network streams and perform analysis on how long it takes to encrypt and decrypt the data with each algorithm. Finally, the results will be discussed.

Rotation of Geometrically Transformed-Nearest Neighbor Data Substitution Algorithm and Its Application to Patient Privacy Protection

David Bishop and Yu Cao

University of Tennessee - Chattanooga

The purpose of this project was to develop new data obfuscation & distortion technique based on an Multiple Rotation Based Transformation (MRBT) algorithm and then compare the resistance of our approach to an Independent Component Analysis (ICA) Attack to the resistance of a program based on an rotation based transformation (RBT) algorithm to the same attack. We also plan to implement an A-priori Knowledge Independent Component Analysis (AK-ICA) attack and measure the resistance of both programs to that. The purpose of the MRBT is to better encrypt data by rotating the data by multiple values instead of the single value rotation that is the basis of an RBT algorithm. We will also talk about the application of our algorithm for patient privacy protection.

Innovating Reconfigurable Computing In Education Using FPGA and YouTube

Samuel James and Andrew Scott

Alabama A&M University

The demand is increasing for engineers to possess the skill of programming and manipulating reconfigurable devices, for example a Field Programmable Gate Array (FPGA), using HDLs (Hardware Description Languages). Reconfigurable devices with the aid of HDLs such as Verilog and VHDL are becoming very widespread in many industrial and commercial products. At Alabama A&M University, we now have 30 students in an EE320L course learning the programming and embedding methods of reconfigurable computing devices, specifically FPGAs. In our Computer Architecture Lab, students are reconfiguring the FPGA using a Xilinx Digilent FPGA board with the aid of the VHDL Hardware Description language in the Xilinx Design Suite. YouTube have been initiated to provide a step by step tutorial to aid the students in using the software. To ensure that the student maintains a good understanding of the attributes of the FPGAs various projects have been designed to achieve learning objectives. In this talk, we will demonstrate two specific student projects performed in our lab that exemplifies the uses of VHDL and the FPGAs as learning tools, and how it helps the students to comprehend the EE320 computer architecture class easier. These projects enable students to design digital logic circuits through VHDL and embed their code in the FPGA on the Xilinx board, as well as, implement test benches and RTL schematics to compare the results of the circuit. Before enrolling in the lab, students already possess the basic skills of circuit designing using the simulation tool, MultiSim. However after several projects, they have verbally expressed that VHDL and FPGA acquire easier and less tedious approaches in designing circuits than with MultiSim. After the course is completed, students will have a firm knowledge of the FPGA, HDL technology, and a clearer understanding of how reconfigurable devices will aid in various products.

A Case Study on Learning Patterns of CS1 Students

Stacey Watson and Dr. Lydia Ray

Columbus State University

Our study analyzes learning patterns of CS1 students with respect to their majors, academic backgrounds and instructional strategies and investigates reasons for their success or failure in CS1. We collect student performance data and survey data from two different groups of students who are taught Java in CS1 by two different instructors with very different approaches.

We observe a few common patterns of learning in both CS major and non-major students with all types of academic statuses. One of the most noticeable observations is that all students, regardless of their background and instructional strategies, have trouble learning object-oriented concepts in the first half of the semester. We also notice that while students struggle with syntax and built-in Java classes, program logic is their weakest point. While most students submit programs with correct output, poor programming logic and unsatisfactory performance in quizzes and exams reveal their lack of understanding. Results of our one-minute survey, designed to evaluate each lecture period, indicate that students feel as though they understand the lecture material. However, quiz and assignment performance show that they do not comprehend the larger concepts of the course. We further observe that non-CS major students typically lack motivation and perform less well than CS major students. We also notice that students with stronger mathematical skills do better in both classes.

Based on the results of class performances and one-minute classroom surveys, we conclude that students struggle with ?objects-first? approach regardless of teaching methodologies and student background. Furthermore, in light of our observation of poor student performance in CS1 we suggest that a programming-oriented discrete mathematics course should be a prerequisite or co-requisite of CS1 course and that a simpler programming language be used to introduce students to basic concepts and theory.

The Challenges of Implementing a STARS Leadership Corps Program at Columbus State University

Stacey Watson and Dr. Radhouane Chouchane

Columbus State University

The mandate of the STARS (Students & Technology in Academia, Research and Service) alliance is to employ a variety of interventions in order to increase the participation of underrepresented minorities, women and persons with disabilities in the computing disciplines. The STARS Leadership Corps, a ?multi-year experience providing students with support throughout their academic journey? (http://www.starsalliance.org/leadershipCorps.html), is one such initiative.

In the Fall semester of 2012, the TSYS School of Computer Science at Columbus State University embarked upon this initiative with a goal of nurturing the technical excellence, leadership, civic engagement and service, and sense of community of members of target groups.

Columbus State University has a diverse student population of students who are in one of several computer science tracks, both at the undergraduate and graduate level. As such, there were many students who belonged to the target group.

This presentation will discuss the challenges in recruiting and motivating these students to participate in the program as well as the administrative, organizational and managerial challenges that were faced by program organizers.

Automatic Photographic Shelf Reading in Libraries

Andrea Schurr and Yu Cao

University of Tennessee - Chattanooga

Shelf reading, the act of visually scanning library shelves to ensure that items are in order and present, is a tedious and inexact undertaking consuming untold hours of staff time in libraries around the world. The goal of this project is to develop a fully-functional and scalable system which will compare a series of images to the contents of a library catalog, allowing staff to both find misplaced items and inventory the collection in an automated fashion. Previous efforts at automating this process include RFID tagging of materials and adding machine readable labels to item spines. These methods have proven effective, but retrofitting the collection is too cost/time intensive for many libraries to undertake. If successful, this project has the capacity to revolutionize how library stacks maintenance tasks are performed. The core of the automated shelf-reading process that we are developing builds on JavaANPR, an open source application created for reading license plate numbers which implements algorithmic and mathematical principles from field of artificial intelligence, machine vision and neural networks. Additional aspects include developing both a user-friendly interface and the necessary algorithms to compare the list of items on the shelves to the library database.

Mobile Evaluation of Well-Being for Post-Stroke Patients Using Compressive Sensing

Robert Derveloy Dr. Mina Sartipi, PhD

Univ of Tennessee - Chattanooga

Recently, systems have been proposed for the remote monitoring of the recovery and overall wellbeing of post-stroke patients. These systems utilize a network of wearable sensors (accelerometers and gyroscopes) to monitor and assess the patient's functional ability in their home, without requiring the presence of a trained physical therapist. Typically, the amount of data collected by these sensors over a small period of time is very large and taxing. Our research aims to provide efficient and comprehensive gathering and classification algorithms for common, off-the-shelf, mobile devices such as Apple's iPhone and iPod platforms. To this end, we propose two novel procedures for gathering and classifying sensor readings. The first algorithm combines edge detection and resampling techniques in order to efficiently and intelligently compresses the raw sensor readings. The second algorithm repurposes and enhances the well-known compressive sensing algorithm for the innovative application of identifying limb movements, posture, and muscular activity levels.

Intelligent Search Engine for Medical Imaging

Nabin Shrestha and Yu Cao

University of Tennessee - Chattanooga

The purpose of this project is to develop a search engine to retrieve relevant biomedical images for end users to mine images. Biomedical information is very important in the medical and biomedical field. The demand for efficient mining tools is increasing daily. Particularly, image search is gaining popularity among medical practitioners, doctors, and researchers in diagnose of disease. We aim to develop a biomedical image retrieval search engine which uses Apache Lucene library and imageCLEF dataset provided by imageCLEF2009 contest. Lucene is an open source text search engine library, which was used in this project to associate images through text mining. In order to meet the goal, this project has followed the following process. First database is crated in SQL Server 2008 using sql language. ImageCLEF XML files were parsed and imported in to SQL Server 2008 database using Lucene java library code. Imported dataset is indexed using different options such as boosting and optimizing. Java and Lucene code were used for Indexing and retrieving the text data associated with the images. Eclipse was used to run all the java code to connect the databases, create index and retrieve data. ImageCLEF contest provided twenty five queries to run and generate different results. These queries ran in our system and yielded different results. These findings were compared and evaluated to ImageCLEF results. Many different indexing and retrieval techniques were performed to compare results to measure the systems.

Notes

Student Abstracts
Doctoral Degree Programs

Partitioning of Cloud Databases: Horizontal or Vertical

Md Ashfakul Islam and Dr. Susan Vrbsky

University of Alabama

Cloud computing is becoming a very familiar concept in industry and is receiving a large amount of attention from the research community. The basic idea is to shift the location of the infrastructure to the network to provide basic components like storage, CPUs, and network bandwidth, which are provided as a service by specialized service providers at a low unit cost. Users of these services need not worry about scalability and backups because the available resources are virtually in?nite, and failed components are replaced without any service interruption and data loss. Data applications are potential candidates for deployment in a cloud computing platform. On premises data management is becoming more difficult each day as enterprise databases are growing quickly. One of the key features of a cloud platform is to prevent the user from having to worry about the variable nature of the workload. Cloud systems should be able to handle a dynamic workload automatically. To manage an increased workload, entire databases need to be partitioned. Partitioning is the process of splitting a logical database into smaller ones, so that an increased workload can be served by several sites. There are two ways to partition: horizontally and vertically. Horizontal partitioning involves splitting across the tuples of a relation, and placing them into different sites in an identical structure. Vertical partitioning involves splitting across the attributes of a relation, and placing them into different sites linked by the relation's primary key. Each type of partitioning may have a significant impact on performance depending on the architectural structure of the system, the nature of workload, and relationships among data. A question arises as to which type of partition is more suitable for a cloud database. Our research will investigate partitioning of cloud databases in order to provide an answer to this question.

Locating Dominating Sets for Tumbling-block Graphs

Liang, Xiao

Middle TN State University

The well-studied Locating-Dominating-Set (LD-Set) problems include three categories: locating-dominating sets, identifying codes, and open neighborhood locating-dominating sets. The open neighborhood locating-dominating set problem, which this research focuses on, is a relatively new. A vertex set $S \subseteq V(G)$ is an open neighborhood locating-dominating set, an OLD-set for G, if and only if for each vertex $w \in V(G)$ there is at least one vertex v in $S \cap N(w)$ and for any pair of distinct vertices w and x we have $N(w) \cap S \neq N(x) \cap S$.

These different locating dominating sets can be used in modeling real-life problems such as finding proper places to set up detection devices in a facility to accurately locate a thief, saboteur, or fire. They can also be used in placing devices to locate faulty processors in computer networks. Our goal here is to place the minimum number of devices to pinpoint the location of the problems or faults. Finding the smallest LD-Sets for tumbling-block graphs is very interesting, but challenging. These problems are known to be NP-complete for general graphs. The NP-complete problems are the problems for which no efficient algorithms exist. We can conjecture what we have found is the smallest set if we cannot find a smaller set satisfying the constraints of the problem. However, proving our answer is the smallest is sometimes even more challenging.

If we exhaustively search for all the possibilities to determine the smallest set for these problems, we have to try all combinations of the vertices of a given graph. Therefore, the complexity is $O(n!)$ when n is the number of the vertices the graph. Since it is hard to find efficient algorithms and the exhaustive search is computationally intensive, we want to write a computer program to help us proceed in the right direction. The program results will either support or disprove our conjecture. If they support our answer, we can focus on proving our conjecture and developing an efficient algorithm to find the answer. Otherwise, we should concentrate on looking for a smaller set which satisfies the constraints of the problem.

Imputed Value of IT Certification Using Unobtrusive Measures

Robert A. Fleck, Jr. and
Ruth Ann Fleck

Northcentral University and Col State U-Global

There are many forms of certification and licensure. Licensure, while similar to certification is usually considered a requirement, by law, for a specific profession. Certification is not always a job requirement but is intended to clearly identify certain skills and abilities. One such example is the CPA. The CPA is required by law for certain occupations (e.g., public accounting and auditing) and used as an indicator of skills for other accounting activities (e.g., personal tax preparation).

Certification may be vendor specific such as Cisco?s CCNA, CCNPT and CCSP or Microsoft?s MCITP, MOS and MCSE. Other certifications are industry or profession specific such as IEEE?s CSPDP, the CCP, and CPA. Some are broader in scope such as Six Sigma and PMI?s credentials. In addition, some certifications are awarded internally by an organization to recognize varying levels of training accomplishments.

The presentation discusses the differences between licensure and certification in detail and then discusses various forms of certification such as those required by law, custom and regulation. The requirements for IT certification in several fields are discussed and then the value of IT certification is explored by unobtrusive measures.

IT certification is claimed to validate a person?s professional expertise. Because the certifications are awarded by an external body, the certification should be portable and recognized by employers as a metric of performance. If certification defines desired skills, then certification should have intrinsic value to the possessor as well as the company hiring the individual. This value should be measureable indirectly by job posting requirements. Various job, career sites and publications are investigated for mention of certification as a job requirement or preference. Based on these findings, the value of IT Certification is discussed and presented along with implications for employment and promotion.

Power Efficient Persistent Cloud Storage Balancing

Jeffrey M. Galloway and Susan S. Vrbsky

University of Alabama

The goal of this research is to give small to medium-sized businesses the opportunity to deploy efficient cloud architectures similar to what is offered by large vendors. Cloud computing resources generally take the form of processing and storage resources. This research focuses on decreasing the amount of energy required to store persistent data in these cloud environments. Relying on the idea that users only access their persistent storage accounts after requesting computational resources, not all persistent data has to be available at any given time. A proposal is made to reduce the amount of power consumed by storage nodes by moving inaccessible data to ?cold? storage servers.

There is a need for storage nodes in the proposed cloud architecture since the virtual machines requested by the users are inherently stateless. As users request computational resources, their persistent data will become available as well. This persistent storage is mounted as accessible network storage and is only available to that user while they are actively consuming compute node resources.

In keeping with the local cloud architectural design, each local cluster comprises only three different types of node. These are compute nodes, storage nodes, and a cluster controller that hosts load balancing and networking processes. The cluster controller is an administrative component and must always remain available. This is not true for the compute nodes and storage nodes. Organizations could reduce the energy consumed by storage nodes by applying a balancing scheme that only gives accommodations for accessible data.

A MySQL database will be used to store metadata about each user?s persistent storage. Once a user becomes active, the Power Aware Storage Balancing algorithm (PASB) searches the database to find the location of cold data, and moves the entire directory to a ?hot? server. We will study the power saved using this approach.

Collaboration in Open Source communities

Amiangshu Bosu

University of Alabama

The development efforts of an Open Source Software (OSS) are typically coordinated by an online community. The nature of collaboration and communication in the OSS communities are different from traditional software organizations. A survey was designed to find out the collaboration, communication, conflict resolution, and peer evaluation within OSS communities. Total 115 members from 68 popular OSS communities responded to the survey. Out of them 60 respondents were volunteers and 55 were sponsored by some company to contribute to a particular OSS project. Most of those respondents believe that the quality of software in OSS projects is high and find working with other developers in an OSS project as a pleasant, enjoyable, and learning experience. The respondents use non-interactive interaction tools (e.g. email, source code repositories, and bug repositories) primarily for collaborating with their peers. Most of the respondents believe mutual trust and peer perception as important factors for interaction with other members. They consider coding related factors (e.g. quality of the code, design decisions, quantity of comments, critical fixes and, informal written communication) to be more important than other factors (e.g. creativity, accuracy, response time, efficiency and background) for evaluating a peer. Moreover, they consider coding related factors (e.g. low quality code, buggy features, introducing critical bugs, and codes violating design integrity) as the top factors for losing trust in a peer. Most of the OSS members rarely or never meet with other members face to face. However, most of the respondents of the survey think that meeting in person can help in improving mutual understanding and relationship between the members. Email threads and IRC are the top tools used by the respondents for resolving mutual conflicts Although they rarely meet in person for resolving mutual conflicts, they believe meeting in person is one of the most effective methods for resolving conflicts.

Application for Emergency Travel Support and Roadside Assistance using V2V Communication

Mohammad A Hoque

University of Alabama

DSRC is the revolutionary wireless technology that enables nearby vehicles talk to each. Variety of applications can be developed using the vehicle-to-vehicle (V2V) communication to ensure the ease of mobility. This submission proposes an innovative application for providing emergency highway travel support and roadside assistance using multi-hop V2V communication which does not require any roadside network infrastructure. The application provides emergency roadside assistance in case of vehicle break down. Using the driver?s DSRC enabled device (also known as the OBE), one can simply send a request to the passing vehicles about the need for assistance. Any driver willing to help the immobile vehicle can then stop by the shoulder and assist with the needs. The applications may be extended to relay the information beyond the normal DSRC transmission range using multi-hop communication that can even connect a totally disconnected person who is out of cell phone coverage driving through remote highway. For example, if a vehicle breaks down while driving over the Great Smoky Mountains at an elevation of 6000 feet where no cell phone network is available, then there is no way that the driver can call any emergency assistance using the phone. In this case, multi-hop DSRC communication can be the only life saving option. If there is no neighboring vehicle that can assist with the need then the passing vehicles can carry the request for assistance down to the ground level where providers for such facilities are available. The message will also include the GPS position of the broken down vehicle as well as identification information of the vehicle such as vehicle make, model and color. Upon receiving such notification, respective agencies can respond to the emergency assistance request. In this way, the proposed DSRC application can provide emergency roadside assistance without requiring waiting for any AAA motorist support from remote location.

Impact of Agile Practices in Industrial Projects

Kazi Zunnurhain

University of Alabama

Agile software practices achieve agility by promoting self-organizing teams, customer collaboration, higher quality, less documentation and reduced time to market. Agile practices are mostly famous for their performance in productivity and customer satisfaction in delivering the product. These practices have enhanced the communication between the project team and clients to a large extent. Enhanced communication not only impacts the productivity and product delivery; it decreases the project failure rate as well as increases flexibility to adapt any changed requirement. Continuous close contact with customers makes it more adaptable and demandable to meet futuristic demand in software development. Expectations about agile methodology in software development are very high. Despite high expectations, agile methods have not always produced the desired results due to many situational factors: team size, project complexity, individual competence, etc. So, there is very little guidance about the impact of agile practices in software development. Our motivation is to understand the factors of the impact of agile practices on communication for some industrial projects, so that negative impacts can be eliminated through careful precautions before adapting any agile practice. We will conduct a systematic review on communication in agile practices to investigate several questions and find some concrete answers about the drawbacks of communication, which may become vulnerable for future agile projects. Research questions which could be answered with justification are:

1. How the agile practices are affecting communication in software development teams and in the organization (Product Owner, Customers, Managers, Testers, and Enterprise Staff)?
2. What are the positive and negative impacts of the mostly followed requirement engineering practices?
3. What are the factors improvising the impacts of communication in agile practices?

The objective of this systematic review is to synthesize and present the empirical findings on communication in agile practices in software industries.

Towards A Generic Developer Model

Zachary Smith

University of Alabama

There is currently no general model in practice to describe a generic "developer". Many simplistic models describe developers as simple "lines-of-code generators". In reality, developer output varies depending on the specific attributes of that developer. Such attributes can include, but are not limited to domain knowledge, GUI design skills, programming language familiarity, and morale. Such a generic model could serve as a basis for simulations, larger models, and other research. This paper attempts to create a taxonomy of these attributes, identifying low-level attributes while placing them in logical groupings. This will be done by synthesizing and modifying the models put forth by previous works. This is the first of several works by the author to create a generic software engineering model.

A Design Pattern Discovery Tool for FORTRAN

Aziz Nanthaamornphong

University of Alabama

The software engineering community typically uses design patterns to solve software design problems and improve the design of existing code. However, designers have to consider trade-offs between the advantages and disadvantages of the patterns. To comprehend these trade-offs, we must be able to document design patterns that exist in the software. A number of design pattern detection approaches exist; but most of them apply to software that implemented in either Java or C++. In this study, I focus on scientific software developed in FORTRAN. FORTRAN was not originally designed for object oriented programming, but new features in FORTRNA90 and later versions do support object oriented design principles. The goal of this study is to build a software tool that assist researchers and practitioners in discovering design patterns that exist in scientific software, especially using FORTRAN. I propose a new automation tool that transforms FORTRAN code into a software model. This proposed tool will assist users in finding design patterns through visualization rather than code reading. The tool consists of two main parts; the FORTRAN parser and the XMI creator. To create the parser, I customized the Open FORTRAN Parser (OFP) library. The creation part generates the XMI file by composing the elements produced by the parser. The tool then constructs the software model using XMI (the interchange format for UML models). Thus, this generated model can be displayed as UML diagrams. The UML diagrams facilitate the developers? ability to examine relationships among the entities and help them discover visually any design patterns that may be present. A case study shows UML class diagrams containing entities and their relationships that were generated from this tool along with correctness and concerns. In addition, I will also show some future works that will extend capabilities of this tool.

The Transformative Software Engineering Framework: Using Collaborative Social Computing To Build Virtual Communities For Transdisciplinary Research

Jerry A. Higgs

University of Alabama - Birmingham

Software systems must allow for the transdisciplinary complexity of today?s research. Traditionally, these types of complex systems are built using software engineering methodologies and frameworks that construct software using a component based structure. This practice couples the functionality too tightly into the core structure of the system. Making changes and upgrades to such component based systems becomes increasingly more difficult or impossible to perform, as the complexity of the system increases. This paper introduces the Transformative Software Engineering Framework. The framework is designed specifically for addressing the system needs of transdisciplinary research environments. The transdisciplinary nature of research today requires access to information systems that are compatible, effective, and efficient across various disciplines. Knowledge sharing and the utilization of community intelligence play a key role in research that involves collaboration. To that end, a prototype was successfully developed, HealthScienceMed (HScMed). The paper starts with a description of the need, objectives and the theoretical approach used to build a collaboration environment using social computing. A detailed description of the prototype is provided using the framework. Finally, the paper is concluded by illustrating how the prototype meets the aforementioned objectives on using social computing for building collaborative research.

Model Evolution in Agile Software Development

Qichao Liu

University of Alabama - Birmingham

In software engineering, new techniques and methodologies are often developed with the aim of simplifying the software development process, improving software productivity and lowering the software development cost. As a result, agile software development is introduced which represents a novel approach with a major departure from the plan-driven development approach.

Agile development is ?about feedback and change? with agile methodologies being developed to ?embrace, rather than reject, higher rates of change?. Under most cases, changes such as requirements modification during the development process are challenges to current software system and may need start over the work. Based on this, software development needs to be agile.

Some popular agile software processes such as Extreme Programming (XP), SCRUM, Crystal family of methodologies, Dynamic System Development Method (DSDM), Rational Unified Process (RUP), Feature Driven Development (FDD), Adaptive Software Development and Open Source Software Development all include modeling as an essential phase of the development process. A well designed model could not only represent a good architecture of the system but also effectively capture the changes from outside of the development team. Under most cases, domain models are the most effective tools to communicate with customers and within the development team. As a result there is a great need of automatic model-evolution mechanism to guarantee this. This paper discusses our research about model evolution in agile software development.

A Graphical Network Simulator for Evaluation of CRN Routing Protocol

Mohammad A Hoque

University of Alabama

Due to the unpredictability of primary user (PU) activity, routing in Cognitive Radio Networks (CRN) is more complicated than traditional ad hoc networks. A major problem in designing efficient routing protocols for CRN is the lack of sophisticated simulation tool for evaluation and performance analysis. Even though many researchers extended the open source Network Simulator (NS-2) to provide a CRN module; but till now there is no standalone graphical simulator that can characterize the performance of CRN routing protocols. This is the key motivation for developing a windows based graphical simulator for analyzing CRN routing algorithms. In this paper, we present the exclusive features of our GUI based simulator and its analytical capabilities for CRN routing algorithms.

Our simulator has a graphical user interface (GUI) that supports several ways for topology input and also allows flexible control of the behavior of the primary network. We developed the simulator with C/C++ language using OpenGL library for the GUI. The simulator is capable of generating the network topology for PU and CR nodes in three different ways- Random generation, File based I/O, Interactive specification. Our simulator also allows interactive spectrum band specification for each cognitive node. Moreover, users can specify different types of PU activity patterns.

The strongest feature that makes our simulator distinctive from others is the capability of analyzing the performance of any distributed CRN routing algorithm where the routing metric can be mathematically defined in terms of the following factors: hop count, channel switching cost, geographical distance, spectrum opportunity, interference and traffic bandwidth. It also performs basic routing operations like generating the most stable route for any source-destination pair, determining the minimum hop count for any source-destination pair, and even provides the option for printing the routing tables of all nodes during the simulation with a single click.

Abstract GPU programming using CUDACL

Ferosh Jacob

University of Alabama

Graphics Processing Units (GPUs) were originally used for graphics cards, but have recently found an application for hosting general-purpose parallel problems, traditionally executed on CPUs. NVIDIA?s Computation Unified Device Architecture (CUDA) and Khronos Group?s OpenCL are the most commonly used frameworks for General-Purpose GPU (GPGPU) programming. In order to obtain the best performance (or to compare the performance of graphics cards), a programmer may need to execute an application on diverse architectures and experiment with different programming models. Because CUDA APIs are optimized for the NVIDIA architecture, it is quite possible that one might obtain better performance with CUDA on NVIDIA chips, but this may not be the case for GPUs from other vendors like AMD. In such a scenario, the contribution described in this presentation reduces the burden on the programmer by generating both CUDA and OpenCL code from a single set of specifications. This contribution presents a new approach through which ?C? or Java programmers can access these GPU libraries and languages without having to focus on the technical or language-specific details. A prototype of the approach, named CUDACL, will be introduced through which a programmer can specify one or more parallel blocks in a file and execute in a GPU. CUDACL also helps the programmer to make CUDA or OpenCL kernel calls inside an existing program. The tool was successfully used in the development of two case studies and a performance comparison revealed that CUDACL does not introduce any performance concerns. This presentation will motivate the need for a more transparent model of parallel programming with GPUs, present our solution with CUDACL using case studies, and outline some directions of future work.

The Turtle Project: Stress Testing With Power State Transitions

Karl Smith

University of Alabama

Distributed computing allows users to better utilize and share resources. Having this advantage currently requires a large amount of electrical energy. However, as the computing field moves towards more environmentally friendly or ?green? computing, it is necessary to reduce this electrical consumption as much as possible. Previous work has proposed that power consumption be reduced by transitioning idle nodes into a lower power state. We propose a low power state in which machines are occasionally turned completely off. An idle limit is used, which will cause the computer to power down only after it has been idle for a period of time longer then the idle limit value. However, this strategy has met with opposition by people who claim that power transitions can negatively impact the life of the hardware. In order to test this claim, we have developed a quasi-experiment in which we examine how many times a cluster node can survive being power cycled. We have built a new cluster node that matches the specification of those used in our experimental cluster. The new node is comprised of a BioStar Viotech 3200+ mainboard with a 1.8 GHz CPU, a 1 GB DDR3 PC1066 RAM, and a 320 GB SATA hard drive. This node goes through a cycle of the following four events. The node is powered on via wake on LAN from our cluster controller. The node boots Ubuntu 11.04 server edition. The node then writes a time stamp to a MySQL database using its MySQL client. The node then waits sixty seconds before shutting itself down. We will continue this experiment until the node is no longer capable of functioning appropriately. Results from this experiment will allow us to determine the feasibility of our proposed power management strategy.

Towards Better Data Security in the E-Health Cloud

Gabriel Loewen

University of Alabama

Security of sensitive medical data is one of the major challenges being faced in the development and application of electronic medical record cloud-based solutions, or E-health clouds. Current security policies address network security and client platform security, however security of sensitive medical data using a data masking approach has not been fully explored. Data masking provides a way to obscure sensitive data while maintaining data validity. We can further enhance data security by providing data masking behind the scenes as defined by a group security policy, which specifies the data which is authorized to be accessed by specific user groups. In this approach, a patients doctors might have complete access to a patients medical records but insurance companies and other secondary viewers of medical records will only have access to certain portions of the data. This ensures that access restrictions may be placed on electronic medical records at multiple security levels.

FAPA: A model to prevent Flooding Attack in Cloud

Kazi Zunnurhain and Dr. Susan Vrbsky

University of Alabama

In the field of computation, there have been many approaches for enhancing the parallelism and distribution of resources and increasing data utilization, such as data clusters, distributed database management systems and data grids. Now cloud computing is emerging as the mechanism for high level computation, as well as serving as a storage system for resources. Clouds allow users to pay for whatever resources they use, allowing users to increase or decrease the amount of resources requested as needed. Cloud computing has been envisioned as the next generation architecture of IT Enterprise, but cloud systems are vulnerable to many different types of attacks. While several schemes and a variety of Intrusion Detection Systems are available in the market to detect DoS (denial of service) or flooding attacks, they are not useful for cloud computing because they address a specific point of interest determined by the developers and experts. Hence in this work, we will design a general model for the prevention of DoS attacks. Our model considers the characteristics of an attack to prevent any kind of flooding attacks. It utilizes a learning phase, validation checking and compatibility checking of each of the messages trying to enter the cloud servers. The central idea is to utilize a profile generation module to extract an extensive set of traffic behavior describing the usual traffic flow for each session initiated by every legitimate customer. Instead of maintaining, searching and investigating a huge data store of logged message traffic details (such as creation time, expiration time, duration, etc.), we will create some associative rules to find traffic abnormalities on the fly. The objective is to propose a model which would protect the cloud system from any type of DoS attacks and with proper evidence to mitigate any dispute between providers and customers.

Detecting the Presence of Undesirable Nodes in Layer 3 Virtual Networks

James A. Jerkins

The University of Alabama in Huntsville

Modern society requires ubiquitous, secure, and reliable network communications. Connecting geographically dispersed sites by layer two virtual private networks is a widely deployed, cost effective, and reliable technology. The key feature of L2 VPNs is confidentiality. Network users can easily observe that the only network nodes in the L2 virtual network are those desired by the network owner. However, L2 VPNs are being rapidly replaced by layer three virtual networks as common carriers expand the roles of their shared IP networks. The recent increase of interest in L3 virtual networks has led to new questions and renewed controversy concerning their security.

A significant disadvantage of operating virtual networks over shared IP networks is that the configuration and operation of the virtual network is moved into the common carrier's network exclusively. All of the routing, forwarding, and management is done by the service provider and the network user has no visibility into the configuration and management of the virtual network. While this high-level abstraction of the virtual network is clearly a benefit to the network user in terms of ease of use, it makes it very difficult to detect undesirable nodes in the virtual network. If an undesirable node is allowed to participate in the virtual network, confidentiality is breached.

In this research we propose a novel algorithm, Message Induced Network Aggregation, inspired by Kleinberg's HITS algorithm for ranking web pages. Our MINA algorithm constructs the communication graph induced by message exchange, scores the participating nodes to identify key nodes, and seeks to detect the presence of undesirable nodes. Using the MINA algorithm, network users are presented with useful indicators about the confidentiality of their L3 virtual network. Our presentation will discuss the motivation and architecture of the MINA algorithm.

Professional Abstracts

Hurdles in Implementing CS0

Dr. Suzanne Smith and Kellie Price

East Tennessee State University

The Department of Computer and Information Sciences at East Tennessee State University is facing a problem common to most universities and colleges ? the retention of first-year computing majors. To address this problem, a CS0 course was developed at ETSU in an effort to better prepare and retain students as computing majors. The focus of ETSU?s CS0 course was on algorithm development and basic programming concepts in order to better prepare students for success in CS1. Originally the CS0 course was required by all majors within the department. A skills proficiency test, which was designed to determine if a student already had the logical and mathematical skills for success in CS1, allowed students to progress immediately into the CS1 course rather than taking the CS0 course.

However, we have encountered several hurdles in incorporating the CS0 course into the curriculum. Issues such as limited faculty resources, misperceptions about CS0 among the faculty, and limited effectiveness of the skills proficiency test have been stumbling blocks to the successfulness of the CS0 course. This presentation will describe potential issues that may arise when incorporating a CS0 course into a CS curriculum and discuss ways to avoid these potential problems.

Crafting Sustainable Assessment Programs

Tony Pittarese and Karen Tarnoff

East Tennessee State University

Assessment can be a key component and valuable tool in a computing program?s continuous improvement process. Unfortunately, many departments have not crafted their assessment program and processes with a focus on efficiency and effective use of resources. (This is especially true in those departments where assessment activities are dominantly focused on satisfying requirements of accreditors or other outside agencies.) As a result of this inefficiency and ineffectiveness, negative faculty attitudes towards assessment are created. The perception is that assessment activities are bureaucratic, pointless, and/or a waste of time. Poor faculty attitudes tend to create poor assessment results.

An assessment program that cannot independently establish value in improved student learning outcomes is not sustainable in the long run. Although the goal of assessment?continuous improvement?is of prime importance, that goal should not override practical concerns of efficient and effective use of personnel and resources. To create an assessment program that is sustainable over time, departments should focus on the three cornerstones of sustainable assessment?people, process, and products.

In this presentation select guidelines for each of the above cornerstones will be presented and briefly discussed to provide both a practical and philosophical foundation for effective, sustainable assessment. These guidelines should prove valuable to those organizations that are just beginning their assessment programs and those that are more experienced. A focus will be placed on sharing practical principles for sustainable assessment that can be progressively implemented over time to yield meaningful improvement in assessment processes.

A Virtual Instruction Lab -- An Update

Willard Munger

Southern Adventist University

In the 2010 ACM Mid-Southeast Conference we presented our view of the requirements for a virtual lab (VLab) and reviewed possible solutions, including the development of our own open source version. During the last year three undergraduate classes (Senior Project, Unix Administration, and Web Services) have completed projects working toward a functional VLab. While the VLab project is not complete, this paper is a progress report of the VLab project, our use of students in its development, as well as, an update on technological changes that might impact VLab.

STEMming the K-12 Link: Asynchronous Technology Instruction for High School Students

Eric L. Brown, Jeremy Ey, and Summer-Mistine Olmstead

Tennessee Tech University

While greater emphasis is often placed on engineering and mathematics in the STEM model, technology is frequently underemphasized in K-12 education. The Department of Computer Science (CSC) and the School of Interdisciplinary Studies and Extended Education (SOISEE) at Tennessee Technological University (TTU) are collaboratively working with the Putnam County School (PCS) system to provide a complete STEM experience for high school juniors and seniors. CSC is delivering CS1, CS2, and sophomore-level course content using asynchronous and hybrid distance learning techniques. For the Fall 2011 term, 16 students from a PCS high school are enrolled in this program with expansion targeted for the Spring 2012 term. Course content delivery consists of university course management system, lecture capture and streaming software, and local and remote instructional personnel. Complementing the efforts of personnel at TTU and PSC, CSC and SOISEE, supported by the university, have invested over $150,000 in a state-of-the-art distance learning studio to be completed December 2011. We present the current status including content delivery, faculty development, and supporting technologies implementation and additionally discuss the benefits and expected project outcomes.

Redesigning CS1

Jim Vandergriff
Nancy Smithfield

Austin Peay State University

The CS1 course at Austin Peay is going through a redesign funded through a Title III grant. CS1 is a C++ based ?Introduction to Programming?, three credit hour course. Before the redesign, the primary instructional environment was lecture. Assessments included graded programming assignments (completed on a Linux server), weekly quizzes, homework, a midterm, and final. The class is taught both online and in the classroom.

The objective of the redesign was to improve student?s understanding of programming concepts, provide an enjoyable user friendly environment, improve success in the course, and student retention at Austin Peay. The revitalized course relies less on student learning through traditional classroom lectures and more on a Web instructional environment where practice makes perfect and videos complement lectures. Prior to each week?s classes students view short videos on the topics to be discussed in class. Outside of class, students use the interactive Web based tools to practice programming with immediate feedback as the student completes multiple exercises on each topic. The tools provide a mechanism for students to master topics in sequence. The weekly programming assignments integrate the concepts learned through the practice exercises. Classes still include lectures but less time is spent on introducing topics and more time is spent on engaging students in discussions on the topics.
This talk will explain in more detail the redesign of the course and the tools we are providing our students.

Revisiting RCC Spatial Relations for the Purpose of Anatomical Ontologies

Alton B. Coalter

University of Tennessee - Martin

Regional Connection Calculus (RCC) as proposed by Randell, Cui, and Cohn in 1992 is an accepted, established representation and reasoning tool that provides a set of eight standard, well defined relations describing the spatial relationships of three dimensional objects. This set, though very useful in many contexts, needs to be redefined slightly to make it more applicable and useful to the field of anatomical ontologies. In this article I define and discuss these modifications and the use thereof for our purposes, thus extending the RCC concept and making it a more useful tool for an ontologist working in the anatomical areas.

Incorporating the Microchip PIC32 Development Board into a Computer Architecture Course

David L Tarnoff

East Tennessee State University

The computer science department where the author is a faculty member prides itself on maintaining an effective balance between its theoretical and practical teachings. In many cases, a laboratory component to a theoretical course has improved student retention and motivation. Historically, this has been difficult to do in the department?s course in computer architecture. The ability to incorporate practical activities into the theoretical computer architecture course would allow students to directly measure performance improvements realized through mechanisms such as caches, pipelining, and DMA. In addition, students interested in compiler design could see the impact instruction sets, data structure alignment, and bus interfacing has on the resulting machine code. The students? understanding of operating systems would also benefit from any experience they could get with interrupt-driven I/O, timers, and the hardware to support virtual memory. Two things, however, impede bringing practical experience into the computer architecture course: (1) increasing restraints that contemporary operating systems exert on computer hardware make it impossible for students to interact directly with hardware and (2) efforts by the University?s IT department to protect its assets from malicious attacks on laboratory machines create additional restraints separating the student from the hardware. In an attempt to overcome these roadblocks, the author incorporated the MIPS-based Microchip PIC32 microcontroller into the department's computer architecture course beginning with the fall semester in 2009. A comparison of assessment measures revealed that the students' comprehension improved significantly along with their satisfaction with the course. This presentation presents how the processor was incorporated into the course along with examples of student assignments and a discussion of the assessment results.

An Inference-Based Super-Resolution Approach

Monica Trifas and Jeremy Straub

Jacksonville State University and University of North Dakota

Image resolution refers to the number of pixels contained in an area of an image. The resolution of a digital image is determined by how it is collected (resolution of camera, etc.) and any transformations applied to it (e.g., resizing, etc.). The physical resolution of an image refers to the actual size of the image as stored on disk. Super resolution is a set of techniques which are used to enhance an image or set of images to create an output image which is of a higher resolution than the effective resolution of a single input image.

A revised super-resolution technique is presented and evaluated in this paper. This technique incorporates prior knowledge gained via training subject domain specific or general purpose images prior to presenting an image for super-resolution image resolution enhancement. When presented with an image to enhance, the engine selects candidate patterns using a low resolution search mechanism and then uses the higher source image resolution to select a winning candidate for inclusion in the super-resolved image. This proposed technique is evaluated from an application-agnostic perspective using several evaluation metrics. The failure of common super-resolution evaluation metrics to adequately measure application goal success is discussed. This failure is also directly tied to engine performance as, in many cases, the success metric and the pattern selection metric are tightly aligned. We will examine objective criteria for the evaluation of the quality of the resulting images that are based on models of visual perception. Thus, by developing new super-resolution evaluation metrics and other enhancements, not only can evaluation of training-based super-resolution be improved but also the super-resolved image product as well.

So You Think You Want To Begin Teaching Mobile Computing

Kathy Winters

University of Tennessee - Chattanooga

Students want it. Businesses want our students to have it. So let?s do it. Let?s teach a course in Mobile Computing. That was several months ago and now in the midst of teaching the course I have some experiences to share. This presentation will answer some of the basic questions. What platform do you use? What kind of text do you use? What do you want your students to know at the end of the course? What prerequisites should the course have? How should the course be structured?
There are lots of questions that need to be answered when one begins to develop such a course and the answers can really make a difference when it comes to success in the class. I will give my experiences at developing a Mobile Computing course and at the end of the presentation there will be some answers, at least from one perspective, and hopefully lots of discussion.

The Influence of Stereotypes on STEM majors in a Problem Based Curriculum Innovation: Computer Science vs. Mathematics Majors

Cynthia Stenger
James Jerkins
Jessica Stovall

University of North Alabama

At universities across the United States, STEM enrollment is in decline. Increasing the number of students interested in and pursuing careers in STEM fields is a national priority. To satisfy the demand for the skilled, innovative workforce needed by the STEM industry, persistence in and successful completion of STEM undergraduate education is crucial.

In our presentation we will describe our novel instructional treatment for immediate immersion into beginning programming. Our design utilizes strategically designed computer experiences in a problem- based learning environment. In the course of our study we found our instructional treatment engaged students in computational thinking and encouraged them to use and improve their programming talents in the pursuit of critical reasoning skills. As colleagues in a math/CS department, we conspired to use mathematics as a vehicle to introduce programming to inexperienced programmers as soon as possible in their education. At the same time, we planned to use computer programming as a vehicle to induce students to build the mental structures needed for abstraction, generalization, and proof. In our teaching sessions, students in mathematics and computer science classrooms were given a mathematical problem whose solution requires abstract reasoning skills. Then we guided the students to write several short programs. These mini-programs targeted key concepts needed in the solution of the overall problem. Students from both disciplines were given the same programming activities and identical math problems during the instructional treatment.

While analyzing the data from our interviews, we discovered significant differences in the two groups of majors. This presentation will share differences and similarities we observed among CS and math majors with respect to stereotypical roles. We will discuss how our treatment design addresses these issues and how initial results suggest ways to defusing harmful stereotypes.

From Programming Blunders to Teaching Moments

Jim Clark

University of Tennessee - Martin

Over the years the author and his students have been involved in what might charitably be called "programming blunders." Fitting into several categories such as "I didn't know you could (or would want do) do that!" or "Why did that get the correct results when it is clearly wrong?" all have relevance to teaching programming languages or language design. Several examples will be discussed, some made by the rather chagrined presenter and some by students or colleagues. If time permits, contributions of those attending will be encouraged.

ICoRD: a Study in Program Growth through Collaboration

Glenn Acree
William H. Hooper

Belmont University

In the fall of 2003, the Computer Science program at Belmont University faced merger or restructuring. Low numbers of graduates, small student cohort groups in the major, poor student retention, and low course enrollments contributed to the sense of urgency. We were charged to locate programmatic, curricular and other solutions that would improve general enrollments and create a viable cohort of students in the major. Our response was to create the Institute for Computing Related Disciplines. ICoRD was a collaborative effort involving computer science, information systems management, design communication, mathematics, biology, psychology and, later, audio engineering technology. Our goal was to attract students with a motivation for technology/computing, and to prepare them for a number of career pathways.

The initial efforts of ICoRD focused upon curriculum development and promotion. Over time, however, we have come to realize that the most critical role of ICoRD is relationship building. Key groups with whom we have built relationships are: technology partners across Middle Tennessee, the K-12 community (teachers and students), colleagues in other areas of the university and those at other area universities. Since ICoRD was established, the number of majors in computer science has grown from 14 to 42, with total majors in Computing Related Disciplines growing from 40 to over 120. In addition, ties with industry have led to an overwhelming number of requests for paid interns, commitments for mentorships of our students, networking opportunities for entry level jobs and the establishment of an ICoRD Advisory Council. What began as an effort to modify curricula to attract students to our program, has developed into a program which focuses on exposure to academic and career pathways, engagement through internships, and industry events, and equipping students through coursework, undergraduate projects and mentoring.

Finding 'Parallel Universes' in 1-D cellular Automata Rule Spaces

Rodrigo A. Obando

Columbus State University

The study of Complex Systems requires nonlinear modeling. Cellular Automata have been used as simple models of complex systems and their study in the last three decades has increased considerably. It has been thought that the distribution of the behavior of the cellular automata rules in these rule spaces is random. This creates the difficulty of finding rules with similar behavior in particular when the rule spaces are big. The number of rules in a given space depend on the number of cells and their possible values used in the creation of the rule functions. The minimum rule space that presents some interesting rule behavior is the one with cells of two values (binary) and it is composed of 256 rules; this is derived from 2^2^3. The search for similar rules can be performed visually because there are not that many rules in the space. ?If we increase the number of cells used in the rule function to 5, the total number of rules is 2^2^5 or 4,294,967,296. If we just increase the number of states from 2 to 3 and maintain 3 as the number of cells used in the equation the number becomes 3^3^3 or 7,625,597,484,987. These spaces have not been fully investigated due to their size. One of the ways that a rule is selected from these spaces is by using a random number generator. If we randomly select an interesting rule and we want another one that is similar in behavior there is no easy way to find it. This research studies a partial order of the rules that has shown that similar behavior rules can be found and they can be considered ?alternate universes? of the original rule. The name of ?alternate universe? comes from the many worlds theory proposed by Hugh Everett in 1957 as an interpretation of quantum mechanics. ?We name these similar rules ?alternate universes? because they are very close to the original rule?s global behavior but vary in the details. The proposed partial order creates blobs of rules with similar behavior. This scheme provides a means to systematically explore these large rule spaces and it is not limited to cells of 2 values but it can be used for 3, 4 or more and it is not limited to 3 cells for the rule function either.

Multi-Core Design and Performance Issues: Some Recent Adaptations of Amdahl?s Law

Srinivasarao Krishnaprasad

Jacksonville State University

Multi-core or many-core processors are considered a natural solution to the challenges and opportunities presented by Moore?s law, power consumption and thermal considerations. Design and performance issues related to multi-core processors have been investigated recently by several researchers. What is interesting is that many of these studies have adapted the original Amdahl?s law in an attempt to characterize the performance implications of their design choices. In this presentation, we will outline some of these results.

Hill and Marty [1] have described how to adapt Amdahl?s law to analyze the performance of multi-core processors based on the organization of the cores. They described three organizations: symmetric, asymmetric, and dynamic. A symmetric chip will have cores that are all equivalent. An asymmetric chip will have cores of different sizes. In a dynamic multi-core architecture one can combine dynamically several cores to realize a larger core. For example, with a 256 BCE chip and a highly parallel application, Amdahl?s law gives an upper bound in speedup of 72, and corresponding speedups for symmetric, asymmetric, and dynamic organizations are 80, 166, and <223 respectively.

Many parallel applications entail synchronization requirements that will also fundamentally limit the speedup potential of the application. Eyerman & Eeckhout [2] have extended Amdahl?s law to include synchronization need for critical sections. They have used a simple probabilistic model to investigate the impact of critical sections on speedup and observed that the parallel performance can be modeled as a completely sequential part and a completely parallel part. The sequential part is determined by the probability for entering a critical section and the contention probability. Their new speedup relationship appears to be a novel and fundamental result.

REFERENCES

[1] ?Amdahl?s Law in the Multicore Era,? M. Hill & M. Marty, IEEE Computer, July 2008.

[2] ?Modeling Critical Sections in Amdahl?s Law and its Implications for Multicore Design,? Eyerman & Eeckhout, ACM ISCA 2010 conference proceedings, June 2010.

Parallelism, Concurrency, Actors, and Fork/Join: Thoughts on Programming in the Multicore World

Ken R. Adcock, Jr.

UPS

Clearly, we are now in the multicore era. The conventional wisdom is that Moore?s Law has taken us as far as it can go. Going forward, performance gains will be made through the availability of multiple cores on single processors. We now have multicore processors on powerful yet relatively cheap desktops, laptops, tablets, and even smart phones. This has opened up the possibility to more effectively tackle expensive problems from a computation standpoint that may have been impractical to address in the past using commodity hardware.

The prevalence of multicore processors in recent years has influenced, either directly or indirectly, the following events in software development:

1. The reassessment of object-oriented programming and its emphasis on manipulating shared mutable state.
2. The interest in functional programming languages as an alternative to OOP.
3. The emphasis on related software frameworks and concurrency models.
4. The great interest in Big Data and the need to quickly process huge datasets that go beyond the scope of traditional relational database solutions.

The need to implement solutions that take advantage of the performance benefits offered by multicore platforms will be a dominant theme over the next few years. So how do developers take advantage of this? One thing is clear in that most will need to learn new skills, and also learn to think differently about solving problems.

In this presentation, we will discuss issues from a software development perspective along with some basic concepts that provide us with a pathway to the new capabilities of the multicore world. More specifically, we will undertake a brief examination of the new Fork/Join framework made available in the recent release of Java SE 7 and the Actor-based model of concurrency.

Is 80% the Limit of Prediction Accuracy for Protein Secondary Structure Prediction?

Leong Lee

Austin Peay State University

Protein secondary structure prediction from its amino acid sequence is a well studied computational problem in bioinformatics and data mining. It can be viewed as a sub research objective of the much more challenging protein three-dimensional structure prediction problem, which is one of the most important research goals of bioinformatics.

The secondary structure prediction problem was first defined in the 1960s. Before the 1990s, the prediction accuracy was only around 60% for most methods. The accuracy of prediction methods continues to improve over the years, with some recent methods reaching or even surpassing 80% accuracy (Q3 score), by utilizing evolutionary information of proteins, large databases, and various machine learning approaches such as artificial neural networks and support vector machines.

The input of the problem is amino acid sequence, A = a1, a2, ? aN; and data for comparison, D = d1, d2, ? dN; ai is an element of a set of 20 amino acids, {A,R,N?V}; di is an element of a set of secondary structures, {H,E,C}. The output of the problem is the prediction result, X = x1, x2, ? xN, xi is an element of a set of secondary structures, {H,E,C}. Each xi is compared with each di to form a 3-class prediction problem, with the 3 classes {H,E,C}, one can obtain a 3 ? 3 confusion matrix Z = (zij), and Q total = 100 ?i Zii / N.

The most modern prediction methods use neural networks and support vector machines, the accuracy of these methods hovers around 80%. Can this 80% barrier be breached? Is 90% achievable? To have a significant breakthrough, we may need revolutionary approaches which further exploit the biological and chemical properties of amino acids and secondary structures.

It is also difficult to evaluate the accuracy of a prediction method. It is always debatable if a particular test dataset will favor a subset of methods, or if a test dataset is better than the rest of test datasets. Early this year there were around 71,000 proteins (unique PDB IDs) with known secondary structure in the Protein Data Bank (PDB) database. If all these 71,000 proteins can be used to evaluate a particular method, the resulting Q3 score should be very representative. But this is a very demanding test approach, because almost all prediction methods need lots of computing resources to even perform prediction for one protein. Most test datasets use only 100 to 500 proteins. Regardless, if a method can use all available data for testing, the resulting Q3 score will be very credible.

Frameworks vs. Textbooks: Teaching How ORM Frameworks Change Database Design

Scott Anderson

Southern Adventist University

Database design takes a central part in many database courses, and as part of normalization, the many-to-many relationship receives special attention. However, most textbooks cover the topic without considering how modern developers use databases. We examine a database design pattern that developers often require but that textbooks rarely teach and that students benefit from.

Two foreign keys in a table identify simple many-to-many relationships. The resulting table, called an intersection table, contains weak (ID-dependent) entities. When intersection tables maintain additional information about a relationship, we call them association tables. If such a weak entity?s foreign key changes, it represents a change in the relationship between the two parent entities. In the process we lose the identity of that weak entity. One cannot know by observing the database if the user deleted one weak entity and created a new one, or if the user changed the foreign key of an entity that existed. From a database design perspective, the designer does not care which of these scenarios actually takes place because designers concern themselves primarily with maintaining consistency within the database.

Object Relational Mapper (ORM) Frameworks depend on objects possessing immutable identity to accurately link changes in the object back to the database. However, ORM frameworks rely on the primary key to provide identity. Since ORMs disconnect data from the database, the ORM does not allow entities, such as those in association tables, to change any part of the primary key. Conventional many-to-many models taught in textbooks force ORM users to delete and recreate such relationships. In this talk, we show how the Entity Framework manifests the above problem and partially solves it. We show how to solve the problem at the design level and conclude that students can gain significant insight into database design from this discussion in database courses.

What Are the Basic Spreadsheet Skills Needed by Business Majors?

Denise Williams

University of Tennessee - Martin

The purpose of this research-in-progress is simply to explore the question of what basic spreadsheet skills are needed by undergraduate business majors to help prepare them for careers after graduation. The authors intend to create a survey to ask this question of various people working in business and academia. One goal of this research is to better understand the expectations of employers with respect to spreadsheet skills for entry-level employees. Understanding these expectations will identify essential spreadsheet skills for students.

Using Processing.js to Introduce Programming in Digital Media Courses

Semmy Purewal

University of North Carolina - Asheville

Processing is a programming language for visual artists developed in 2001 by Casey Reas and Benjamin Fry of the MIT Media Lab. Over the years it has been used in a wide variety of contexts, from teaching introductory programming to building professional quality visualizations. It has also influenced the programming language associated with Arduino, the popular open-source microcontroller platform.

Processing.js is a port of Processing to the JavaScript language which allows Processing programs to run in any HTML5 compatible browser. It was originally authored and released by John Resig, who also developed the popular jQuery JavaScript library. In the past few years, the development has been handled by a team of students at Seneca College.

In this talk, I will give an overview of Processing.js and share some experiences using it to teach programming in introductory Digital Media courses. I will also demonstrate my continuing work on a processing.js IDE that allows for the development and deployment of processing.js applications using only a web-browser and an Internet connection.

Writing Apps - From C# to Objective-C to Monkey

Bob Bradley

University of Tennessee - Martin

Last year I gave a talk on writing iOS apps in C# using MonoTouch. Within the span of about eight months, I was able to develop and release five special purpose apps that have been very successful in the App store. However, earlier this year, Novell, the company that made MonoTouch, was bought by another company. And while the new company had promised to continue all current development, one of the first things that happened after the purchase went through was that the MonoTouch development team were all laid off / fired. Even though the original development team promised to form a new company, secure the rights to MonoTouch and bring it back to life, I did not want to be bitten again. And although it only took the original MonoTouch team a couple of months to get on their feet again, I decided to begin rewriting my apps in Objective-C. After about four months of learning and coding in Objective-C and I am almost ready to start releasing updates of my apps, rewritten in Objective-C.
This talk will describe the process and pit-falls of going from C# to Objective-C. I will list the pros and cons of both approaches. I will also talk about my next planned adventure of porting the core of my apps over to Monkey, which is a cross compiler that can target Android, iOS, X-Box, and many more systems.

Physical Computing with the Arduino Microcontroller

David Brown

Pellissippi State Community College

At the 2011 Google I/O, Google announced their intention to work with Arduino to create an open-source development environment for Android peripherals. Arduino manufactures open-source microcontroller boards that can be easily attached to physical devices and programmed using a language based on the open-source Processing language.

In this paper, I introduce the Arduino board family and show how quickly and easily they can be wired and programmed to create robots, mobile phone peripherals, sensor networks and other physical computing devices.

Computer Science Perspectives on Transhumanism

Steve Donaldson

Samford University

Transhumanism?the process and promise of human enhancement through technology?often exerts a polarizing influence on those individuals who ponder its ramifications. Given the prospect of transitioning from a cell phone in every hand to a chip in every head, it seems reasonable to ask if computer science, which has played and will continue to play such a key role in developing the actual technologies involved, might provide any special insights into the deeper issues at hand. This presentation explores how the unique perspectives of computer science pertaining to computation, complexity, evolution, sensory perception, cognitive abilities, motor skills, and search have the potential to provide useful ways to address the question, ?What will it mean to be human?? and asks to what extent the logic and creativity traditionally associated with computer science might translate into reasoned approaches to the complex questions surrounding transhumanism

Notes

Conference at a Glance

	Azalea	Dogwood I
7:30 AM	**Morning Coffee–Poolside**	
8:00 AM	**Welcome and Keynote Address**	
9:00 AM	**Coffee Break–Poolside**	
	Session I–Masters	**Session I–Undergraduate 4**
	Chair: Williams	Chair: Smith
9:15 AM	King, Khan	Dale
9:35 AM	Chasteen, Rath	Johnson, Turner
9:55 AM	Durand	Plagge, Harris
10:15 AM	Rmachandra, Sartipi	Yousif, Naghedolfeizi, et al
	Session II–Masters	**Session II–Undergraduate 4**
	Chair: Williams	Chair: Khan
10:40 AM	Lehrfeld	Bailey
11:00 AM	Flores	Dale
11:20 AM	Howard, Cao	Wright
11:40 AM	Bishop, Cao	Li
12:00 PM	**Lunch–Patio Restaurant**	
	Session III–Masters	**Session III–Undergraduate 4**
	Chair: Smith	Chair: Obando
1:00 PM	James, Scott	Shuff, Brown, Kroutil
1:20 PM	Watson, Ray	Komilov
1:40 PM	Watson, Chouchane	Adam
2:00 PM	Schurr, Cao	Weigandt, Langford
2:20 PM	**Break–Poolside**	
	Session IV– Masters	**Session IV– Undergraduate 4**
	Chair: Williams	Chair: Obando
2:35 PM	Derveloy, Sartipit	Terrell
2:55 PM	Shrestha, Cao	Hagood
3:15 PM	Jacob	Fletcher
3:35 PM	Karl	Anderson, Olsen
	Session V– Doctoral	**Session V– Undergraduate 4**
	Chair: Toone	Chair: Purewall
4:00 PM	Loewen	Shore
4:20 PM	Zunnurhain, Vrbsky	Kennemore
4:40 PM	Jerkins	Hill
5:00 PM		Allen
5:00 PM	**Business Meeting–Highlander I**	
7:00 PM	**Awards Banquet–Azalea**	

	Dogwood II	Highlander I	Highlander II
7:30 AM	**Morning Coffee–Poolside**		
8:00 AM	**Welcome and Keynote Address**		
9:00 AM	**Coffee Break–Poolside**		
	Session I–Doctoral	**Session I–Professional**	**Session I–Professional**
	Chair: Toone	Chair: Obando	Chair: Purewall
9:15 AM	Islam, Vrbsky	Smith, Price	Vandergriff
9:35 AM	Xiao	Pittarese, Tarnoff	Coalter
9:55 AM	Fleck, Fleck	Munger	Tarnoff
10:15 AM	Galloway, Vrbsky	Brown, Ey, Olmstead	Trifas
	Session II–Doctoral	**Session II–Professional**	**Session II–Professional**
	Chair: Toone	Chair: Galloway	Chair: West
10:40 AM	Bosu	Winters	Obando
11:00 AM	Hoque	Stenger, Jerkins, et al	Krishnaprasad
11:20 AM	Zunnurhain	Clark	Adcock
11:40 AM	Smith	Acree, Hooper	Lee
12:00 PM	**Lunch–Patio Restaurant**		
	Session III–Undergraduate 4	**Session III–Doctoral**	**Session III–Professional**
	Chair: Galloway	Chair: Toone	Chair: Khan
1:00 PM	Johnson	Nanthaamornphong	Anderson
1:20 PM	Alshurafa	Higgs	Williams, Williams
1:40 PM	Bright, Frazier	Liu	Purewal
2:00 PM	Moore	Hoque	Bradley
2:20 PM	**Break–Poolside**		
	Session IV–Undergraduate 4	**Session IV–Professional, Undergraduate 2**	**Session IV–Undergraduate 4**
	Chair: Galloway	Chair: Clark	Chair: Purewall
2:35 PM	Hill, Holder, et al	Brown	Flores, Plagge
2:55 PM	Plummer	Donaldson	Kawell
3:15 PM	Palmer	Cobble	Williams, Weaver
3:35 PM	Walling	Quaicoe, et al	Alshurafa, et al
5:00 PM	**Business Meeting–Highlander I**		
7:00 PM	**Awards Banquet–Azalea**		

Glenstone Floor Plan