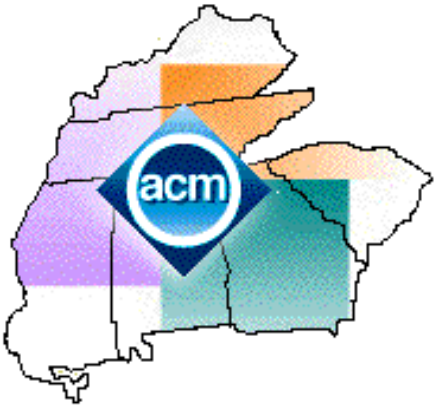
Fall Conference Proceedings

Mid-Southeast Chapter

of the ACM

Gatlinburg, Tennessee
Nov. 12-13, 2015

Mid-Southeast Chapter



of the ACM

For information on the 2016 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.

Table of Contents

Message from the Chapter Chair

Welcome to the 57th annual Fall Conference of the Mid-Southeast Chapter of the Association for Computing Machinery. On behalf of the officers and members, welcome to the conference and the beautiful Smoky Mountains. If you are a student, we want to give you a special welcome and let you know we are so glad you are here. If you are a faculty, join me in being so excited to see what our student have done and are doing.

It is such an honor to be a part of and lead a conference of this type and with such a long history and a fifty seven year old tradition. If you are a first timer to the conference, you are in for a treat as we hear about the exciting work done by the future of our profession, our students. Be sure and go to some of the student presentation and get excited about the future. Of course, if you have been here many times, as I have, you know how exciting the presentations will be. I don't want to leave out the professional, both from industry and from academia. We are excited to hear what you are doing both in and out of the classroom. Everybody take the time to look over the abstracts and prepare to be inspired.

I want to take the time to say a special thanks to the group of people who work hard to put this conference together. I also want to take the time to say thank you to the staff of the Glenstone without whom this conference would not happen. As you are out and about please take the time to tell the staff and the conference organizers thank you for the job they are doing to make our conference so successful.

There are some exciting changes happening with this conference. Last year we experimented with adding poster sessions. We are continuing that this year. In addition, we are working on adding a peer reviewed paper track to the conference. We can't do all of this without your help. Think about how you can get involved for next year. How can you do that? There are two very simple ways: 1) attend the business meeting at the close of the conference held in the Highlander; all are welcome and 2) let one of the people listed in the program know you are willing. It truly takes us all.

Now sit back, enjoy the beautiful Smoky Mountain, and the conference. Again, thank you for taking your time to come and participate and plan to be inspired.

Kathy Winters – University of Tennessee Chattanooga

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Undergraduate 4-year

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Doctoral

Glenn Wiggins, *Mississippi College*
John Nicholson, *Austin Peay State University*

Conference Session Chairs

Azalea

Session I:	Melissa Wiggins - *Mississippi College*
Session II:	Melissa Wiggins - *Mississippi College*
Session III:	Kathy Winters – *University of Tennessee-Chattanooga*
Session IV:	Poster Session

Dogwood I

Session I:	Glenn Wiggins - *Mississippi College*
Session II:	Glenn Wiggins - *Mississippi College*
Session III:	Radhouane Chouchane – *Columbus State University*
Session IV:	Poster Session

Dogwood II

Session I:	Kathy Winters – *University of Tennessee-Chattanooga*
Session II:	Masoud Naghedolfeizi – *Fort Valley State University*
Session III:	Ken Adcock – *Cleveland State Community College*
Session IV:	Ken Adcock – *Cleveland State Community College*

Highlander I

Session I:	Radhouane Chouchane – *Columbus State University*
Session II:	Radhouane Chouchane – *Columbus State University*
Session III:	Nabil Yousif – *Fort Valley State University*
Session IV:	Nabil Yousif – *Fort Valley State University*

Highlander II

Session I:	Denise Williams – *University of Tennessee - Martin*
Session II:	Denise Williams – *University of Tennessee - Martin*
Session III:	Masoud Naghedolfeizi – *Fort Valley State University*
Session IV:	Masoud Naghedolfeizi – *Fort Valley State University*

Notes

ACM Mid-Southeast Chapter
2015 Fall Conference
Gatlinburg, Tennessee
Glenstone Lodge

Conference Program

Thursday, November 12, 2015

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 13, 2015

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: **Undergraduate 2yr**
Session Chair: *Melissa Wiggins*

9:15 – 9:35 *GPC Campus Mapp* - Taslim "Jay" Dosunmu, Naoto Abe, Orestis Markozanes, Shuopeng Zhou, Jorge Magallon, Tuan Vo, Abel Santi, Max Metellus, Sarian Potin, Angellina Hou, Wren Howell, Janella Yar - Georgia Perimeter College

9:35 – 9:55 *Finite Element Analysis and Efficiency Computing of TEG Workstation* - Vatis Fongang, Daniel Barnes, Shantonio Birch, Dr. Anant Honkan - Georgia Perimeter College

9:55 – 10:15 *Robot Obstacle Avoidance and Object Recognition* - Julian Barnes - Georgia Perimeter College

10:15 –10:35 *A Portable Biometric Attendance System* - Atsou Koudonou, Fo-Yao Alessou, Anant Honkan, Gedeon Nyengele, Yash-Yee Logan, Lovina Delph and Yoseph Guta - Georgia Perimeter College

Dogwood I: **Doctoral Degree Presentations**
Session Chair: *Glenn Wiggins*

9:15 – 9:35 *Breadth First Search-based Efficient Algorithm for Betweenness Centrality* - Natarajan Meghanathan - Jackson State University

9:35 – 9:55 *A Content Oriented Middleware for Transportation and Communication* - Meng Kuai, Xiaoyan Hong, Bing Zhou - University of Alabama

9:55 – 10:15 *Community Detection using Betweenness Centrality and Eigenvector Centrality* - Natarajan Meghanathan - Jackson State University

10:15 –10:35 *Relationships Among Polygons, Chebyshev Polynomials and Eigenvalues: A Mathematica Exercise* - Zheng Zhang and Murat Tanik - University of Alabama - Birmingham

Dogwood II: **Undergraudate 4 Year Degree Presentations**
Session Chair: *Kathy Winters*

9:15 – 9:35 *The Instrumentation of Unsafe to Safe Functions Using the RTC Runtime Checking Tool* - Samuel Collie - University of Alabama - Birmingham

9:35 – 9:55 *Cross-Site Scripting in the Strangest Places: Exploitation via Tool-Generated API Documentation* - Christopher B. Lamberson - Columbus State University

9:55 – 10:15 *Examining the Power of Reflection in Java to Exploit and Explore* - David Naylor - High Point University

10:15 –10:35 *Harnessing and Securing IoT Devices on a Massive Scale*

Highlander I:	**Professional Presentations** Session Chair: *Radhouane Chouchane*
9:15 – 9:35	*Demonstrating Asymptotic Analysis in Early Computer Science Courses* - Joshua T. Guerin - University of Tennessee - Martin
9:35 – 9:55	*Computer Science Curriculum Redesign at Fort Valley State University* - Masoud Naghedolfeizi, Nabil Yousif, Sanjeev Arora, and Xiangyan Zeng - Fort Valley State University
9:55 – 10:15	*Teaching Computer Architecture using Visual Software Simulators* - Roger Shore - High Point University
10:15 –10:35	*Computer Science Education: A Systems Approach* - Nicholas Coleman - Austin Peay State University
Highlander II:	**Professional Presentations** Session Chair: *Denise Williams*
9:15 – 9:35	*A Brief Introduction to Digital Marketing* - Ken R. Adcock, Jr. - UPS
9:35 – 9:55	*Get Moving With Yet Another iOS Fitness App* - Bob Bradley and Kurt Wesner - University of Tennessee - Martin
9:55 – 10:15	*Design and implementation of an app for paper competition judges* - Brian Toone - Samford University
10:15 –10:35	*Real Time Online Poll / Quiz / Attendance System* - Bob Bradley and Matthew McAlister - University of Tennessee - Martin

Session II: 10:40 – 12:00 p.m.

Azalea: **Undergraduate 2 / 4 Year Degree Presentations**
Session Chair: *Melissa Wiggins*

10:40 – 11:00 *Third Party Data Retention and Government Surveillance* - Wren Howell - Georgia Perimeter College

11:00 – 11:20 *Improved Accuracy and Efficiency in Predicting a Protein's Native Structure by the Addition of Feature Selection Algorithms and the GOAP Protein Feature* - Joshua Pritchett and Silvia Crivelli - University of Alabama - Birmingham

11:20 – 11:40 *Determining the Resilience of Network Topology: Through Effective Path Diversity and Total Graph Diversity* - Julio Co and Hoda Mehrpouyan - Columbus State University

11:20 – 11:40 *Using Genetic Algorithms to Approximate Digital Circuits* - Michael Nolte and Joshua T. Guerin - University of Tennessee - Martin

Dogwood I: **Doctoral/Master's Degree Presentations**
Session Chair: *Glenn Wiggins*

10:40 – 11:00 *DPSL Virtual Platform Module: SDPS Student Membership Web Database Development With Python, MySQL And Apache Server* - Zheng Zhang, Ranveer Kumar, Karthikeyan Lingasubramanian, Urcun John Tanik - University of Alabama - Birmingham

11:00 – 11:20 *Testing Context-aware Software* - Songhui Yue - University of Alabama

11:20 – 11:40 *The Golden Age of High Performance Graphics* - Joseph Shiraef - University of Tennessee - Chattanooga

Dogwood II: **Undergraduate 4 Year Degree Presentations**
Session Chair: *Masoud Naghedolfeizi*

10:40 – 11:00 *Towards an Indoor Autonomous UAV Using a Subsumption Architecture* - Connor Brooks and Christopher Goulet - Western Kentucky University

11:00 – 11:20 *Developing a Learner-Centered Educational Software Using Visual Basic.NET* - Thuy-Duong Nguyen and Samantha Brown - Fort Valley State University

11:20 – 11:40 *Building a Simulated Processor in the Classroom* - Mason Cordell, Joseph Cloutier, Amy Hill and Joseph Elarde - Austin Peay State University

11:40 – 12:00 *Programming concepts in scratch using Raspberry PI 2* - Shaquan Q Dickerson and Anthony S Morris - Talladega College

Highlander I:	**Professional Presentations** Session Chair: *Radhouane Chouchane*
10:40 – 11:00	*Plagiarism? Are Our Students Culturally Different?* - Kathy Winters - University of Tennessee - Chattanooga
11:00 – 11:20	*Augmenting Tegrity Lecture Recordings with a PIP Video Stream of the Roaming Instructor* - G. Jan Wilms - Union University
11:20 – 11:40	*Gearing up for Distributed Computing: Learning how to Java* - Kathleen Ericson - University of Tennessee - Martin
11:40 – 12:00	*iTunesU Extra Credit* - Denise Williams and David Williams - University of Tennessee - Martin
Highlander II:	**Professional Presentations** Session Chair: *Denise Williams*
10:40 – 11:00	*Processor Resource Utilization Measurements in Simultaneous Multi-Threading Configurations: Synthetic Benchmark Analysis* - Joseph Elarde - Austin Peay State University
11:00 – 11:20	*Priority Inversion Issues in Real-Time Systems* - Srinivasarao Krishnaprasad - Jacksonville State University
11:20 – 11:40	*Determining the Accuracy and Precision of Spatial Data through the Use of GPS-Enabled Mobile Devices* - Leong Lee, Gregory S. Ridenour, Matthew Jones, and Michael J. Wilson - Austin Peay State University
11:40 – 12:00	*Lazy Evaluation of Unstructured Mesh Queries in C++* - Craig Tanis - University of Tennessee - Chattanooga

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

Session III 1:00 – 2:20 p.m.

Azalea: **Undergraduate 4 Year Degree Presentations**
Session Chair: *Kathy Winters*

1:00 - 1:20 *Kinect Dog Alarm* - Lewis A. Whiteman - University of Tennessee - Martin

1:20 - 1:40 *Reworking the Wearable: A Practical Design for a Common Problem* - Allison Higgins, A'nita Evans, Maygan Hooper, Jamil Taylor, Cerise Webster, Nathan Ross and David Smith - Clayton State University

1:40 - 2:20 *Immersive VR Hang-gliding Simulator with Tactile Elements* - Michael Nolte, Chance McCrary, Frank Palma - University of Tennessee - Martin

2:00 - 2:20 *Smart Home System* - Chisom Caleb Ogbonnaya and Brody Bruns - Western Kentucky University

Dogwood I: **Undergraduate 4 Year Degree Presentations**
Session Chair: *Radhouane Chouchane*

1:00 - 1:20 *Conversion of MATLAB to C++ to Improve Performance and Efficiency* - Amalee Wilson - University of Alabama - Birmingham

1:20 - 1:40 *The Use of Robotics in the Classroom Using the Raspberry Pi 2* - Robert Bryant and Anthony S. Morris - Talladega College

1:40 - 2:00 *Implementing Interactive Components within eBooks* - Jennifer Oberstadt and Jessica Welch - University of North Georgia

2:00 - 2:20 *From CSC to CEO, The Transition from Classroom Knowledge to Practical Programming* - Nicholas Zayatz - High Point University

Dogwood II: **Undergraduate 4 Year Degree Presentations**

Session Chair: *Ken Adcock*

1:00 - 1:20 *Designing an Intelligent Agent in Tic-Tac-Toe* - Andre Carter, Arianna Hollingshed and Justin Bullard - Fort Valley State Univ

1:20 - 1:40 *Utilizing Machine Learning in Stochastic Game Environments* - Wil Dunlap with advisor Bryson Payne - University of North Georgia

1:40 - 2:00 *Vermis* - Justin Evans, Joshua A. Myers, Matthew R. Poborsky - University of Tennessee - Martin

2:00 – 2:20 *The Gripper: Addition of a Loading/Unloading Device for Real-time Scheduling of a Model Train* - Alexander Henderson, Jacob Maynard and Michael Doran - University of South Alabama

Highlander I:	**Undergraduate 4 Year Degree Presentations** Session Chair: *Nabil Yousif*
1:00 - 1:20	*AWS: The Good, the Bad, and the Broken* - Michael Newton - High Point University
1:20 - 1:40	*Running a Tech Company With Only a Quarter in Your Pocket* - Reza Moghtaderi Esfahani - High Point University
1:40 - 2:00	*Virtual Campus* - Alexander D. Clark, Mason R. Cullen, Houston N. Howard - University of Tennessee - Martin
2:00 – 2:20	*Campus Connect* - David K. Hudson, Lauren LaGrone - University of Tennessee - Martin
Highlander II:	**Professional Presentations** Session Chair: *Masoud Naghedolfeizi*
1:00 - 1:20	*Summer Camps: The What and the Why* - Kellie W. Price and Suzanne Smith - East Tennessee State University
1:20 - 1:40	*30 Pairs of Hands and One Terminal* - Robert Lowe - Maryville College
1:40 - 2:00	*When Secret Sharing Schemes Are Not Used Properly* - Yesem Kurt Peker - Columbus State University
2:00 - 2:20	*Cyber Physical System Security: A Survey of Challenges and Existing Solutions* - Lydia Ray and Hoda Mehrpouyan - Columbus State University

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

Session IV 2:35 – 3:55 p.m.

Azalea: **Graduate Poster Session**

2:35 – 3:30

Cloud Security - Pezhman Sheinidashtegol - Western Kentucky University
Building a Middleware for a Vertical Cloud Architecture - Travis Brummett - Western Kentucky Unversity
Solution Algorithm of N-Queens Problem by Sets - Serkan Guldal - University of Alabama - Birmingham

Dogwood I: **Undergraduate 4 year Poster Session**

2:35 – 3:30

The Use of Robotics in the Medical Field - Tiara Threadford and Anthony S. Morris - Talladega College
TopperCloud - Infrastructure as a Service Cloud for Education - Christopher Goulet, Trevor Brown, Darshan Patel, Dylan Howard,Thomas Lackey, Manh Do, Saad Ahmad - Western Kentucky University
Cyber Security Risks in Telemedicine - Alexandria Causey - Talladega College

Dogwood II: **Undergraduate 4 Year Degree Presentations**

Session Chair: *Ken Adcock*

2:35 - 2:55 *Tech Girl Shine: A Diverse Computing World* - Kaleb Corcoran - Columbus State University

2:55 - 3:15 *MoPro* - Kevin L. Cartmell, Douglas D. Durkee, John M. Sawyer - University of Tennessee - Martin

3:15 - 3:35 *Diversity In Technology: STARS Computing Corps* - Kaleb Corcoran - Columbus State University

3:35 – 3:55 *FitForMe* - Domonix D. Gibson, Justin M. Shipp - University of Tennessee - Martin

Highlander I:	**Undergraduate 4 Year Degree Presentations** Session Chair: *Nabil Yousif*
2:35 - 2:55	*Utilizing Emoticons in Sentiment Analysis* - Abygail McMillan - University of North Georgia
2:55 - 3:15	*Illumanon* - Yu-Hsuan Chien, Daryl O. Hawkins, Matthew J. Proudfit - University of Tennessee - Martin
3:15 - 3:35	*Augmented Riffs* - William M. Hayes - University of Tennessee - Martin

Highlander II:	**UG 4 Year Degree / Professional Presentations** Session Chair: *Masoud Naghedolfeizi*
2:35 - 2:55	*Intelligent Management of Autonomous Vehicles in a Factory Setting: Simulation and Scale Model* - Jacob Maynard, Alex Henderson and Michael Doran - University of South Alabama
2:55 - 3:15	*Autonomous UnderWater Vehicle* - Rotimi Olotu, Darryl Jackson and Immanuel Brown - Clayton State University
3:15 - 3:35	*Is CS0 Working? A Case Study* - William H. Hooper and Joyce Crowell - Belmont University
3:35 - 3:55	*Malicious Android Apps: Threat Assessment and Open Problems* - Radhouane Chouchane - Columbus State Univ

4:30 – 5:00 p.m. **Business Meeting, Highlander I**

5:00 – 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**

Notes

Keynote Address
Abstract

Dr. Mina Sartipi
Department of Computer Science and Engineering
University of Tennessee at Chattanooga

mStroke

Abstract

Stroke is the leading cause of serious, long-term disability for adults in the United States. Each year approximately 795,000 individuals suffer new or recurrent strokes. After surviving a stroke and discharge from the acute hospital, patients enter a rehabilitation phase, focused on stroke recurrence prevention and restoration of systems impaired by the stroke as well as functional return to activities of daily living. Rehabilitation is generally restricted to a short time frame for professional intervention, ranging from 1 to 6 weeks depending on stroke severity, because early, highly coordinated, multidisciplinary rehabilitation decreases disability and improves compensatory strategies.

In this talk, we will be presenting mStroke. Using wearable motion sensing devices, the goal of mStroke is to establish a remote extended monitoring and mobile health system for risk-related stroke measures to proactively provide patients, caregivers, and health professionals with previously unavailable real-time data at the body structure, activity, and participation levels. Patient compliance and progress are monitored. Rehabilitation and/or medical intervention can be triggered to support stroke patients' optimal long-term recovery in mStroke's ultimate launch.

The mStroke system is delivered as an application (App) running on a hardware system consisting of Bluetooth low energy (BLE) modular sensor devices and an iPad. This system is a practical, accurate, and mobile health system that can remotely measure a stroke patient's proficiency in standard post-stroke therapy activities mentioned below. The system uses accelerometers, gyroscopes, and magnetometers to measure movement during four clinical activities: the functional reach test, the NIHSS motor arm test, the NIHSS motor leg test, and gait analysis. The proposed system has been extensively tested using emulated and real data from physical therapy students.

Finally, data acquisition and data transmission in wireless body area network (WBAN) is studied. Due to size and power constraints of sensors used in WBAN, data transmission will be the bottleneck. We explore data compression and reconstruction in WBAN by taking advantage of inherent structure within data to reduce the size of data for transmission. The real-time data collected by mStroke is used to investigate the accuracy of the technique.

(This is a joint work between Dr. Nancy Fell (Physical Therapy Dept. at UTC), Dr. Li Yang (CSE at UTC, specialized in security) and Dr. Mina Sartipi.)

About the Speaker

Dr. Mina Sartipi is a Professor at the University Of Tennessee Chattanooga (UTC), where she leads the Smart Communications and Analysis Lab. She received her B.S. in Electrical Engineering from Sharif University of Technology, Tehran, Iran in 2001 and her M.S., and Ph.D. degrees in Electrical and Computer Engineering from Georgia Tech in 2003 and 2006, respectively. In 2008, she was named UC Foundation Assistant Professor. This award was given to her based on her research activities and students evaluating her teaching. She has also received the outstanding researcher awards in the College of Engineering and Computer Science at UTC in 2010, 2014, and 2015.

Dr. Sartipi's research interests are in the area of communications and signal processing, in particular modern error-control coding (LDPC and rateless codes) and its applications, distributed source coding, compressive sensing, information processing for wireless networks, and artificial intelligent-based communication. She also has expertise in data analysis for smart healthcare and smart grid. She has served as the technical program chair of conferences in the areas of wireless communications and networking. Additionally, Dr. Sartipi has been called on to review several papers on data compression and error control coding for various IEEE, ACM, and EURASIP conferences and journals in the past several years.

Student Abstracts
Undergraduate Two Year Programs

GPC Campus Mapp

Taslim "Jay" Dosunmu, Naoto Abe, Orestis Markozanes, Shuopeng Zhou, Jorge Magallon, Tuan Vo, Abel Santi, Max Metellus, Sarian Potin, Angellina Hou, Wren Howell, and Janella Yar

Georgia Perimeter College

Our mobile app lets students and visitors find their way to class rooms and buildings. Simply put, it's a map for one of our campuses. We will outline the campus path using a tree structure, and use Dijkstra's algorithm to find the shortest path between nodes. Moreover, Forutne's algorithm and Voronoi's diagram will be used to set boundaries within the map. Built and developed by 12 students of all skill levels, our app is a great way for students to learn about the professional app development. Our project is a good way to garner interest in computer science as well, as it is not too difficult to implement these methods. The work is divided by student skill levels and even students who have no experience in computer science can get a concrete idea of what you can accomplish in this field.

Finite Element Analysis and Efficiency Computing of TEG Workstation

Vatis Fongang, Daniel Barnes, Shantonio Birch, and Dr. Anant Honkan
Georgia Perimeter College

Thermoelectric generators are solid state devices that are used to generate electricity from a temperature difference. This project aims to develop a laboratory solution to test and characterize the performance of thermoelectric generators. A workstation was developed that tested the efficiency of a commercial TEC1-12706. One side of the device was cooled by water through a tubing system and the other side was heated by a flexible heater. Before construction Solidworks was used to conduct a simulation of a flow analysis for water flow and a simulation of a thermal analysis for heat dissipation of the heater. From these simulations, the proper material properties and tubing method could be chosen for the workstation. The Labview coding software was utilized to calculate power and efficiency of the thermoelectric device from data acquired by the data acquisition system.

Robot Obstacle Avoidance and Object Recognition

Julian Barnes
Georgia Perimeter College

Programming a robot to complete the simple task of avoiding obstacles and efficiently reaching a destination requires several algorithmic and mathematical calculations. We show how object recognition and multiple dimensional analysis can be used to locate potential obstacles in a robot's path. To this end we implement the FAST[1] (Features from Accelerated Segment Test) corner detection algorithm together with a Raspberry Pi B+ and Pi camera module to detect objects.

A Portable Biometric Attendance System

Atsou Koudonou, Fo-Yao Alessou, Anant Honkan, Gedeon Nyengele, Yash-Yee Logan, Lovina Delph and Yoseph Guta

Georgia Perimeter College

The process of taking attendance in higher education institutions should be optimized for time efficiency and also reduce the incidences where students may want to mislead the attendance system. However, with the current paper-based attendance system, there are a few problems that expose how unreliable it is for keeping track of attendance. These problems include: students forging their friends' signatures even though they are absent and teachers opting to call roll which can interfere with valuable teaching time. In order to solve these problems, we designed a portable biometric attendance system based on a finger print scanner to record attendance in higher education institutions. The design system has been implemented and tested, and it correctly identified all subjects tested. A classroom of students can be marked present for attendance upon entering the classroom, taking approximately 3 seconds per student.

Third Party Data Retention and Government Surveillance

Wren Howell
Georgia Perimeter College

From the Edward Snowden leaks that happened over two years ago, it is now known that government uses telecommunication services to monitor and retain massive data sets of its customers. While extensive analysis has been done on government programs such as PRISM and XKeyscore, there has been very little research and analysis on the role of telecommunication companies supplying these government agencies data. This research will explore two topics: (1) the methods third party services use to access this information and (2) the reasons behind the alliance between the telecommunication companies and government surveillance. This topic is important to study because it will make people think about their relationship with the Internet and understand the power of third party service providers and the government. What kinds of technologies do methods third party services use to access this information? What motives do these third parties have in assisting government surveillance? The methods of researching this topic primarily include analyzing the works of different privacy and security experts, including Christopher Soghoian, Ashkan Soltani, and Bruce Schneier. There are different methods to access information including wiretapping and using weak encryption algorithms. There are many reasons why these third party service providers allow the government to access their customer information. There are significant economic incentives for the third party service providers to allow backdoors in their products that the government exploits. Perhaps the most important reason why third parties assist in government surveillance is that there is no market for customer privacy. There are significant political and economic motives behind the alliance between the government and third party service providers that make this relationship inevitable. Until these political and economic incentives are addressed and there is a market for privacy, third party service providers will continue to play an important role in government surveillance.

Student Abstracts
Undergraduate Four-Year Programs

The instrumentation of unsafe to safe functions using the RTC runtime checking tool.

Samuel Collie
AL, University of Alabama – Birmingham

Part of the prevalence of the C programming language can be attributed to its speed, maturity, and extremely low overhead. However, the features that afford C these qualities are also responsible for some of its greatest shortcomings; the absence of dynamic safety checks and a relatively weak type system allow for dangerous bugs to emerge. To meet the needs of the C programming community, a coalition of researchers from the University of Alabama at Birmingham, North Carolina State University, the Lawrence Livermore National Laboratory, and Matlab have developed RTC, a tool for performing runtime analysis of C programs. Through lightweight and fully portable instrumentation of source code, RTC is able to detect a variety of runtime errors including spatial and temporal memory violations and arithmetic underflows and overflows.

However, one issue not currently addressed by this tool is the use of unsafe standard C library functions. A prime example of how dangerous unsafe functions can be is OpenSSL's Heartbleed bug which stemmed from the unsafe C Standard Library function “memcpy”. While we may be able to popularize coding practices that forbid certain unsafe functions from being used, this will not prevent such functions from being used entirely, nor will it fix already written code. Our solution to this problem is adding the instrumentation of unsafe function calls to RTC's arsenal. Thanks to our extension, RTC can now check calls to certain unsafe standard library functions by rerouting these calls to a library of safely implemented standard functions. RTC does this by iterating through the given file of code and checking for unsafe function calls. The source code for the safe versions of any unsafe function called is then prepended to the given file. Finally RTC changes each unsafe function call to the corresponding safe function call. This method poses some difficulties since it requires interaction with another library. However, with the library being exposed to instrumentation, we're able to continue tracking runtime behavior even when such calls are made.

Cross-Site Scripting in the Strangest Places: Exploitation via Tool-Generated API Documentation

Christopher B. Lamberson
Columbus State University

Cross-site scripting (XSS) is a common, well-known vulnerability among those savvy in web application security. While the vulnerability is generally associated with web applications on websites, there are other programs which use HTML and display their results via a web browser. API documentation generators such as Javadoc and Rdoc are two such tools that generate output in HTML and are viewed via a web browser. These tools provide an interesting and unexpected attack vector. With my research, I have shown that such API documentation generators do not always validate input in a way to nullify malicious JavaScript. As such, some popular API documentation generators produce output which is vulnerable to XSS.

I will present the methodology I used in my research. I will report on the tools used to uncover the vulnerability, why these particular tools were used, and how these same tools may be used by an attacker in order to exploit a victim. This XSS vulnerability in tool-generated API documentation may be used as a beachhead for further social engineering and information gathering attacks. My presentation will include proof of concept of such an attack.

Along with a proof of concept of such an attack, I plan to present countermeasures that one can take now to prevent or mitigate such attacks. One may consider it irresponsible to provide information on such a vulnerability without also providing defensive measures that one can take until the vulnerability is patched. That is assuming the vulnerability is ever patched. This section of my presentation will provide practical advice on how not to become a victim of XSS hidden within API documentation generated by tools.

Examining the Power of Reflection in Java to Exploit and Explore

David Naylor
High Point University

Reflection is the powerful ability to inspect and alter methods, fields, and objects at runtime. This ability allows one to discover and manipulate data in unexpected and unintended ways. The presentation will show vulnerabilities in real world applications and games. The ethical and legal implications of using these vulnerabilities will be discussed. Additionally, possible solutions to preventing these attack vectors will be explored.

Harnessing and Securing IoT Devices on a Massive Scale

Grant Pinkert
Auburn University

Internet of Things (IoT) is a catch all term for smart devices, connected to the internet, that perform one small task, such as a temperature sensor, a lightbulb, or wearable technology. According to an article by Forbes magazine, there are an estimated 10 billion IoT devices in use today, and that number is expected to grow to an astonishing 30 billion (some estimate 50) by 2020. These devices do not typically consume all of their hardware resources and these additional resources can be tasked with other jobs that are not directly related to their original purpose. In addition, as is typical with emerging technology, security is not at the forefront and is typically considered only after significant breaches have been publicized. One perfect example, reported by NBC news, involved hacking into more than 100,000 gadgets (including TVs, multimedia centers, routers, and at least one fridge) and using those appliances to send out more than 750,000 malicious emails.

I was tasked with building a large scale network of IoT devices in order to answer several important questions: how can we best utilize the unused resources of IoT devices on a connected network, how do we protect IoT devices against malware, malicious attacks, or another malicious IoT device attempting to connect to the network. Our goals are: to measure the scalability of this network; to ensure that the devices can reliably communicate with each other over one or more gateways; to record and measure traffic generated by these IoT devices as well as efficiently capture data generated by the devices; automatically detect and prevent malicious actions; and to efficiently allocate and use the IoT networked devices resources for other tasks.

My presentation will cover our strategy, where we currently are in this process, and preliminary results.

Improved Accuracy and Efficiency in Predicting a Protein's Native Structure by the Addition of Feature Selection Algorithms and the GOAP Protein Feature

Joshua Pritchett
AL, University of Alabama – Birmingham

The goal of this research is to investigate the hypothesis that a feature selection algorithm along with a new feature -- GOAP, has an effect on the accuracy of a scoring function. A scoring function is a method for quality assessment of predicted protein models. In addition, one new feature known as GOAP, is added to the existing 59 protein features; GOAP has been proven in literature to help improve scoring functions. In pursuit of improving the scoring function, a feature selection algorithm that determines which protein features are most important to the scoring function is implemented. The result should be an improvement in the accuracy in which the machine learning algorithm can predict a protein's native structure. This is done using free modeling also known as ab initio methods. Using computational methods to discover a protein's native structure is a revolutionary concept in biology. Given any specific protein (also known as a target), models (also known as decoys) can be generated. Decoys are predicted protein structures given a sequence of amino acids. Some benefits of machine learning is that it offers an accurate way to determine the quality of each decoy by means of a scoring function, and it is much cheaper and time efficient in comparison to current experimental procedures such as X-Ray Crystallography and NMR Spectroscopy. Finally, the method of research for achieving the objective include the following steps: 1) identify the set of most significant protein features included, but not limited to the features suggested by the literature, 2) use Sci-Kit Learn's Random Forest algorithm along with high performance computing for testing the optimized feature set and scoring function for the benchmark data set from CASP 8, 9, and 10. The desired outcome of this research is an improved machine learning algorithm that can predict a protein's native structure using ab initio methods, and an improved scoring function which ranks the quality of predicted protein models to help determine which decoy is closest to the native structure. An accurate scoring function is critical to assist biologist for enhanced designing of their experiments and for designing improved drugs.

Determining the Resilience of Network Topology: Through Effective Path Diversity and Total Graph Diversity

Julio Co and Hoda Mehrpouyan
Columbus State University

The world is an ever changing and evolving place. This is especially true when it comes to computer technology. To protect this technology, we must protect the networks that these technologies depend on. This can be done through network resilience; which is the ability of a network to maintain service while under duress. The first step in resilience is to quantify the values of resilience, to establish a baseline resilience. The metric I measure first is effective path diversity; this is the measurement of how many elements two paths have in common. The second metric I measure is total graph diversity, which is the average effective path diversity of all node pairs selected. The node pairs selected are those that have more than one path between the nodes. These pairs are further modified based on the following criteria: 1) first fully disjoint paths between the pairs are selected from the possible paths and more paths can be added to fulfill the diversity requirement; 2) the paths with the minimum effective path diversity requirement or more are selected; 3) paths that are shorter than the stretch limit are selected from these paths are chosen from the list created by the first two requirements. To modify these paths, I use the Floyd-Warshall algorithm; this not only modifies the paths, but selects the shortest paths from the topology. This method is one way to measure resilience, but there are many different methods to evaluate resilience. Each focuses on a specific attribute of the network. The future of this research focuses on compiling these different methods. Through testing, evaluating and strengthening these methods, a framework can be created that evaluates the resilience of all network attributes. In doing this, we can evaluate a network's resilience more efficiently and precisely in the future.

Using Genetic Algorithms to Approximate Digital Circuits

Michael Nolte and Joshua T. Guerin
University of Tennessee – Martin

Genetic algorithms are biologically-inspired heuristic search alternatives to classical search algorithms. In each generation (iteration), a genetic algorithm generates many possible solutions, and tests each one. The algorithm then keeps a subset of the population of solutions, and replaces the remaining solutions with new solutions. Any new solutions are generated by emulating reproduction and the natural process of evolution: pairs of individual solutions are selected from the original population, and a "child" is produced using a combining (crossover) technique. During the crossover process a small portion of the solution is randomly mutated. Over many generations, this technique can produce viable solutions in drastically less time than exact methods.

Electrical systems have grown increasingly complicated, and some have reached the point where they cannot easily be designed by hand. We have developed a genetic algorithm, written in Python, that can generate reasonable approximations of circuits of any complexity. Approximate computing methods may be applicable in numerous domains where some level of precision may be sacrificed for a greater degree of efficiency (e.g., simplicity of hardware and resources expended). This presentation will include our methodology, results of our preliminary testing, and an analysis of future practicality.

Towards an Indoor Autonomous UAV Using a Subsumption Architecture

Connor Brooks and Christopher Goulet
Western Kentucky University

The rapid proliferation of unmanned aerial vehicle (UAV) technology into consumer hands has given rise to many possible uses of robotic aerial capabilities. Though most applications of UAVs so far have focused on outdoor use, indoor UAVs may be useful for applications such as security, site monitoring, and environment sensing. The aerial component of these vehicles gives them an advantage over traditional robots in traversing stairs and ground-based obstacles, allowing them to potentially cover staircases and multiple floors of buildings.

This project investigates the potential for autonomous UAV use in indoor settings. Such settings provide challenges over outdoor UAV usage due to increased local obstacle occurrence and the requirement for precise movement with little room for error. Autonomous control of UAVs in indoor settings must take into account these restraints and provide precise control, including obstacle avoidance.

In this project, we work to design a UAV meant for flight in indoor settings. Our objectives for this UAV are for it to be capable of human-controlled flight, as well as fully autonomous flight through simple indoor environments with no human oversight required. As part of the project, we require that all computing is done onboard the vehicle during time of flight so that no remote connection of any kind is necessary for successful control of the vehicle, even when flying autonomously. This restricts the computational resources for autonomous control to be limited to that which the UAV is able to carry and power while flying. We utilize environmental sensors including ultrasonic sensors, LIDAR, and IMUs to acquire necessary environment information for autonomous flight. We specifically investigate the use of a subsumption architecture in designing the control structure of the UAV, and the advantages and disadvantages this approach provides.

Developing a Learner-Centered Educational Software Using Visual Basic.NET

Thuy-Duong Nguyen
Fort Valley State University

The purpose of this project was to design a GUI based software system for people with little or no background in computer science to learn fundamentals of a computer system without any supervision. The software was designed in Visual Basic.NET with a friendly and easy to navigate GUI. The GUI structural design was modeled after Periodic Table of Chemical Elements and is called "Table of Computing Elements" of a computer system. The table includes 4 major columns and 10 minor columns. The major columns include major computing elements related to input, process, storage, and output devices of a computer system and minor columns include computing elements related to operating system and computer hardware as well as various control and processing techniques within a computer system.

The entire table is designed on a single form on Visual Basic .Net and includes 66 elements that are displayed on the table visually using VB PictureBoxes. The user interacts with the table by clicking on a desired element (e.g; Keyboard) that displays a new form containing both visual and descriptive information about that element. To further enrich the user learning experience, the form also includes a multimedia component containing a short video clip (with audio) about the element.

The table of computing elements designed in this project is a valuable tool to help naive to intermediate computer users to learn about various components of a computer system visually and efficiently.

Research Advisor: Dr. Masoud Naghedolfeizi

Building a Simulated Processor in the Classroom

Mason Cordell
Austin Peay State University

Many students in computer organization courses have difficulty understanding how the components of a computer processor work together. Although instruction is helpful, by and large, the majority of computer science students find it useful to play and experiment with the ideas presented to them in class. This lead to the idea of building a processor. The course instructor set the goal for the class of replicating the functionality of an Intel 8080 with a digital logic simulator. The result of this is twofold: first, due to the breakdown of responsibilities in the course, every single student experienced a small part of the stresses involved in hardware development in the form of meeting tight deadlines, handling sudden project requirements, and maintaining a primitive form of version control; second, every student gained a greater understanding of the basic computer processor, how its components work together, and how microcode and opcode work together to provide basic instructions.

Programming concepts in Scratch using Raspberry PI 2

Shaquan Q Dickerson
Talladega College

The Growing Concerns of students being unprepared brought on a change from George W. Bush known as the No Child Left Behind Act. This act was introduced to encourage educators to remodel their methods of teaching a particular subject. Programming concepts are one of the areas of concerns in the undergraduate level. Students need a hands-on approach to programming rather than the traditional; black and white coding. This research will utilize a click-and-drag programming concept called scratch. Scratch is a program that is preinstalled in the Raspbian operating system, used in the Raspberry Pi 2. Learning modules will be developed for students to recreate similar logical structures as their results.

Kinect Dog Alarm

Lewis A. Whiteman
University of Tennessee – Martin

The Kinect is a Microsoft Xbox peripheral that is fairly sophisticated, allowing for a wide range of programming capabilities, including facial recognition, depth perception, voice recognition, skeletal tracking, and more. The Kinnect Dog Alarm application recognizes dogs and sets off an alarm if a dog are too close to an object defined by the user, generating a high pitched noise that only the dogs can hear, discouraging the dog from interacting with the object, and encouraging him to stay away from that certain area.

Reworking the Wearable: A Practical Design for a Common Problem

Allison Higgins, Anita Evans, Maygan Hooper, Jamil Taylor, Cerise Webster, Nathan Ross, and David Smith
Clayton State University

The basis of this project was to design and code a back pack with the use of the Gemma Sequin Starter Pack by Adafruit Technologies to benefit the student body of Clayton State University that attend evening classes. The common complaint that the students seemed to have was regarding the difficulty in finding their belongings inside of their bags on the way to class and back to their cars or dorms once class ended. The Gemma Sequin Starter Pack includes lights, a micro controller, conductive thread, conductive velcro, and a battery. We hypothesize that the conductive velcro used in the original design of the light up pouch by Adafruit can be reworked to be used in conjunction with the zipper of a book bag thereby giving a student an internal light for their book bag to aid in searching and locating for materials in the bag.

Immersive VR Hang-gliding Simulator with Tactile Elements

Michael Nolte, Chance McCrary, and Frank Palma
University of Tennessee – Martin

Virtual Reality is emerging as the next major growth area for simulation and gaming. While many VR headsets can engage a user's eyes and ears, very few products immerse the user in the simulation. This paper develops a Hang-gliding simulator, using the Oculus Development Kit 2, which includes tactile feedback as well. The system includes a bench for the user to lie on, which pivots slightly, in sync with the movement of the glider. In combination with a variable-speed fan (which blows on the user in proportion to their speed) this will provide more realism and more enjoyment. The environment was designed in Blender, the game was created using Unity, and the external hardware is controlled by a microcontroller, which connects to the PC. The project has a potential to become a viable trainer for Hang-gliding, or for use by anyone who is unable to otherwise.

Smart Home System

Chisom Caleb Ogbonnaya and Brody Bruns
Western Kentucky University

This project will be to design a Smart Home system. We will be using a Raspberry Pi to simulate the hub that connects all of the devices in the smart home. We will also have several devices connected to the Raspberry Pi's GPIO pins in order to simulate the normal input and output interactions of a Smart Home. We are going to use a web based interface to allow the user to interact with the Raspberry Pi. In order to meet our client's expectation, our smart home must consist of a working Raspberry Pi system to simulate the central hub and devices of our smart home, and a mobile interface to interact with the simulator. The mobile interface must be accessible by nearly any mobile device. The mobile interface must be refined to the point that it is professional looking and easy to use. It will need to be designed so that the experience of use is generally enjoyable for the user. Since the user's interface is supposed to be accessible by any device we've decided to go the web-based route using PHP, JavaScript and CSS to code the website which communicates with the raspberry pi. The Sense Hat which is has a 6 by 6 LED matrix and a lot of other sensor's on it, is going to be connected on top of the raspberry pi through its GPIO (general purpose input and output) and we will be using some libraries to interact with the Sense Hat to turn off and on the lights, which in a bigger picture could be an actual light in a home, office and etc.

Conversion of MATLAB to C++ to Improve Performance and Efficiency

Amalee Wilson
AL, University of Alabama – Birmingham

MATLAB is widely used for academic, research, and industrial applications, and my work is part of a larger effort at UAB to run MATLAB code efficiently on parallel heterogeneous architectures. Our aim of efficiently running MATLAB code raises this question: how do we extract that much parallelism from MATLAB programs, and how do we schedule computations to utilize all processors while minimizing data transfer among them? This question is inherently interesting, and we hope to explore it in the future; however, rather than attempting to parallelize MATLAB code directly, we are currently converting it to C++ and expressing matrix operations by using a parallelized C++ matrix library. We are presenting some preliminary findings for the speedup gained by converting MATLAB to C++.

An incomplete prototype of a MATLAB to C++ converter has been created by modifying Octave's LR grammar for Bison to generate an abstract syntax tree (AST) with the ROSE compiler; this prototype supports the basic elements of the MATLAB language. My work has been focused primarily on extending the functionality of this converter, including adding support for MATLAB while loops and structs. Using while loops as an example, we are explaining what modifications must be made in order to extend the functionality of the converter: editing the grammar, generating an AST, producing C++ code from that AST, and extending the unparser to confirm that the generated AST produces the original MATLAB code that was parsed.

On the other hand, automatically converting structs from MATLAB to C++ is more difficult. Because C++ is a statically typed language, and MATLAB is dynamically typed, assigning types to the values of struct fields is a major challenge. We are discussing the existing experimental implementation of type inference as well as how it can be extended for use with structs.

The Use of Robotics in the Classroom Using the Raspberry Pi 2

Robert Bryant
Talladega College

As our world becomes increasingly technological, students are becoming further behind in programming. Opportunities are missed when the majority of the materials is inaccessible to students. Even though it may be fading some states still utilize the No Child Left Behind Act of 2001 (NCLB). The use of the act has helped motivate faculty to develop different approaches to students learning, such as, the utilization of robotics in the classroom. This process has helped reinforce computer programming. The purpose of this research is to innovate the idea of using robotics in the classroom to teach programming through the RaspberryPpi 2. This is completed by the creation of several easily produced visualized programming functions modules using the Raspberry Pi 2 to control a robot (Lego Mindstorm NXT 2.0 Brick, motors and sensors). The robot then responds based on the program code which will replicate movement sent by the coding.

Implementing Interactive Components within eBooks

Jennifer Oberstadt and Jessica Welch
University of North Georgia

ePub readers are growing popularity within the academic world as textbooks can know be obtained in both the traditional hard copy style or an online eBook format. An eBook textbook was intended to reduce costs for students and increase convenience of carrying multiple textbooks by storing them in one central device. With textbooks and technology combining into one, we now have the possibility to add interactive pieces within the eBooks. In this research project, the editing and modifying of ePubs will be explored as well as how to properly implement these altered ePubs over multiple platforms. In order to make the interactive ePubs, which can contain videos and interactive maps, new code must be written and tested for each platform. There is no one universal code that will allow interactive ePubs to be read over all platforms, so we are challenged to modify the code differently for each specific platform. The research goal is to provide authors of textbooks with the ability to provide interactive components into eBooks to better interest students in the material and increase retention of information.

From CSC to CEO, The Transition from Classroom Knowledge to Practical Programming

Nicholas Zayatz
High Point University

Learning core concepts of programming in various courses is one thing, but taking those abilities and applying them to real world interests is an entirely different element. Advanced ideas such as race conditions, protocol oriented programming, and lazy evaluation are various subjects that are discussed in theory. However, real-life applications of said topics are rarely explored in the classroom setting. This presentation will discuss distinct approaches taken from learning the foundational concepts of programming and exploiting them in the development of iOS applications.

Designing an Intelligent Agent in Tic-Tac-Toe

Andre Carter, Arianna Hollingshed and Justin Bullard
Fort Valley State University

Tic-Tac-Toe is a very simple and popular game where two opponents play in a grid to get spaces in a row either horizontally, vertically, or diagonally. In this paper, we developed an intelligent agent that observes the environment and directs its activity towards the goal to win the Tic-Tac-Toe game. The standard approach for implementing goal-directed behaviors is to use predetermined behavior patterns. Inspired by a series of video tutorials on "*How to never lose in Tic Tac Toe*", we designed three winning strategies for the possible situations that the game starts from a corner space, a center space or a side space. The three methods are composed of a series of condition-action rules to accommodate for all the possible game scenarios. It is harder for the agent to win when starting from the center because of the large number of possible moving patterns. We implemented the game in Visual Basic which is simple and particularly easy to develop graphical user interfaces.

Utilizing Machine Learning in Stochastic Game Environments

Wil Dunlap
University of North Georgia

In this paper, we describe an AI (artificially intelligent) game opponent programmed in Python that is capable of learning and improving based on game results. The opponent is capable of recognition of numerous environmental shapes that it encounters in its search for the player's character. The opponent makes use of several search algorithms, understanding which is appropriate regarding the current situation. The machine learning will be implemented via scikit-learn in Python. The opponent also maintains separate repositories for individual users and overall results to differentiate. The user results are weighted more than overall results so that the opponent is capable of differentiating tactics that are more effective against unique users. The opponent will also make use of a neural network with a number of inputs, intermediate nodes, and outputs. Once the neural network is built and a sizable data store achieved, the AI opponent's results will be compared to a non-learning opponent that merely uses an unchanging, optimized algorithm. The AI opponent should outperform the non-learning opponent in a stochastic environment.

Vermis

Justin Evans, Joshua A. Myers,
and Matthew R.Poborsky
University of Tennessee – Martin

Vermis is a 3D action adventure video game that was created using the Unity and Blender programs. Vermis, Latin for worm, is a Cybernetic worm that is part of an interstellar organization designed to protect planets from being invaded or destroyed. As the player you are assigned the task of protecting a planet inhabited by cat like beings from an invading force known as the Procella, which is Latin for storm. What sets this game aside from a typical video game is that it has some distinct differences from PC to Mac, including different items, different enemies, and even different levels.

The Gripper: Addition of a Loading/Unloading Device for Real-time Scheduling of a Model Train

Alexander Henderson and Jacob Maynard
AL, University of South Alabama

This project is an extension of our previous project, wherein scheduling requirements are imposed on a cyber-physical system composed of a model railroad and stations, represented by distributed sensors. The addition gives the system the ability to handle cargo and adds new constraints on the scheduling algorithm. It is comprised of a robotic arm that can lift small blocks into and out of the model train's cargo car. Optimization of performance involved reconciling the old scheduling demands with the new requirements to plan ahead for cargo delivery. Our approach is to calculate a quantity, derived from cargo size and the performance of the arm, by which the train adjusts its speed. Subsequent test runs motivated refinements to the speed adjustments. The results show that for any amount of cargo, the system conforms to a schedule above a certain time threshold.

AWS:
The Good, the Bad, and the Broken

Michael Newton
High Point University

Amazon Web Services is the leading cloud platform. The main draw of AWS is the shear size and power of its infrastructure along with the low cost of using the service. For these reasons AWS was chosen as the optimal solution for developing the social media app Zipsy. Amazon's success can be partially credited to their constant drive towards improvement and development of new services. But this culture of always being on the cutting edge can result in auxiliary services such as documentation and the web console being treated as an afterthought. The documentation in many cases is outdated, lacking, and sometimes even non-existent. The console is clunky, slow, or even broken in certain areas. Nevertheless it is one of the most advances platforms on the market so in this talk we will discuss the many benefits and drawbacks of using AWS. More specifically, we will discuss the utilization of DynamoDB, AWS Lambda, and API Gateway to create a scaleable and "serverless" mobile backend in the development of Zipsy.

Running a Tech Company With Only a Quarter in Your Pocket

Reza Moghtaderi Esfahani
High Point University

You may have heard the phrase Cloud Computing before and thought it didn't apply to you. In this talk, you will learn about the three major cloud-providers in the world; gain an insight into the services they offer; and find out why companies like Netflix, Slack, Airbnb, and Yelp, have decided to use the Cloud as the infrastructure of their business. More specifically, a side-by-side cost and performance comparison between Google Cloud Platform, Microsoft Azure, and Amazon Web Services will be presented. By analyzing the development of a social media app called Zipsy, innovative ways of using these Cloud-providers to host scalable mobile apps and websites will be discussed. As an added bonus, you will hear how four computer science students utilized the power of the cloud in their startup to gain a competitive edge and appeal to geeks and investors alike!

Virtual Campus

Alexander D. Clark, Mason R. Cullen,
and Houston N.Howard
University of Tennessee – Martin

Virtual Campus give prospective students a taste of the UT Martin experience. Using Google SketchUp, buildings from the campus are painstakingly recreated to allow the user to feel like they are actually there. The 3D models and their textures are exported from Sketch Up in the .FBX format and imported into Unity. After importing the buildings into Unity, the users can walk around the campus, entering individual buildings and exploring. Other models such as trees and sculptures are also created using Sculptris.

Campus Connect

David K. Hudson and Lauren LaGrone
University of Tennessee – Martin

The increasing presence of mobile applications in our community has made once lengthy, tedious processes as simple as the click of a button. One process that has not been simplified yet is the process of college class registration and scheduling. Our application, Campus Connect, is the first step towards meeting this need as a mobile implementation of the class registration system used throughout the UT system and many other colleges.

Tech Girl Shine:
A Diverse Computing World

Kaleb Corcoran
Columbus State University

Women are an extremely under-represented group in Computer Science. This presentation illustrates the results of a study done by students at Columbus State University on how educational events can help increase interest in Computer Science, specifically among young women under the age of sixteen. The STARS Computing Corps at Columbus State University held an event in early 2015 in which we brought in 27 3rd through 5th grade girls and taught them a number of fun Computer Science skills, in the form of workshops. The data presented in this survey demonstrates the effectiveness of these events.

The specific data gathered is from surveys taken by the mentors who helped the girls in the event. Data gathered demonstrates an increasing eagerness among professionals to help increase diversity. For an organization like the STARS Computing Corps, this data is promising. STARS seeks to hold more outreach events in the future, and the data gathered and presented here is valuable in completing that mission.

MoPro

Kevin L. Cartmell, Douglas D. Durkee,
and John M.Sawyer
University of Tennessee – Martin

MoPro is a mobile application that provides the user with real-time promotional data from a retailer of their choice. Circular ads, newspaper inserts, and paper coupons are quickly becoming obsolete. With smartphones at their side, savvy customers expect retailers to provide instance sales promotions, pricing, and electronic coupons "on-demand." MoPro, designed for Android, iOS, and Windows, will allow any user the unique experience of receiving promotions on demand, and thereby reducing or eliminating emails and texts from retailers.

Diversity In Technology: STARS Computing Corps

Kaleb Corcoran
Columbus State University

For four years, the STARS (Students & Technology In Academia, Research, and Service) Computing Corps has operated at Columbus State University with an important mission: increase diversity in technology-related fields. CSU's STARS Computing Corps first started in Fall 2011 at CSU's School of Computer Science which had an enrollment of 11% women and 23% minorities at the time. In the last few years, the percentages have grown considerably; we've learned many effective methods on how to increase diversity in Computer Science. In this presentation, we share everything we've learned by illustrating what we got right and what we got wrong.

The presentation covers our journey. In the early days, STARS students held events at venues such as CSU ROAR Orientation and Girl Scouts of America. By 2013, we were presenting at regional conferences such as the ACM MidSE Conference and Women In Cyber Security. Thanks to the groundwork that STARS leaders completed, we were awarded a $1000 grant in Spring 2015 from NCWIT to hold an event in which we brought 27 elementary school aged girls to CSU and exposed them to Scratch, TouchDevelop, and Lego WeDo. This year, we plan to hold a Django Girls workshop on campus in the fall and a workshop at Carver High School in the spring.

This year, we have become an official student organization, and we hope to illustrate the process for those who may want to form a STARS chapter of their own. In the years ahead, we want to reach out to other organizations who may be interested in helping us achieve our mission. We have already connected with STARS organizations on other campuses, such as one at Florida State University. We're always looking to make new friends. Help us. Together, we can change the world for the better.

FitForMe

Domonix D. Gibson and Justin M. Shipp
University of Tennessee – Martin

Weight loss and also proper weight gain are common issues with which people tend to struggle. FitForMe relieves the stress of being unable to keep up with daily intake of calories and also provides users with the knowledge of which foods and beverages will help achieve their physical goals. The FitForMe app was designed using the Swift programming language and Xcode development software.

Utilizing Emoticons in Sentiment Analysis

Abygail McMillan
University of North Georgia

Until recently, sentiment analysis of Twitter posts ("tweets") has either disregarded emoticons as noisy data or used them to classify text as inherently positive or negative based on the emoticon alone. However, previous research by other teams of researchers has indicated that they should be given a second look based on their impact on the sentiment of the text, which can differ from straight positive/negative influences. In this paper we explore a system designed to integrate both emoticons and text when considering sentiment and compare it with a system that uses only the sentiment of words present when analyzing text. A manually annotated corpus of English tweets, half containing emoticons and half without, will be used to test each system, respectively; the integrated system is expected to correctly identify the sentiment of a larger number of tweets than the non-integrated system.

Illumanon

Yu-Hsuan Chien, Daryl O. Hawkins,
and Matthew J.Proudfit
University of Tennessee – Martin

With the growing possibilities of augmented reality, Illumanon, a group of apps, explores the possibilities of Sony's SmartEyeGlass and the possible future of augmented reality. These apps demonstrate the practicality of using Sony's SmartEyeGlass in everyday life and for special situations, such as receiving text messages, displaying notes, or as a compass. Hopefully, these apps can benefit future users and make their lives more convenient.

Augmented Riffs

William M.Hayes
University of Tennessee – Martin

Augmented Riffs is an app developed for Sony SmartEyeglass for guitar musicians. Augmented riffs not only utilizes the Sony SmartEyeglasses to display the lyrics to songs, but also displays the tablature for the guitar as well, thusl allowing guitar musicians to have a hands free way of reading music.

Intelligent Management of Autonomous Vehicles in a Factory Setting: Simulation and Scale Model

Jacob Maynard and Alex Henderson
AL, University of South Alabama

The following project was designed to model and simulate the functions of a warehouse system equipped with Automatic Guided Vehicle (AGV) technology. An initial simulation of the environment was developed to test various scheduling strategies. The centerpiece of the project was the to-scale mock-up of the warehouse environment integrated with RFID technology to enable landmark recognition. Multiple Lego NXT robots complete with RFID reception antennae and XBEE radio modules represented the AGVs. Communication across the system was moderated by a central control unit according to a hierarchical network structure, which enabled global vision for the system, prevented collisions, contention, deadlock, and stored large amounts of system data for diagnostic and statistical purposes. Model results were compared to simulation results and to data from a manually operated warehouse to determine that equal throughput was possible with automation.

Autonomous Under Water Vehicle

Rotimi Olotu, Darryl Jackson, and Immanuel Brown
Clayton State University

We will be exploring, researching and applying the possibility of an autonomous underwater robot; specifically its physical composition, the breakdown of its movement and also the way by which it moves throughout the water, taking in account all potential obstacles it may encounter.

Notes

Student Abstracts
Master's Degree Programs

The Golden Age of High Performance Graphics

Joseph Shiraef
University of Tennessee – Chattanooga

Currently there is a lot of buzz in the world of computing about the next generation of today's graphics programming API's. Later this year the Khronos Group, the consortium behind openGL, will be rolling out Vulkan (also known as nextGL) which is the next big reboot of openGL. DirectX 12, Microsoft's next big update for their world graphics programming, is set to come out sometime this summer. As expected there are many proclamations about how these new libraries will offer astounding new features which will enhance graphics capabilities across all platforms while lowering overhead. They are claiming to help achieve massively increased framerates. They also claim to have the ability to combine performance among GPU's which would mean a drastic reduction in CPU bottleneck. So it seems this year, 2015 and for years to come, graphics programmers should have a bunch of new toys to keep them busy.

Cloud Security

Pezhman Sheinidashtegol
Western Kentucky University

Cloud Security Cloud computing technology is growing fast and exerting by private organizations, governments, and federal agencies. Clouds are more affordable, consistent, effective and additionally cost less to maintain. This technology can reduce the risk of starting businesses and even transferring from traditional computing centers by decreasing initial costs and providing a quick transition to the beneficiary stage. Nevertheless, one of the controversial issues and obstacles is the concern for security and privacy. Cloud security has its own pros and cons as compared to traditional network and information security. Cloud security is preferable since cloud providers have the chance to have more expertise staff to work on security and privacy, and other critical areas for customers as compared to the norm of most organizations. In addition, uniform platform leads them to a stronger configuration control, penetration testing, security patching, auditing, information assurance, load balancing and traffic monitoring in order to meet better standards. Furthermore, redundancy and disaster recovery are built-in within capabilities of cloud technology, while on-demand features can be used for defending against or mitigating DDoS Attacks. Cloud can also be the best practice for companies with a mobile workforce in regards to data security and accessibility. The affordability and the ever-improving security of cloudhave already convinced multi-billion dollar organizations tojoin the club and many more will follow as cloud services continue to develop in all aspects of computing technology. Despite the numeral improvements already made to cloud technology throughout its life span, cloud services are stillsubject to various different types of security breaches and privacy concerns. Many of the threats and methods of mitigation and defense associated with cloud have been discussed in this paper and the overwhelming focus on improving cloud technology only goes to show the drastic shift that these types of services will experience in popularity.

Building a Middleware for a Vertical Cloud Architecture

Travis Brummett
Western Kentucky Unversity

There are several different implementations of open source cloud software that organizations can utilize when deploying their own private cloud. Some possible solutions are OpenNebula, Nimbus, and Eucalyptus. These are Infrastructure-as-a- Service (IaaS) cloud implementations that ultimately give users virtual machines to undefined job types. A typical IaaS cloud is composed of a front-end cloud controller node, a cluster controller node for controlling compute nodes, a virtual machine image repository node, and many persistent storage nodes and compute nodes. These architectures are built for ease of scalability and availability. Interestingly, the potential of such architectures could have in the educational field remains vastly underutilized. Large labs filled with costly machines could be replaced by an IaaS implementation of a cloud. To manage such an architecture one would need a middleware. Thus, I have developed a middleware using Python sockets. Two programs were written. One serves as a server on each compute node. When executed the server program causing the node to listen for commands from the second program, the client. The client is executed on the head node. The client gets a list of nodes from a database and begins building a list of information about each node using commands passed to the compute nodes through the Python sockets. The program then uses the information gathered to conduct a load balancing function. This function picks the least utilized node and polls it for a list of active virtual machines. The program then uses this list and a database table to launch an inactive virtual machine. This process ensures that virtual machines are spread out evenly across the architecture based on each node's capabilities.

Student Abstracts
Doctoral Degree Programs

Breadth First Search-based Efficient Algorithm for Betweenness Centrality

Natarajan Meghanathan
Jackson State University

The betweenness centrality (BWC) of a vertex i is a measure of the fraction of the shortest paths (between any two vertices) going through vertex i when considered over all pairs of vertices j and k, excluding vertex i. We propose an efficient algorithm to determine the betweenness centrality of the vertices in a complex network graph G(V, E), where V and E are respectively the set of vertices and edges. We first run the Breadth First Search (BFS) algorithm of time-complexity T(|V|+|E|) on each of the V vertices. For a BFS tree rooted at a vertex j, the number of shortest paths from the root j to a vertex i at level l is the sum of the number of shortest paths from j to the vertices at level l-1 to which vertex i has links in the original graph. For any BFS tree, the number of shortest paths from the root to itself is 1. For any vertex i, the number of shortest paths between two other vertices j and k that go through i is the maximum of the number of shortest paths from j to i and from k to i. It takes a total of T(|V^2|+|E||V|) time to run the BFS algorithm across all the vertices of a graph. For every vertex j, it takes another T(|V|+|E|) time to determine the number of shortest paths from j to the other vertices; it takes a total of T(|V^2|+|E||V|) time to determine the number of shortest paths from the root vertices of the |V| BFS trees to the rest of the vertices in the graph. Hence, the overall time-complexity of the above described algorithm to determine the BWC of the vertices is T(|V^2|+|E||V|) and is much less than the T(|V|^4) time-complexity of the Brande's algorithm.

A Content Oriented Middleware for Transportation and Communication

Meng Kuai, Xiaoyan Hong, and Bing Zhou
University of Alabama

Vehicle Ad-Hoc Networks (VANETs) are effective approach to address nowadays transportation issues, such as accidents and traffic jams. However, traditional host-based network architecture limits the message dissemination in VANETs. To tackle this issue, we explore a content oriented network architecture (based on the Named Data Networking (NDN) architecture), which does not require end-to-end connection, but multicast in nature and in-path caching possible. On the other hand, due to the testing and experimentation limitation for a real VANET, many simulation tools have been developed to assess transportation algorithms and network protocols. In order to simulate the content oriented network architecture in a state-of-art simulator, namely, the V2X Simulation Runtime Infrastructure (VSIMRTI), new simulation modules and interfaces are in urgent need. As a result, the simulator will become a framework that supports interoperation between a transportation system simulator SUMO and a network simulator NS-3, with the ability to run NDN module in NS-3 upon the vehicle traffic generated by SUMO, and the interactions between transportation events, communications, and vehicle mobility being controlled by VSIMRTI. In this presentation, we introduce an interactive system which delivers traffic information using NDN upon real-time generated transportation events. Specifically, we designed and implemented a middleware for SUMO and NDNSIM in VSIMRTI framework. Message broadcast has been modified from push-based to pull-based to adapt the middleware to NDN model. In addition, for guaranteeing message delivery, the middleware applied an acknowledge mechanism using flow id. The presentation will also show a scenario where an accident occurs to a vehicle on road and the vehicle broadcasts emergence message to all vehicles around. Other vehicles, upon receiving the message, will switch their routes accordingly.

Community Detection using Betweenness Centrality and Eigenvector Centrality

Natarajan Meghanathan
Jackson State University

The Betweenness Centrality (BWC) of a vertex is a measure of the fraction of the shortest paths that go through the vertex among all the node pairs in a network. The Eigenvector Centrality (EVC) of a vertex is a measure of the degree of the vertex as well as the degree of its neighbors. We hypothesize that nodes having a higher BWC and a lower EVC serve as anchor nodes (have a high BWC/EVC ratio) connecting two or more communities (components) of a network. The anchor nodes have a relatively fewer neighbors (hence a lower EVC score) compared to nodes that are closely-knit within a community (these nodes have a higher EVC score and lower BWC score). We propose a community detection algorithm that removes the anchor nodes of a network (one node at a time; in case of a tie, all the competing anchor nodes are removed simultaneously) until the network gets fragmented into two or more components (communities). Once the first set of communities are detected, the community detection algorithm proceeds further in iterations seeking to identify anchor nodes within each of the smaller components until the modularity scores of the communities detected in a particular iteration fall below the modularity scores of the communities detected in the earlier iteration. The BWC/EVC values for the nodes in the smaller communities are computed afresh based on the nodes and links within the community. The anchor nodes are associated with the community that will increase the overall modularity score. The algorithm also attempts to form a community of the anchor nodes and checks if the overall modularity score would be the greatest by doing so. The proposed community detection algorithm has been observed to perform better than some of the well-known community detection algorithms for complex network analysis.

Relationships Among Polygons, Chebyshev Polynomials and Eigenvalues: A Mathematica Exercise

Zheng Zhang and Murat Tanik
University of Alabama – Birmingham

This paper developed a new 3 dimensional polygon representation model to demonstrate the relationships among polygon, Chebyshev polynomial and eigenvalues in Mathematica. We demonstrate these relationships with our model and generate a series of scatter chart results, which has not been reported in the literature.

DPSL Virtual Platform Module: SDPS Student Membership Web Database Development With Python, MySQL And Apache Server

Zheng Zhang, Ranveer Kumar, Karthikeyan Lingasubramanian, and Urcun John Tanik
University of Alabama – Birmingham

This paper develops a web-based database system for SDPS (Society for Design and Process Science) student chapter for the University of Alabama at Birmingham. In our development, we use Python Script to construct the MySQL database, set up the Apache server and create the user interface webpage using HTML with Python. With this database system, users are able to query, search, add and delete the membership information on a web-browser. This system can be utilized as a module in the Design and Process Science Lab (DPSL) virtual platform architecture in development. The DPSL was established by Texas A&M University-Commerce as a multi-university platform to sponsor, educate, and train students for innovative product design and venture development that supports STEM activity for the SDPS student chapter network. Future work on this type of module will include more special features that promote more advanced social networking capability.

Testing Context-aware Software

Songhui Yue
University of Alabama

Testing context-aware software has become an emerging area along with the rapid development of context-aware software. Context-aware software is considered as a type of software that adapts context-aware ability. We will explain what is context-aware in the presentation. The adaption of this feature to software systems imports new challenges to testing such software. After introducing some testing and context-aware concepts as a necessary background, we will present many identified challenges such as inconsistency of context data, difficulty to identify the effective data, difficulty to find root cause related to adaptation rule, and need of various testing adequacy criteria. We will also present related work to resolve such challenges accordingly. At last, we will conclude the areas of testing context-aware software and explore their relationships to give guidance to future research.

Solution Algorithm of N-Queens Problem by Sets

Serkan Gulda
University of Alabama – Birmingham

N-Queens is a well-known problem. It has various applications because of its mathematical properties, such as combinatorics. Deadlock prevention is one of the known applications. Such is an NP-hard problem, so it does not have an analytical solution. Researchers have developed different techniques to solve the N-Queens problem. All of the known techniques calculate a variation of the combinations of the solutions. In this paper, we eliminate the attacked cells. This technique reduces the possible combinations dramatically.

Professional Abstracts

Demonstrating Asymptotic Analysis in Early Computer Science Courses

Joshua T. Guerin
University of Tennessee – Martin

Asymptotic analysis of algorithm run time is a fundamental area of study in most Computer Science programs. Advanced algorithm analysis techniques are often reserved for upper division students, and are typically covered after the completion of multiple semesters of programming fundamentals, (discrete) mathematics, and basic theory. Because of the importance of the material many programming and data structures texts refer to the basic principles of Big-O analysis as early as the first year. Students at the first and second year may lack the mathematical maturity or computing experience to gain a deep understanding of the justification for Big-O analysis. As such many early treatments of Big-O analysis include intuitive approaches to nested loop analysis and algorithmic steps to simplify polynomial expressions. These basic techniques are often motivated by static figures, tables, and diagrams that explain why such simplifications are used. Such justifications for Big-O analysis serve as a good starting point, however first and second year students may still lack an intuitive understanding of why asymptotic analysis is performed. This presentation will include a brief survey of the treatments of asymptotic analysis in early computer science texts, and will be used to demonstrate the effectiveness of a simple, spreadsheet-based justification for asymptotic analysis in early computer science courses.

Computer Science Curriculum Redesign at Fort Valley State University

Masoud Naghedolfeizi, Nabil Yousif, Sanjeev Arora, and Xiangyan Zeng
Fort Valley State University

The computer science program at Fort Valley State University (FVSU) , a unit of University System of Georgia (USG), is presently going through a major revision to reflect the most current trends in the job market and the ABET computer science curriculum requirements. Additionally, the curriculum redesign is needed to increase the program's appeal to students and employers. The underlying principle for this redesign is to provide more flexibility for students to take major and free elective courses and less emphasis on traditional mathematics requirements (such as Calculus II). Currently, the major area in curriculum of computer science at FVSU includes 60 credit hours of which 9 hours are major electives and 6 hours free electives. The revised program will include 29 credit hours in core curriculum of computer science, 16 credit hours in major electives, and 15 credit hours in free electives. The mathematics requirements will include 19 credit hours with Calculus II placed under major electives. The increased number of credit hours in both major and free electives will allow students to obtain academic concentrations or minors in fields of interest. It should be noted that most minor and concentration programs at FVSU require 15-18 credit hours. It is expected that the program revision would help increase the retention, recruitment, and graduation of students while maintaining a quality undergraduate computer science program aligned with both USG and the ABET requirements. This paper presents the details of curriculum revision and discussion of a number of practical considerations that are crucial to success of the revised computer science program at FVSU.

Teaching Computer Architecture using Visual Software Simulators

Roger Shore
High Point University

Motivating computer science students to learn difficult concepts in computer architecture can be challenging. Over the years a variety of techniques were tried. One technique is implementing problem solutions using actual integrated circuit components. Some students enjoyed this aspect of the course and achieved success. However many students become frustrated when circuits fails with a blown component due to a missed placed connection. In the end, a majority of topics in the course were only discussed in theory with pencil and paper solutions to assigned work. Students wanted better feedback to achieve a deeper understanding. During the last 10 years visual software simulators were utilized instead of building actual circuits. Immediately, student understanding and productivity went up. After the core components at the digital logic level are covered in the class students are assigned a group project to implement the microarchitecture level using a visual software simulator. A typical microarchitecture can be found in chapter 4 of the Structured Computer Organization book by Andrew S. Tanenbaum. Through the implementation of the microarchitecture level all aspects of a modern CPU design can be addressed. This presentation serves two purposes. First, it presents the pros and cons of several visual software simulators in the implementation of the microarchitecture level. Then it demonstrates one student implementation which shows how fundamental concepts in computer architecture are covered.

Computer Science Education: A Systems Approach

Nicholas Coleman
Austin Peay State University

Textbooks for upper-level computer science courses often include the phrase 'A Systems Approach.' The use of this phrase is not limited to computational disciplines. Discussing complex concepts from a systems perspective is common in the natural and social sciences as well. Systems are so pervasive that a great deal of interdisciplinary work has been done to investigate common properties of systems in many fields. Given the pervasiveness of systems in our own field, it is unfortunate that the underlying concepts behind them are typically not discussed at the undergraduate level until students take an upper-level operating systems course. Many institutions have adopted courses in 'systems concepts' as a means of introducing some of the core principles common to upper-level systems courses, but these are still typically upper-level courses taken in a student's third year at the earliest. If we intend our students to be proficient in designing, constructing, and analyzing systems we should not relegate the instruction of systems principles to a small corner of our curriculum. Instead, we should start our students on this path with their first computer science class and reinforce the concepts they learn with concrete examples throughout their undergraduate education. In this presentation I will discuss some of the key principles in the systems approach to computer science and how they may be integrated at all levels of the CS curriculum. I will go beyond the traditional operating systems examples in order to demonstrate how these principles can be applied to each of the subjects commonly taught as part of an undergraduate computer science education.

A Brief Introduction to Digital Marketing

Ken R. Adcock, Jr.
UPS

It is very easy to view web sites and applications as a set of technical problems. However, for most large companies, public-facing web sites are now a key channel for both potential and current customer engagement. The world of engaging customers through TV, radio, newspapers, and direct mail to encourage visits to brick-and-mortar stores has long passed. We have since moved to the use of a web browser from a desktop or laptop to now include the use of mobile devices such as smart phones and tablets. Making a trip to a physical store is increasingly viewed as a wasteful activity. As we know, the internet has made this possible and, as developers, we are all familiar in varying degrees with the technical underpinnings that make this possible. However, a critical element is that digital properties such as web sites have to be managed beyond just the technical considerations. The fundamental question is how do we get people to visit what do we want them to do once they get there? In this presentation, we will examine solutions for categories such as web analytics, advertising, voice of the customer, and more. This is a dimension of web development unfamiliar to even most technical professionals. Behind the scenes, this dimension has significant business importance in terms of generating revenue, ensuring a good user experience, and measuring how well a site is encouraging a user to behave in a desirable way. The goal of this presentation is to introduce the audience to the software industry used to facilitate what is known as Digital Marketing. An additional goal of this presentation is to encourage developers to consider the fundamental business objectives and think beyond just the technical details behind elements such as HTML, JavaScript frameworks, Java, Objective-C, and server-side code.

Get Moving With Yet Another iOS Fitness App

Bob Bradley and Kurt Wesner
University of Tennessee – Martin

One of the hottest areas in iOS apps (other than games) is fitness tracking. There are hundreds of iOS apps to help you keep track of your running and fitness goals. One of the most popular is the iOS app RunKeeper with over 40 million users. This session will examine the development process of building a similar iOS fitness app. We will talk about the process of getting started developing an app: do you start from scratch, start from example code, or purchase a prebuilt app template? We will talk about the technical challenges of: receiving GPS data, storing it in a database, displaying the data on a map, displaying charts of the information, filtering the data, making vocal audio cues and more. Finally, we will talk about our motivations to get off the couch, to get out of the house and to get moving.

Design and Implementation of an App for Paper Competition Judges

Brian Toone
Samford University

The student presentation competition is an important part of the annual ACM Mid-Southeast Conference. Finding judges, assigning judges to presentations, tallying scores and determining a final ranking are all logistical challenges associated with the competition. This presentation will discuss the design and implementation of an app that attempts to simplify the student competition judging process for judges and conference organizers. The mobile app allows judges to scan a QR code assigned to the current presentation in order to pull up an electronic scoring sheet for the presentation. Additionally, judges are able to see a summary of all the presentations they have judged. Conference organizers are able to manually enter scores for any judges who turn in paper scores. Additionally, conference organizers are able to see a summary of all scores for all presentations to determine final rankings.

Real Time Online Poll / Quiz / Attendance System

Bob Bradley and Matthew McAlister
University of Tennessee – Martin

In this session, we will demonstrate a new real time online poll / quiz / attendance system that we are developing. The system is patterned after the 'clicker' system, but is unique in that the students can use their smart phones, tablets or notebooks to interact. The students can join the interaction by simply pointing their phone to a QR code or by typing in a short URL. Once online, the student's web browser is taken to a real time controlled web page, that lets the instructor control when each question is displayed, show the results of the questions in real time and then automatically advance each student's browser to the next question. The system also gives feedback to each student. We will give an actual real time demo of this system. We will also talk about all of the technologies behind it which include include: node-js, angular-js and websockets. We will also talk about the technical challenges we faced and the other features we are adding such as real time quizzes and attendance tracking. Please make sure that you have a QR app on your smartphone if you wish to participate.

Plagiarism
Are Our Students Culturally Different?

Kathy Winters
University of Tennessee – Chattanooga

As educators we spend a great deal of time checking for plagiarism and cheating, teaching what is and isn't plagiarism, being frustrated over the lack of progress in dealing with the topic, program, such as SAM and SafeAssign, are even written to detect cheating and plagiarism. A lot of energy is spent on this topic and yet our students still plagiarize. The question is why? Are current students just lazy, or ignorant, or perhaps culturally different. Perhaps looking at this issue from a different point of view may answer these questions. In this presentation I will examine the thought that, in the student's eyes, they are not committing plagiarism rather using material that is readily available to them. Perhaps students consider it 'code' or 'information' reuse. The internet has put information at our student's fingertips and it is readily available to them with a click of the mouse. Perhaps we need to look at plagiarism differently as a way of stopping plagiarism. In this session, we will explore the thought that our students are culturally different in the way they view plagiarism. By understanding the cultural, perhaps we can find solutions to the problem.

Augmenting Tegrity Lecture Recordings with a PIP Video Stream of the Roaming Instructor

G. Jan Wilms
Union University

Making a video recording of a lecture is helpful for students who missed class, for students who want to review for a test, and to use at some future semester when the instructor has to miss class. Such a recording typically shows the instructor screen with voice over, optionally with a picture-in-picture from a webcam. There are several companies which sell such capture software, some with advanced features such as search queries based on indexing of shown slides and even voice recognition. Webcams behind the instructor machine unfortunately don't work very well when the professor tends to move around in the classroom - a wide-angle camera showing the whole room gives a better picture of what is going on, especially in cases of student participation. Unfortunately, the quality of the audio quickly deteriorates as the instructor moves away from the webcam. SWIVL sells a device that rotates a recording device like an iPhone to follow the instructor by targeting a dongle s/he wears. This dongle also acts like a remote microphone. Thus the instructor is always centered in the picture even when away from his computer, and the voice quality remains excellent. Unfortunately recording software like Tegrity only works with a live video stream. This presentation will show how the offline recording can be integrated into the lecture capture after the fact. Best practice is to synchronize the instructor's video with the wide-angle footage as a PIP. The only drawback is the amount of time it takes to do this editing and rendering.

Gearing up for Distributed Computing: Learning how to Java

Kathleen Ericson
University of Tennessee – Martin

Modern distributed systems frameworks are primarily Java-based. In order to leverage these tools, students must first become competent and comfortable with the Java programming language. This can be a challenge when no student in the room has worked with Java before. Here we present a first pass at a Java Bootcamp designed to ensure that all students have the basic Java chops to be able to start working with Java-based frameworks. Success is then measured against the first large-scale programming assignment of the course where students have built a distributed Instant Messaging application.

iTunesU Extra Credit

Denise Williams and David Williams
University of Tennessee – Martin

This semester one of the authors teaches a class that is new to the author. The author is experimenting with offering new extra credit assignments in that class. The assignments involve students finding course-related content videos or podcasts in iTunesU, and then sharing links to those videos or podcasts with the class in discussion spaces. This presentation will discuss the assignments, associated challenges and potential lessons for the author from the assignments.

Processor Resource Utilization Measurements in Simultaneous Multi-Threading Configurations: Synthetic Benchmark Analysis

Joseph Elarde
Austin Peay State University

This presentation discusses our recent research into the IBM Power7 architecture to explain an observed processor bottleneck and unexpected processor utilization measurements. Our research was conducted in collaboration with the IBM Power Systems Center Laboratory though the IBM Academic Initiative which enabled us to study multiple shared Logical Partition (LPAR) configurations with Simultaneous Multi-Threading (SMT) active. After completing multiple synthetic benchmark studies, we have gained an understanding of the issues involved enabling us to develop a methodology to more accurately report processor utilization and thereby improve the precision of the capacity planning forecasts. In the presentation, we review multi-threading, logical partitioning, and other related concepts; we then present and analyze benchmark data captured to illustrate the utilization issue; after which, we describe what we consider to be workable alternatives.

Priority Inversion Issues in Real-Time Systems

Srinivasarao Krishnaprasad
Jacksonville State University

A primary requirement in a real-time system is that the individual task deadlines are met. Specifically, high priority tasks will be able to preempt currently executing low-priority tasks and thus make progress in meeting the deadlines. Also, real-time applications are often coded as cooperating, concurrent tasks. This will invariably involve mutually exclusive access to various resources. When a task is currently accessing an exclusive resource another task requesting the same resource has to wait and hence is blocked. The dynamic interplay between these activities may result in a situation where a higher priority task is waiting while a lower priority task is running, a scenario termed as priority inversion. This will result in unpredictable execution timelines for the various tasks and may lead to time-critical tasks missing their deadlines. Priority Inheritance Protocol (PIP) and Priority Ceiling Protocol (PCP) are two common strategies to deal with priority inversion problem. PIP uses dynamic priorities meaning if a high priority task X is blocked for a low priority task Y to perform a computation then task Y inherits the priority of task X. The problems with PIP are transitive blocking leading to excessive delays and unnecessary blocking for some tasks. PCP addresses some of these issues. It assigns a priority to the lock of a shared object based on a ceiling which is the highest priority of any task that may use that lock. Also, the task using that lock will automatically execute at that priority ceiling. Two variations of PCP are discussed by researchers: original ceiling priority protocol (OCPP) and immediate ceiling priority protocol (ICPP). In this presentation we will review the basic ideas behind several of these protocols along with some recent suggestions from real-time researchers.

Determining the Accuracy and Precision of Spatial Data through the Use of GPS-Enabled Mobile Devices

Leong Lee, Gregory S. Ridenour, Matthew Jones, and Michael J. Wilson
Austin Peay State University

GPS-enabled mobile devices such as smart phones and tablets are extremely popular today. Billions of such devices are currently in use. The application and research potentials of these devices are limitless, but how accurate are these devices? The research team used Average Euclidean Error (AEE), Root Mean Square Error (RMSE), and Central Error (CE) to define and calculate the accuracy and precision of six popular GPS-enabled mobile devices, running on two different operating systems (Android and iOS), in a particular geographical region in Clarksville, Tennessee, USA. Spatial data (multiple measurements) consisting of latitude and longitude coordinates of positions reported by these six GPS-enabled mobile devices were collected at nine different physical locations (control points). The results of the field data were ranked and compared, through the use of three different measuring protocols. Protocol 1 is defined as a scientific protocol, with Wi-Fi disabled on all devices. Protocol 2 is defined as a realistic protocol, with Wi-Fi disabled on all devices. Protocol 3 is defined as a realistic protocol, with Wi-Fi enabled on all devices. The scientific protocol is designed to simulate standard scientific experimental practices. The realistic protocol is designed to simulate daily usage of mobile devices. In this preliminary study, it was discovered that various mobile devices performed differently in terms of AEE, RMSE, and CE. It also shows that the protocol is not a significant contributing factor to the variation in the measurements in terms of accuracy and precision. The device and operating system are contributing factors to the variation in the measurements. The location is a significant factor to the accuracy of device measurements.

Lazy Evaluation of Unstructured Mesh Queries in C++

Craig Tanis
University of Tennessee – Chattanooga

Unstructured meshes are a common way to represent discretized geometries in computational simulations and computer graphics. To facilitate experimental applications in these fields, we've developed a software framework that allows users to write abstract mesh queries in standard C++. Template techniques provide optimized performance, and the resulting compiled queries are evaluated lazily. A description of the framework will be presented, along with applications involving computational simulations, performance analysis and future directions for this work.

Summer Camps: The What and the Why

Kellie W. Price and Suzanne Smith
East Tennessee State University

At the Department of Computing at East Tennessee State University, part of our mission has always been to reach out to the community and region. The department has accomplished that through service learning in the department's senior capstone course, the PASTA (Providing Area Schools with Technical Assistance) program which refurbishes donated computers for use in area schools, and summer camps. The department started its first summer camp outreach 15 years ago with the development of a Girls In Science & Technology (GIST) camp. GIST, which was developed by two faculty members in the department, targets rising 5th and 6th grade girls. Camp sessions have been developed and taught by ETSU faculty from the Department of Computing, Department of Physics and Astronomy, College of Pharmacy and College of Medicine. The goal of GIST is to introduce female students to a wide variety of sciences and technology. To expand the department's outreach and offerings, in the last two years the department has also partnered with 100 Girls of Code and TN Code Academy which are well established external organizations. The 100 Girls of Code camp targets females from 12 to 18 years old. Code Academy camps/workshops are open to males and females from 10 to 16 years old. The focus of these two camps is only on computational thinking and programming. During the conference presentation we will explore the content of these camps, details on running these different types of summer camps, and the benefits and challenges of each.

30 Pairs of Hands and One Terminal

Robert Lowe
Maryville College

I like to code code with my students, especially with beginning students. Thinking through examples and seeing them converted into code in class really seems to help them. The only problem is, how can we make this an interactive activity? If I am the only one typing, then students have to dictate code to me and something seems to be lost. If, on the other hand, students are invited to the projector to type, they tend to freeze from the shock of it all. I stumbled upon an answer while playing around on a public UNIX server. A friend of mine joined me and used GNU screen to share a terminal session to perform remote "pair programming", an agile software technique where two programmers share one computer. In our case, we were sharing a PTY and talking over the phone. About mid-way through the session, it hit me. I asked my friend, "What would you think of having a classroom with, say, 30 students, all sharing a PTY?" My friend replied "That sounds confusing and irresponsible." Naturally I had the setup ready to go by the next day's class meeting. This presentation is about this technique of sharing one terminal session among thirty students. I will detail my initial attempts, which were really just cobbled together via scripts and a telnet daemon, and then later attempts with a stand alone piece of software created for this purpose. Thirty people can sit in a room and work through code together Now, in my introductory classes, I very rarely type code, and my lectures take on a new form where I coach my students through writing programs to solve a problem. Students seem to catch on quicker, and they seem awake and attentive. In fact, they really seem to enjoy these sessions!

When Secret Sharing Schemes Are Not Used Properly

Yesem Kurt Peker
Columbus State University

Secret sharing schemes enable us to 'break' some secret information into 'pieces' called shares and require all or some of the shares to be present to reconstruct the secret. Secret sharing schemes have found applications in various areas since their introduction by Blakely [1] and Shamir [2] in 1979. However, not all applications make proper use of the secret sharing schemes; that is, the use of a secret sharing scheme does not deliver the perceived security in the application. This study focuses on such applications and discusses ways to improve the security in those systems. [1] G. R. Blakley. Safeguarding cryptographic keys. In Proc. AFIPS 1979 NCC, vol. 48, pages 313-317, 1979. [2] A. Shamir. How to share a secret. Communications of the ACM, vol. 22, pages 612-613, 1979.

Cyber Physical System Security: A Survey of Challenges and Existing Solutions

Lydia Ray and Hoda Mehrpouyan
Columbus State University

Cyber Physical System (CPS) is composed of both computational and physical elements, deeply embedded in a physical process, typically providing monitoring and actuation services. Such systems are envisioned to enable many pervasive computing technologies such as smart home, smart vehicle, smart health monitoring systems etc. Security of such systems is extremely important when considering the risks that a compromised CPS can pose to human life. Research on CPS security is currently in a very premature stage, with a very few existing solutions for a very specific CPS applications. As complex as Cyber Physical systems are, one of the biggest challenges in providing an all-compassing security solution is modelling security in CPSs in a realistic manner. Consequently, modeling and simulation as pointed out previously is no longer an after-thought. It is a forethought that security is built into the design as a part of a layered defense system architecture. As evident by the current research simulation and modeling should be used to analyze complex problems in order to predict what may happen in the future. This ability to predict allows for a future course of action to be implemented to deal with a crisis. The goals of our current research project are as follows: Understanding different aspects of CPS security; Survey all existing solutions for CPS security; Analyze these solutions and determine their merits and demerits; Working towards finding a solution that addresses the yet unresolved issues of CPS security. In this presentation, we will discuss the following: Importance of research in CPS security; Different aspects of CPS security as compared to cyber security; Challenges of finding a good security solution for any general CPS; Analysis of existing solutions for CPS security; Future research directions.

Is CS0 Working? A Case Study

William H. Hooper
Belmont University

Launched in 2002, CSC 1020 (Computer Science Inquiry) is a general education course at Belmont University that teaches introductory math and CS concepts using Java web applets. It was designed to "hook" talented students into the CS1-2 sequence, particularly those with weaker math skills, while simultaneously identifying students whose talents and career aspirations are not in sync. The course uses the same language and IDE as the CS1-2 courses, a design decision intended to help weaker students master the programming environment before tackling more abstract programming concepts.

We present the data that we have collected since the Fall of 2011. Simple head counts show that CSC 1020 has a significant positive effect on enrollments in CSC 1110. Using grades in CSC 1020 and CSC 1110, we assess whether students from CSC 1020 do as well in CSC 1110 as those who jump directly into the latter course. We account for differences in the preparedness of the two groups using math ACT scores when available, and Belmont's Math placement test scores where not.

Our program is small, and we have not accumulated enough data to establish with certainty that CSC 1020 improves student outcomes in CSC 1110. Our preliminary findings do show useful correlations, and our methods may provide a useful model for other institutions.

Malicious Android Apps: Threat Assessment and Open Problems

Radhouane Chouchane
Columbus State University

According to the 2015 edition of Android Security Survey, the year 2015 has seen a substantial growth in the global usage of mobile devices, and exposure to malicious apps, especially by those users who are running the Android operating system. This growth came at a time when (1) about 50% of mobile device users are not aware that they need to install a security app to face this rising threat by the malicious mobile apps and (2) about 70% of a device's network packets get exchanged in the back end, without the user's knowledge of the purpose of these exchanges. We will present an annotated survey of the ways in which these threats have been categorized and provide a breakdown of the most serious ones that, to this day, neither industry nor academia has seemed to be able to fully control. We will share, using examples, our findings about those 2015 malicious apps that are the hardest to detect because of their reliance on such inevitable facts as: (1) smartphones that are constantly connected to a network, (2) apps that use the network and location services without explaining why, and (3) apps that retain their original permissions even when an Android OS upgrade may interpret these permissions differently than the previous version of the operating system. We will survey the recent static and dynamic methods which attempted to mitigate these threats, especially the covert channels which use vibrations and other means to communicate sensitive information to other apps or to nearby devices. We will conclude by exploring the ways in which these methods may be improved in the future. We hope that our discovery, and sharing, of these open problems will inspire the computing community to devise more effective ways for improving the existing mobile security platforms.

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– Undergraduate 2	**Session I– Doctoral**
	Chair: M Wiggins	Chair: G Wiggins
9:15 AM	Dosunmu, et al	Meghanathan
9:35 AM	Fongang, et al	Kuai, et al
9:55 AM	Barnes	Meghanathan
10:15 AM	Koudonou, et al	Zhang
	Session II– Undergraduate 2 and Undergraduate 4	**Session II– Masters/Doctoral**
	Chair: M Wiggins	Chair: G Wiggins
10:40 AM	Howell	Zhang,, et al
11:00 AM	Pritchett, et al	Yue
11:20 AM	Co, et al	Shiraef
11:40 AM	Nolte, et all	
12:00 PM	**Lunch–Patio Restaurant**	
	Session III– Undergraduate 4	**Session III– Undergraduate 4**
	Chair: Winters	Chair: Chouchane
1:00 PM	Whiteman	Wilson
1:20 PM	Higgins, et al	Bryant, et al
1:40 PM	Nolte, et al	Oberstadt, et al
2:00 PM	Ogbonnaya, et al	Zayatz, et al
2:20 PM	**Break–Poolside**	
	Session IV– Graduate Poster	**Session IV– Undergraduate 4 Poster**
2:35–3:30 PM	Sheinidashtegol	Threadford, et al
	Brummett	Goulet, et al
	Guldal	Causey
4:30 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 - Undergraduate 4	**Session I– Professional**	**Session I– Professional**
	Chair: Winters	Chair: Chouchane	Chair: Williams
9:15 AM	Collie	Guerin	Adcock, Jr.
9:35 AM	Lamberson	Naghedolfeizi, et al	Bradley, et al
9:55 AM	Naylor	Shore	Toone
10:15 AM	Pinkert	Coleman	Bradley, et al
	Session II– Undergraduate 4	**Session II– Professional**	**Session II– Professional**
	Chair: Naghedolfeizi	Chair: Chouchane	Chair: Williams
10:40 AM	Brooks, et al	Winters	Elarde
11:00 AM	Nguyen, et al	Wilms	Krishnaprasad
11:20 AM	Cordell, et al	Ericson	Lee, et al
11:40 AM	Dickerson, et al	Williams, et al	Tanis
12:00 PM	**Lunch–Patio Restaurant**		
	Session III– Undergraduate 4	**Session III– Undergraduate 4**	**Session III– Professional**
	Chair: Adcock	Chair: Yousif	Chair: Naghedolfeizi
1:00 PM	Carter, et al	Newton	Price, et al
1:20 PM	Dunlap, et al	Esfahani	Lowe
1:40 PM	Evans, et al	Clark, et al	Peker
2:00 PM	Henderson, et al	Hudson, et al	Ray, et al
2:20 PM	**Break–Poolside**		
	Session IV– Undergraduate 4	**Session IV– Undergraduate 4**	**Session IV– Undergraduate 4 / Professional**
	Chair: Adcock	Chair: Yousif	Chair: Naghedolfeizi
2:35 PM	Corcoran	McMillan	Maynard, et al
2:55 PM	Cartmell, et al	Chien, et al	Olotu, et al
3:15 PM	Corcoran	Hayes	Hooper, et al
3:35 PM	Gibson, et al		Chouchane
4:30 PM	**Business Meeting–Highlander I**		
7:00 PM	**Awards Banquet–Azalea**		

Glenstone Floor Plan