

Computer Science Department

Missouri University of

Science and Technology



ACM-Women



ACM



ACM SIG Security



IEEE Computer Society



ACM SIG Game



Spring 2012 Newsletter

Graphic by Michael Wisely
Computer Science Major

In this issue

Chair's Message	2	Expanding Cyber Diversity	15
Welcome to the Department	3	NSF Industry/University Cooperative Research Center	16
Academy of Computer Science	4	2011 Computer Science Department Colloquium Series	17
Computer Science Awards Banquet	5	Guest Speaker Susan Elliot	23
Scholarships and Special Awards	6	Computer Science Student Organizations	24
Computer Science Advisory Board	7	Missouri S&T 2011 AI Tournament	26
Alumni News	8	Selected Graduate Certificate Programs	29
2012 Computer Science Phonathon	8	Departmental Research Labs & Highlights	32
Computer Science Department Picnic	9	2011 Publication by Research Area	39
Keeping in Touch	10	Donations Alumni and Friends	47
Outstanding Teacher Awards	13	New Technology Space Classroom	50
Computer Science Degree Recipients	14	Thanks	51



CHAIR'S MESSAGE

Dear friends of the CS department,

Greetings from Missouri S&T's Department of Computer Science and welcome to the spring 2012 edition of the CS Newsletter. This letter is my fourth formal interaction with you as I start my fifth year of service at Missouri S&T. The 2011 calendar year has been another exciting period and another successful milestone for the CS department.

This year was marked by another state revenue shortfall. Though the departmental budget was not affected, we are still very concerned since it is anticipated that next year's budget will be flat at best. Nevertheless, in spite of the budget cuts and economic hardships, we remain committed to continuing on our path to success, mainly due to the efforts and sacrifices of the CS faculty members.

Summer 2011 was highlighted by two events:

- a) successful recruitment of three new junior faculty members, and
- b) completion of the CS multipurpose multimedia technology space.

Once again, I am extremely pleased to report that all performance indicators such as productivity, research expenditures, students' satisfaction, and students' teaching evaluations, are indicating strong improvement relative to the last year.

- A. Enrollment: Student enrollment in the CS department, again, grew at a faster rate than the university. Relative to fall 2008, in spite of raising the admission and degree requirements, enrollments at the BS level grew 36% and our PhD level grew from 9 in 2008 to 39 in 2011.
- B. Course offerings: In spite of offering an increased number of upper level courses in support of our expanded graduate programs, all lower level courses (except for CS53) are now offered by faculty members without sacrificing their offering frequency.
- C. Productivity and scholarly activities: Our research productivity in terms of funded research and publications continues to grow. Relative to the 2006 calendar year, the research expenditures of the department for the 2010 calendar year grew more than 800%. At the moment, our faculty members are involved in 44 funded research projects supported amongst others by the National Science Foundation (NSF), U.S. Department of Education, U.S. Air Force, U.S. Army, U.S. Department of Defense (DOD), U.S. Department of Energy, Oak Ridge National Laboratory, Sandia National Laboratories, Hengsoft, Rockwell Collins, Office of Naval Research, Boeing, and the University of Missouri System. More than 75% of our PhD students, a significant number of our MS students, and even some of our top undergraduated students are financially supported through these efforts.

Two outstanding alumni joined our computer science academy: Pam (Thebeau) Letterman and Susan Hadley Rothschild were inducted into the Missouri S&T Academy of Computer Science (ACS). I would like to welcome them and I am looking forward to their active contributions to the department. The 2011 CS Academy meeting was held on October 7, 2011, the CS student award banquet was held on April 7, 2011, the CS Advisory board meeting was held on April 8, 2011, and the 2011 CS picnic was held on September 24, 2011.

We are eager to hear from you and your reflections on the program. As part of our accreditation process (both ABET and the Higher Learning Commission) you, as stakeholders, provide vital input in assessing how

well we are delivering education.

To the 2006 Alumni, as 5 year alumni you will be receiving an alumni survey in the mail. Please fill this out and send it back – the information requested measures our departmental objectives, including technical background, communication, life-long learning, and societal appreciation. Tell us how we did, now that you’ve been out for awhile. Or you may fill it out online at cs.mst.edu (navigate to “Alumni, Corporations & Partner - alumni survey”).

To our employers, your feedback is vital – we need to continue to produce the students you want to hire. Take a moment to fill out our employer survey at cs.mst.edu (navigate to “Alumni, Corporations & Partner - employer surveys”). Alternately, if you’re on campus, fill out a survey when you’re in the Career Opportunities Center. Your input tells us how our fresh graduates stack up against your expectations.

Finally, the computer science department is humbled by, and deeply grateful for, the financial support of its alumni and corporate partners.



Ali Hurson
Department Chair, Professor

Welcome to the Department



The Computer Science Department is pleased to welcome Dr. Zhaozheng Yin as a new Assistant Professor in the Fall 2011 semester. Dr. Yin received his PhD from Pennsylvania State University in 2009. His research interests are in the areas of Computer Vision, Biomedical Imaging, Machine Learning, Signal Processing, and Robotics.



The Computer Science Department is pleased to welcome Dr. A. Ricardo Morales as a new Assistant Teaching Professor in the Spring 2012 semester. Dr. Morales received his Ph.D. from Texas Tech University in 2010. His research interests are in the areas of Answer Set Programming, Declarative Programming Languages, Knowledge Representation and Formal Program Verification.



The Computer Science Department is pleased to welcome Dr. Marouane Kessentini as a new Assistant Professor in the Spring 2012 semester. Dr. Kessentini received his Ph.D. from University of Montreal (Canada) in 2011. His research interests include the application of artificial intelligence techniques to software engineering (search-based software engineering), model-driven engineering, software quality, and re-engineering. He has published around 30 papers in conferences, workshops, books, and journals including four best paper awards. He has served as program committee member in several conferences and journals, and as organization member of several conferences and workshops. He was the associate director of the International Center of Excellence in Software Engineering at Qatar University in 2011.

Two inducted into Missouri S&T's Academy of Computer Science

Two Missouri University of Science and Technology alumni were inducted as members into the Missouri S&T Academy of Computer Science in 2011.

The academy honors outstanding computer scientists for their contributions to the profession and their involvement with Missouri S&T students and faculty. The academy also serves as an advisory group to the computer science department. The web site for the Missouri S&T academy is:

<https://sites.google.com/a/mst.edu/csacademy/>.

New members are:



Pam (Thebeau) Leitnerman is a business and marketing professional in the computer industry. She retired from Hewlett-Packard in 2007 after a 28-year career. Prior to working for Hewlett-Packard, Leitnerman taught mathematics in the Rolla Public Schools. She is an active member of the Silicon Valley chapter of the International Association of Business Communications and has served on its board of directors for three years. Recently, she was the featured kick-off speaker for Women's History Month at Missouri S&T. Leitnerman earned a bachelor's degree in applied mathematics from S&T in 1975.



Susan Rothschild is a CPA for the John T. Straub firm in St. Louis. She joined the firm in 1993. Previously, Rothschild worked for Southwestern Bell Telephone Co. for 14 years. She has also served as vice president of Sandy Rothschild and Associates. She is currently president of the Miner Alumni Association and serves on the Missouri S&T Board of Trustees. Rothschild earned a bachelor's degree in computer science at S&T in 1974.



Left to right John Lovitt, Susan Rothschild,
Dr. Ali Hurson, Dr. Robert Schwartz,
John Mathis and Dean Swisher



Left to right Karen Squires-Foelsch, Pam Leitnerman,
Dr. Ali Hurson, Dr. Robert Schwartz,
John Mathis and Dean Swisher

Computer Science Awards Banquet

The Tenth Annual Missouri S&T Computer Science Department Awards Banquet was held on April 7, 2011 bringing students, faculty, staff, alumni, and friends together for an evening of food, fun, and awards. A short reception preceded the banquet. Following a delicious meal, Ms. Kathy Henely, COO, Perficient, and a CS Alumnus, presented a talk entitled "Your Career Adventure: Enjoy the Ride". The evening concluded with the distribution of fabulous door prizes donated by several of the banquet sponsors. In addition to door prizes, banquet sponsors also sponsored tables for the event. The money from table sponsors made it possible for all Computer Science majors to attend the banquet free of charge. The 2012 Computer Science Awards Banquet is scheduled for April 9, 2012. If you are in the area, we would be delighted to have you join us. If you and/or your company would like to participate in the 2012 banquet, please contact Rhonda Grayson at rhondag@mst.edu or Dawn Davis at dawnd@mst.edu. Additional information about the banquet can be found at: <http://cs.mst.edu/department/csbanquet/CSawardsBanquet.html>.

Sponsors for the 2011 event included:

A Slice of Pie
 Alex Pizza
 Blossom Basket
 Boeing
 Coachlite Lanes
 Colton's Steakhouse
 Dairy Queen
 Domino's
 El Maguey's
 Garmin

Gordoz
 Hardee's
 Imo's Pizza
 Keys Sport Shop
 Lee's Chicken
 Maid Rite
 Matt's Steak House
 Mobil
 Panera's
 Pizza Inn

Purina
 Randy' Roadkill BBQ
 Shoney's
 Sirloin Stockade
 Sonic
 South Central Creamery
 Missouri S&T Bookstore
 University Bookstore



Missouri S&T 2011 Undergraduate Research Conference



2nd Place – Joseph Kurtz –
 Balancing Limited Resources for
 Speech Transcription on
 Mobile Devices - Research
 Advisor, Dr. Daniel Tauritz /
 Computer Science



Craig Henely, Kathy Henely
 and Dr. Ali Hurson



Rachel LaFiore won the Student Union
 Board's scholarship for volunteerism



Bader Alotaibi won Student
 Council's "Rookie of the Year" award

Scholarships and Special Awards

CS Department Special Awards

Distinguished Speaker Award
Kathy Henely

CS Leadership Award
Kyle Ensing

CS Mentor Award
Matt Nuckolls

CS Ambassador Award
Ravi Arvapally

**Outstanding Computer Science
GTA Award**
Josh Wilkerson

Scholarships

Accenture Scholarship
Dylan Williams
Anthony Lonigro

**John W. Hamblen Computer
Science Scholarship**
Gerard Busch

**Ellen M. Hodges Memorial
Scholarship**
Katelynn Burns
Lisa Tatro

**Rex Widmer - RWS - Software
Archaeology Computer Science
Scholar**
Corey Busche

**Daniel C. St. Clair Scholars &
Fellows**
Jared Gohr

Mark X. Stratman Scholarship
Joseph Austin
Christopher Jones
Jake Bielefeldt

**Howard L. & Lois M. Cook
Scholarship**
Vincent Pizzo

Garmin Scholarship
Seth Green
Wayne Viers III

CS Alumni Scholarships
Justin O'Brien
Thomas Reese
Dennis Holt II
Alex Bertels
Michael Catanzaro
Kyle Jamison
Donald Halsted Jr.
Elliott Kopp
Jason Rosσμαier
Nathan Barron
Max Eisenbraun
Katrina Ward
Robert Dunn
Jessica Misak

CS Academic Achievement Award 4.0 GPA

Freshman
Luke Allen
Alex Bertels
Jared Gohr
Conner McKinney

Sophomore
Gerard Busch
Mark Elders
Jordan Denny
Matthew Lindsay
Justin O'Brien
Alex Wright

Senior
Jacob Pennington
Thomas Reese
William Reynolds
Jason Rosσμαier
Thomas Roth
Stewart Sanchez

Masters
Lekshmi Chidambaram
Brian Goldman
Steven Jackson
Raghavendra Kotikalapudi

Ph.D.
Amir Bahani
Nathan Elo
Li Feng
Thoshitha Gamage
Thomas Szalapski



Computer Science Advisory Board

This year, the annual CS Awards Banquet and the Advisory Board meeting were held on April 7 and 8, 2011, respectively. Ms. Kathy Henely, COO, Perficient, and a CS Alumnus was our keynote speaker. She delivered an inspiring talk entitled, "Your Career Adventure: Enjoy the Ride". The talk highlighted "the ups and downs and the challenges one faces in every job". She advised students to "always take chances and not to be afraid of making mistakes".

During the banquet, many scholarships and a number of door prizes were awarded to students. We wish to extend our sincere thanks to the CS Advisory Board members, CS alumni, corporations, and local businesses for sponsoring tables, providing scholarships, and donating door prizes for this event.

The Board meeting had a full agenda ranging from the state of the department, research activities in the department, and expanding the distance program. The discussion topics included: (i) research in software engineering, (ii) research in secure distributed platforms to identify and share information, (iii) eLearning and Blended learning practices, and (iv) remodeling and strategic planning. The board members made many practical suggestions and unanimously endorsed our quest for excellence.

We appreciate the time and dedication of the Board members in contributing to our continuous efforts to improve the quality of education in the Department. Their perspectives provide valuable insights to the Department as we develop and revise our academic and research programs. If you are interested in serving on the CS Advisory Board, please send us an e-mail at csdept@mst.edu, along with a short bio.

CS Advisory Board Members (2011-12): Amanda Mechlin (Cerner), Robert (Bob) Perry (MasterCard), Craig Walters (Monsanto), Curt Schroeder (AT&T), Jeff Herzog (Maryville), Jim Lahm (Reliv International), Jim Leonard, (Boeing), John Brown (Purina), John Stone (University of Illinois), Ken Brenneke (Boeing), Kent Lynn (Verizon), Matt Dissinger (Garmin), and Robert Byrne (Boeing).

The Advisory Board website is: <https://sites.google.com/a/mst.edu/csadvisory/>.



From left to right Jeff Herzog (Maryville Technologies), Jim Leonard (The Boeing Co.), Robert Perry (MasterCard International), John Stone (University of Illinois), Amanda Mechlin (Cerner), Back Row Craig Walters (Monsanto), Thomas Weigert (Dr. Daniel St. Clair Endowed Chair), Matt Dissinger (Garmin International), Ken Brenneke (The Boeing Co.), John Brown (Purina) & Dr. Ali Hurson Department Chair.



Alumni News

Ralph Szygenda, CS '70, former global CIO at General Motors, Bell Atlantic and Texas Instruments and now a strategic consultant at iRise, a business applications vendor in El Segundo, Calif., was listed in the Jan. 10 issue of Computerworld.

Joanna Kovarik, CS '10, was named to the All-Great Lakes Valley Conference (All-GLVC) third team.

Roger Fleig, CS '97, and wife Mandy, had a girl, Scarlet Rebekah, on Feb. 16, 2010. She joins brothers Jack, 10, Grady, 7, and Asher, 4.

Tommy Lee Stocking, CS '89, My wife, Sarah, and I are enjoying life with our two daughters, Lilia (age 4), and Anya (age 2). I'm still at Raytheon in Aurora, Co. I was recently promoted to Engineering Fellow, and I'm developing the data processing system for JPPSS (NASA/NOAA polar weather satellite), as well as consulting on a planning and scheduling system for a commercial satellite imaging system.

Laura (Mills) Harrington, CS '83, I returned to the classroom last fall for one class--the first time since my stroke in 2007.

Lister Florence, CS '07, works for U.S. Geological Survey as an information technology specialist. He was recognized for his achievements during the Legends Banquet on Saturday, October 8, 2011.

Glenn E. Cordes, CS '74, attended "The Golden Alumni event in May 2010 and had a great time.

Brian McCrary, CS '99, and his wife, Amanda, had their third child, a boy named Ezra Daniel, on December 19, 2010.

2012 Computer Science Phonathon

Last year's Computer Science Department phonathon was held in April and, thanks to all the alumni, it was a great success. The Missouri S&T Computer Science Department received pledges totaling \$44,995. Thank you to all those who made this possible, and thank you for supporting the students!

This year's phonathon will be held January 9, 10, 11, 12, 15, 16, 17, 18 and 19, 2012. With the economy as it is, please answer your phone and say "Yes," when asked to make a pledge. Taxpayer support accounts for only a minor portion of the university's revenue, making your contribution a vital ingredient in the revenue pie. Any amount you give will be greatly appreciated.





The Fourth Annual Computer Science Department “Friends and Family Picnic”

Thank-you to everyone who came out to this year’s picnic! We had a great time! Thanks to support from the Computer Science Department and great weather, we were able to pull off another fun-filled Saturday at Schuman Park. Thanks to Rhonda Grayson and Dawn Davis who did a wonderful job organizing the event by arranging all of our reservations, food orders and setting up. This year we played t-ball, sand volleyball, a skit that was well done by our faculty, along with a Geo-caching game & wonderful food catered by Jimmy John’s & Lee’s Chicken.

Pictures and videos can be found at: <http://cs.mst.edu/department/picnic/2011PicnicPictures.html>.

We hope to see all of you there next year!



KEEPING IN TOUCH



DR. SRIRAM CHELLAPPAN is busy conducting research on various aspects of networking and security of Internet, Sensor Networks and Vehicular Networks. His research is funded by Army Research Office, Missouri Research Board and University Transportation Center. He is also busy advising his new Ph.D. and Masters students on various research topics. He enjoys teaching courses in Automata, Operating Systems, Computer Networking and Advanced Network Security.



DR. MAGGIE CHENG is working on network performance optimization and fault diagnosis. She still serves on the technical program committees of several major conferences in computer networks and communications, including INFOCOM, ICC and Globecom. She teaches Algorithm Analysis class and Computer Networks class this fall. She was on sabbatical leave for Spring 2011.



DR. FIKRET ERCAL is collaborating with faculty from Biological Sciences in the area of Bioinformatics. He continues to teach undergraduate and graduate classes in Parallel Processing, Operating Systems, Algorithms, and Numerical Methods.



DR. ALI HURSON saw another busy yet productive year pass by. As always, international trips to Germany and France with domestic trips to Pullman, State College, Seattle, Alaska, Orlando, Palo Alto, Rapid City, and Dallas; coupled with editorship of the advances in computers, actively involved with several international conferences including IPDPS, PerCom, IGCC, CCNC; endless administrative duties; teaching, publishing, writing proposals, and finally research were the highlights of his activities.

His last PhD student at Penn State successfully defended his dissertation entitled “Enabling sensor network interoperability and reconfiguration through mobile agents”. His son also graduated in May and started his PhD program at Stanford University. Driving cross country in late summer with his son was a very rewarding and delightful experience for him. Hurson finished two projects, one supported by NSF and the other one supported by Oak Ridge National Laboratory.

At Missouri S&T, currently, he is working with three PhD students, and on a grant funded by the Department of Education. Completion of the CS “technology space” was one of his milestone achievements during the past year.



DR. WEI JIANG came to Missouri S&T in 2008. Currently, he has three Ph.D. students and one Masters student. He serves on several Ph.D. and Masters' thesis committees. He usually teaches distributed systems and information security related courses. His research has been funded by the University of Missouri Research Board, the National Science Foundation and the Office of Naval Research in areas of secure data analysis and text sanitization.



DR. JENNIFER LEOPOLD taught the Data Structures I course in Fall 2011 and is teaching the Automata Theory course in Spring 2012. She also is on appointment for the 2011-2012 academic year as a Faculty Fellow to the Missouri Supreme Court. Her current research interests are ontologies and automated spatial reasoning in 3D.



DR. DAN LIN has been at Missouri S&T for three years. Her current research interest includes VANETs (vehicular ad-hoc networks) and cloud computing. She has graduated her first Master student this past summer and published several interesting papers this year. She is now the chair of the departmental diversity committee and will continue her efforts on organizing various workshops for under-represented groups. She is serving as faculty advisor of two student associations: IEEE Computer Society Student Branch and ACM-W (women in computing). She is particularly proud of the IEEE-CS student branch which was recognized as IEEE St. Louis Outstanding Student Branch this year.



DR. FRANK LIU continues to develop a web-based argumentation and collaborative decision support system, which is ranked as one of the top sites in Google search in this area. It may find applications in many domains, such as collaborative software development. In addition to conducting research, he teaches software testing and quality assurance, software requirements engineering, and advanced software engineering classes, which

attract many distant learning graduate students. He currently serves as the graduate coordinator of the computer science department.



DR. SANJAY MADRIA is directing the W2C (Web and Wireless Computing) Lab, and is currently supervising 8 PhD students in the area of mobile and secure sensor networks. He graduated 4 MS thesis students in 2011. He continues to teach CS338, 437, and 467 classes in the area of databases, web and wireless computing. He has offered a new class on Cloud Computing in Fall 2011. He is busier than ever before with his research, teaching and service. He is general co-chair for IEEE Intl Conference on Software Reliability in Distributed Systems for 2011.



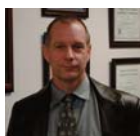
DR. BRUCE MCMILLIN continues to work on advanced models of computer security for cyber physical systems (such as the smart grid). He is also an ABET program evaluator (one of two on campus) evaluating accreditation studies for other institutions.

Congratulations to my student Thoshitha Gamage for completing his Ph.D. this year using theoretical models of information flow to develop secure electric power transmission grids. Thoshitha will continue on at S&T as postdoc to work on the NSF FREEDM ERC.



DAVE MENTIS is still teaching C++ and Fortran, and is also planning on teaching the Discrete Math course soon.

Dave's still living on the farm with his wife Doyla, his daughter Dava, and his grandson Layton. Replacing fence remains a lifelong project.



CLAYTON PRICE is expecting the 2011-2012 academic year to be an enjoyable, successful, and promising one. His teaching will include some of his favorite courses. Handling the introductory courses in programming is always a challenge as he strives to produce engaging and humorous programming assignments. Work continues on the eLearning effort to create a blended course version of the CS 53/54 pair. The web posting of the course materials and videos has received very positive reviews to date. He has presented his development of the course at the Focus on Teaching and Technology conference in November in an effort to pass on his wisdom and experience in on-line course creation.

Besides teaching CS 53, he keeps busy with his Object-Oriented Numerical Modeling course in the spring, and committee work throughout the year. Life on the farm is as busy as usual with a large and productive garden and farm livestock, large and small. Additionally, Price has managed to build a new barn, barnyard, and many of the fences on the property. He was very happy to bury the old barn ten feet under.



DR. CHAMAN SABHARWAL continues to teach Graphics (CS358), Robotics (CS 345), Java GUI & Visualization (CS342). In fall 2011 he taught Programming Languages and Translators (CS256), Numerical Methods (CS228), and Java GUI & Visualization (CS342). In the spring of 2012, he will teach Discrete Mathematics for Computer Science (CS128), Programming Languages and Translators (CS256) and Interactive Computer Graphics (CS358). Dr. Sabharwal still commutes back and forth from St. Louis.



DR. JAGANNATHAN (JAG) SARANGAPANI, the Rutledge-Emerson Distinguished Professor of Electrical and Computer Engineering, holds a joint appointment with CS. Dr. Sarangapani's students have been working on the development of indoor localization algorithms, routing protocols for regular and cognitive networks, and networked control systems with applications to cyber physical systems. He directs the Embedded Systems and Networking Laboratory where the students gain hands-on experience with networking protocols and Missouri S&T Mote hardware for wireless ad hoc and sensor networks. These Motes have been successfully deployed and evaluated on a number of industrial applications. He is also Director of NSF Industry/University Cooperative Research Center Site at Missouri S&T, where the Mote hardware and smart algorithms are used to detect and predict component and system failures. There are several company members in the Center Site. His team of faculty has received funding from the Army Research Laboratory to work on localization and tracking of threats and network security. His overall funding for the past 10 years has exceeded \$13 Million. He has co-authored 94 juried articles (mostly IEEE Transactions with his students), over 180 IEEE Conference publications, several book chapters, 3 text books, and holds 18 patents. He has advised 27 M.S and 14 doctoral students with several in the pipeline.



DR. SAHRA SEDIGH is an associate professor in Electrical and Computer Engineering, with joint appointment in Computer Science. The goal of her research is to understand how complex systems fail, and to use this information to make these systems more reliable. Critical infrastructure systems such as smart (power) grids and intelligent water distribution networks are among the complex systems studied by her group. She also designs and deploys wireless systems that monitor bridges and alert authorities of inclement weather conditions or structural hazards. Her most recent research investigates methods for using technology to make better use of class time and personalize and improve the learning experience for students. The Army Research Lab, Samsung, and the US Department of Transportation are among the sponsors of her research. All of the classes Dr. Sedigh currently teaches are focused on computer networks – introducing them (CpE 319, available through distance education), making them more secure (CpE 349, also available through distance education), and modeling them (CpE/CS 417). In her free time, she enjoys painting, reading books that have nothing to do with engineering, and catching up on lost sleep. She will be very happy if she finds a way to do all three concurrently.



DR. DANIEL TAURITZ, or just Dr. T as the students call him, continues to enthusiastically teach his two-course sequence on Evolutionary Computing, his course on Artificial Intelligence, and a section of the freshman course on Discrete Mathematics of which he now is the coordinator. He ran the 11th S&T Artificial Intelligence Tournament in spring 2011 (see article) and is already in the planning stages for the 12th S&T Artificial Intelligence Tournament in spring 2012.

In addition to continuing to chair the department's publicity committee, he assumed the chairpersonship of the department's undergraduate committee, he is for a third consecutive year chairing S&T's Discipline Specific Curriculum Committee for the Sciences and for a second consecutive year chairing S&T's Campus Curricula Committee, the standing committee of S&T's Faculty Senate which handles all curricular matters. He is also proud to have served as the Doctoral Symposium Chair of the 35th IEEE Computers, Software, and Applications Conference (COMPSAC 2011) and to be serving as co-chair of the Genetic Algorithms track of the 14th ACM Genetic and Evolutionary Computation Conference (GECCO 2012), the largest conference series in the field of Evolutionary Computing.

He is enjoying his tenth year as the Missouri S&T ACM Student Chapter SIG Security advisor (see article). Since December 2004 he has been the Missouri S&T coordinator for Sandia National Laboratories' Center for Cyber Defenders (CCD); during summer 2005 he brought a team of outstanding students (three from CS, one from CpE) to the CCD as summer interns, and has sent new teams every summer since. On the research front, Dr. Tauritz continues to lead the NC-LAB whose main focus is developing novel evolutionary algorithms and applying them to real-world problems from a diverse set of domains including Critical Infrastructure Protection, Automated Software Engineering, and Social Computing (see NC-LAB article for details). He is currently supervising three Ph.D. students, one of whom was awarded a prestigious NSF Graduate Research Fellowship. He is particularly excited that on September 1st 2011 the NC-LAB was provided new digs in the Missouri Enterprise Innovation Center which he is currently transforming into a state-of-the-art research facility (see NC-LAB article for photos).



DR. THOMAS WEIGERT has continued to focus his efforts on creating development tools and technologies that he has found most lacking in current engineering development environments: (i) Support the verification of system requirements specifications as early as possible in the system life-cycle; (ii) automatically derive system test suites which would establish that a system-under-test satisfies a given requirements specification from the specification; (iii) support the development, enhancement, and maintenance of a system at the level of its features; (iv) allow delay of the imposition and selection of a software architecture until late into the development life-cycle; and (v) support retargeting an application to a different hardware platform, operating system, or middleware, without affecting the features or architecture of the application. In 2011, he and his team completed new tools that address items (ii), (iii), and (iv). They have conducted several projects together with industrial partners from the telecommunication and automation industries. In these projects, they were provided with requirements from previously completed projects and developed the applications specified by these requirements using the methods and tools they had developed. These projects were a tremendous opportunity as they allowed a direct comparison between the performance of traditional development methods with the development methods supported by these technologies. For each of these projects, they were able to demonstrate that the productivity in terms of effort required to produce these applications is dramatically higher than demonstrated by the original engineering effort. In addition, the quality of the application using his methods was determined to be superior to the traditional processes in terms of defect rates, maintainability, and modifiability of the resultant code.



DR. DONALD WUNSCH continues to serve as the International Neural Networks Society Senior Fellow, Chair of the INNS College of Fellows. He has two new books: *Neural Networks and Micromechanics*, with Ernst Kussul and Tatiana Mailyk, Springer; and *Unified Computational Intelligence for Complex Systems: Adaptation, Learning and Optimization*, with John Seiffertt, Springer. He is co-PI (with Ganesh Venayagamoorthy) on a \$2 million NSF grant entitled: EFRI-COPN: Neuroscience and Neural Networks for Engineering the Future Intelligent Electric Power Grid. He is PI, with Ganesh Venayagamoorthy and Daniel Tauritz, of the Army Research Office Grant entitled: DURIP: A GPU-based High Performance Computing Cluster for Multiple Military Modeling Capabilities. He is also PI of the NSF grant: Computer Go -- A Proxy for Key Open Challenges and Opportunities in Computational Intelligence. He gave several plenary talks, a tutorial on Clustering at the IEEE World Congress on Computational Intelligence and, with Rui Xu and Jie Xu, won "Overall Best Paper" at the IEEE Conference on Evolutionary Computation.



DR. ZHAOZHENG YIN joined the department in Fall 2011, he is working with one Ph.D. student and will teach "CS301 Introduction to Computational Perception and Cognition" in Spring 2012. His group is doing research in the field of Biomedical Imaging, Computer Vision and Pattern Recognition, with applications in civilian, military, multimedia and healthcare areas.



DAWN DAVIS is ending another wonderful year with the Computer Science Department. She has been very busy with all of the students in the department, still enjoys the challenges that come each day, and says that she really enjoys working with the faculty, students, and everyone on the Missouri S&T campus. Dawn's summer was filled with family, camping, fishing, gardening, going to Antique Malls, being outside, and going to fairs to watch her daughter show cattle. Dawn and her husband Rick hope to do more next summer. She hopes next year is as good or better than this year was and is looking forward to all the challenges to come.



RHONDA GRAYSON believes that 2012 promises to be a great year, with three new faculty members and more new students. The past year has been a very busy, but fun year, with faculty searches, banquets, and new students. Rhonda's summer was filled with family, friends, rodeo, fairs, and auctions. Rhonda and her husband William hope to do more of the same next summer, and maybe include a trip to Gulf Port, Mississippi to visit family. She enjoys working with the students and faculty and is looking forward to all the challenges that the next year will bring.

Outstanding Teacher Awards



Mr. Clayton Price, Dr. Daniel Tauritz and Mr. Matt Buechler (not pictured) received the 2010-2011 Outstanding Teacher Award on the Missouri S&T campus. The quality of teaching is of utmost importance to the University and the Department.

A certificate acknowledging their accomplishments was presented to them on November 30, 2011 at the CET Outstanding Teaching Awards Ceremony.

The Outstanding Teaching Award is given each year to faculty members by the Outstanding Teaching Award Committee, which bases its selections on student evaluations.



Dr. Jennifer Leopold, Associate Professor of Computer Science, received the 2010 Teaching Award. Each award winner receives a \$1,000 stipend funded by industry and alumni contributions. An awards ceremony was held on Tuesday, February 8, 2011.



Congratulations to S&T's 2011 Computer Science Degree Recipients



May 2011

Bachelor of Science

Bader Alotaibi
Jacob Oliver Alyea
Benjamin Charles Brannan
Jingwen Chen
Jeremy Andrew Davidson
Tyler Christopher Donelson
Andrew Thomas Dunkman
Kyle Matthew Ellman
Kyle Andrew Ensign
Benjamin Gray Everly
Scott Joseph Follmer
Joshua David Godi
Joanna Marie Gonzalez
Samuel Ray Goodfellow
Donald Eugen Halsted, Jr
Joseph Brent Hawkes-Cates
Kevin Andrew Howe
Jeremy Michael Koontz
Nathaniel Tanner Martin
Brandon Angus Mikel
Orobosa Nosa Omoregie
Brian Allen Pringle
Thomas Patrick Roth
Stewart Lionel Sanchez
Kyle Lee Saylor
Jeffery Scott Shelburg
Jared Daniel Simon
Caleb Andrew Smith
Alexander George St. John
Gary Wesley Steelman
Dale Arthur Twombly
Michael Andrew Wegener

Adam Brawnell Whaley
Alexander Robert White

Master of Science

Abhinav Chadda
Ajith Cherukad Jose
David Bryan Denney
Bandar Abdulmajeed Kabous
Mukund Krishna
Naraen Mandhusudan
Hemanth Meka
Anik Kumar Sinha
Swetha Surapaneni
Jameson Lee Tallyn
Sagar Dilip Thatte
Renjie Wang

Doctor of Philosophy

Xuan Gong

July 2011

Master of Science

Lekshmi Chidambaram
Sri Harsha Chitturi
Arej Muhammed

December 2011

Bachelor of Science

Stephen Lawrence Gonzales Benito
Michael Joshua Busby
Kristofer Kang Butler
Matthew Patrick Dunnivant

Paul Edward Egger
Jacob Ryan Feldmann
Benjamin Deguire Fischer
Jason Brian Gebhart
Gerard Owen Goeke
Bradley John Grafelman
Matthew Wilson Harrison
Cole West Hornbeck
Summer Howard
Timothy Michael Huff
Ryan Andrew Jarvis
Christopher Lawrence Jones
Elliott James Kopp
Joshua Patrick McCarville-Schueths
Donald Richard Mertens
Omar Armando Rivera
Jason Terrence Rossmair
Alexander Kevin Shepard
Steven Neligh Wallace
Edward George Wieggers IV

Master of Science

Ashwini Auradkar
Makarand Vishwas Bhonsle
Jonathan Joseph Blount
Komal Patel Chintala
Vidyasri Gadidala
Priyanka Suhas Gupte
Raghavendra Kotikalapudi
Bhupathi Reddy Sarasam
Derek Justin Snyder

Doctor of Philosophy

Thoshitha Thanushka Gamage



Expanding Cyber Diversity

Missouri S&T is working with the University of Arkansas at Pine Bluff (UAPB) to develop a new program for undergraduate students in an effort to get more women and minorities interested in the field of cyber-security -- specifically, information assurance education.

Information assurance education brings together computer science, engineering and information technology to find ways to improve the security of computer and electronic networks. Minorities and women make up only 3 to 5 percent of the workforce in this specialized field.

The three-semester program gives interested UAPB undergraduates who complete the coursework a chance to obtain a minor in information assurance. Those students may then apply to pursue master's or Ph.D. degrees with an emphasis in information assurance at S&T.

Missouri S&T is already a leader in information assurance education, says Dr. Bruce McMillin, professor of computer science, and this partnership builds on that role. In 2007, the U.S. National Security Agency (NSA) and the Department of Homeland Security designated Missouri S&T as Missouri's first National Center of Academic Excellence in Information Assurance Education. McMillin is the center's director.

"Nationally, the NSA and intelligence community is looking to hire 1,000 Ph.D.'s the next few years due to the increasing demand," McMillin says. "If you want to do research in security, the NSA is the place to be, because you have security clearance all the way to the top. You'll know what the leading edge is."



2012 PHONATHON DATES:

January 9, 10, 11, 12, 15,
16, 17, 18 and 19



NSF Industry/University Cooperative Research Center On Net-Centric Software & Systems

Site Director: Dr. Sanjay K. Madria

Associate Director: Dr. Sriram Chellappan

Objective: The Net-Centric Software and Systems Center will perform scientific and applied research in the areas of network centric computing in the domain of mobile computing, cloud computing and security. Targeted services are for military surveillance, crowd sourcing & sensing, sensor aided diagnostics, health care, transportation systems and telecom. The center has received funding from AFRL and NSF.

Mission: Our mission is to provide a platform for cutting-edge inter-disciplinary research in which faculty from many disciplines and organizations can collaborate on funded real-world projects with an emphasis on network centric systems

Goals:

- Developing internationally recognized research programs with Industry Collaboration
- Addressing critical needs of government and industry
- Cohesive integration of research, application and education
- Nurturing faculty and students in a research centric environment.

The focus research areas are under the following theme:

Cloud Computing Technologies

Theme: Ongoing research attempts to expand the current scope of Cloud computing from a platform for mere storage and processing power to also include sensing services including mobile platforms. Many military and civilian applications are now integrating Cloud in their IT infrastructure which can significantly enhance computing capabilities of not only wired environments, but also sensor and mobile networks. Benefits include cost savings, resource optimization, ease of collaboration, etc.

Research Topics Include:

- Design of Identity management and data security for Cloud environment
- Design of applications like environment / campus sensing over the Cloud
- Design of Trustworthy, Secure and Privacy preserving operations in Cloud
- Replication and Pub/Sub in Cloud
- Integration of Mobile Computing with Cloud

Risk Analysis and Mitigation

Our objective is to develop an off-premise security assessment framework. The framework shall benefit the cloud consumers in a) gauge the trustworthiness of cloud-based solution, and b) analyze cloud adoption plan and suggest optimal cloud migration strategy. Cloud computing has become an established paradigm for running services on external infrastructure. However, it changes the dynamic of how to address the threats as the underlying architecture is completely transparent to the consumer. Hence, we need a new paradigm of security assessment framework which operates on off-premise clouds without the need to access the physical cloud elements.

Research Topics Include:

- Develop an off-premise security assessment which helps evaluators to model the client-specific security requirements
- Develop an evolutionary security assessment framework to gauge the trustworthiness of individual cloud elements and suggest resource-efficient cloud adoption strategy

Computer Science Department 2011 Colloquium Series



Towards Quantification of Survivability

Dr. Kishor Trivedi

Hudson Professor of Electrical and Computer Engineering

Duke University

Feb. 8th, 2011

Abstract - Survivability is a critical attribute of modern computer and communication systems. The assessment of survivability is mostly performed in a qualitative manner and thus cannot meet the need for more precise and solid evaluation of service loss or degradation in presence of failure/attack/disaster. This talk addresses the current research status of quantification of survivability. First we carefully define survivability and contrast it with traditional measures such as reliability, availability and performability. We then discuss probabilistic models for the quantification of survivability based on our chosen definition. Next, two case studies are presented to illustrate our approach. One case study is about the quantitative evaluation of several survivable architectures for the telephone access network. Hierarchical models are developed to derive various survivability measures. Numerical results are provided to show how a comprehensive understanding of the system behavior after failure can be achieved through such models. The second case study deals with the survivability quantification of communication networks.

Brief Bio - Kishor S. Trivedi holds the Hudson Chair in the Department of Electrical and Computer Engineering at Duke University, Durham, NC. He has been on the Duke faculty since 1975. He is the author of a well known text entitled Probability and Statistics with Reliability, Queuing and Computer Science Applications, originally published by Prentice-Hall; a thoroughly revised second edition (including its Indian edition) of this book has been published by John Wiley. He has also published two other books entitled Performance and Reliability Analysis of Computer Systems, published by Kluwer Academic Publishers; and Queueing Networks and Markov Chains, published by John Wiley. He is a Fellow of the Institute of Electrical and Electronics Engineers. He is a Golden Core Member of IEEE Computer Society. He has published over 450 articles and has supervised 42 Ph.D. dissertations.

.....



Design of A Very High Level Programming Language

Dr. David Fisher

Carnegie Mellon University

Feb 22nd, 2011

Abstract - Omega is a very high level programming language with potential to dramatically increase productivity, accuracy, and performance in software development and use. Although it is intended specifically for accurate modeling and simulation and research in emergent behavior, it is a general purpose, declarative, property-oriented, and agent-based language that can be used in a broad spectrum of applications. It enables accurate abstract descriptions of anything and provides specialized notations for function and process descriptions. Omega is derived from and incorporates lessons learned from Easel, an experimental agent-based modeling and simulation language developed and used from 1998 to 2006. The presentation includes design, implementation strategy, and example programs.

Brief Bio - David A. Fisher is currently a Senior Research Scientist in the Software Engineering Institute

(SEI) at Carnegie Mellon University where he conducts research on next generation information security. Dr. Fisher has held technical and executive positions in academia, industry, and government. His research interests include modeling and simulation, emergent behavior, and automated reasoning especially as they relate to security, HPC, and socio-technical systems. He has degrees in computer science (Ph.D. Carnegie Mellon 1970), electrical engineering (M.S.E. Univ. of Pennsylvania), and mathematics (B.S. Carnegie Mellon), and is a Senior Life Member of the IEEE.

.....



Computational Models for Degraded Document Enhancement

Dr. Tayo Obafemi-Ajayi
Illinois Institute of Technology.
Mar 22nd, 2011

Abstract - Rapid evolution of scanning and computing technologies in recent years has led to the creation of large collections of scanned historical documents. Usually, these scanned documents suffer from some form of degradation. Large degradations make documents hard to read and substantially deteriorate the performance of automated document processing systems.

Enhancement of degraded document images is normally performed assuming global degradation models. When the degradation is large, global degradation models do not perform well. In contrast, we propose to learn local degradation computational models for binarization and enhancement. We approach the task of document enhancement from a machine learning perspective by generating computational models using both unsupervised and supervised learning techniques and applying them in a principled manner.

When enhancing document images with the goal of improving readability, it is important to understand human perception of quality. Hence, we also propose a novel method for learning and estimating human perception of document image quality. Experimental results obtained demonstrate the advantage of our proposed methods to current state of the art techniques.

Brief Bio - Tayo Obafemi-Ajayi is currently a research associate at Illinois Institute of Technology (IIT), Chicago, IL. She received her BS and MS degree in Electrical Engineering from IIT in 2000 and 2001 respectively. She obtained her PhD degree in Computer Science in Dec. 2010 from IIT under the supervision of Drs. Ophir Frieder and Gady Agam. Her research interests include document image processing, machine learning, information retrieval and data mining.

.....



Cloud Computing
Dr. Sandra Johnson
IBM
Apr 5th, 2011

Abstract - Driven by trends in the consumer Internet, cloud computing is a relatively new way to consume and deliver IT services. It is a utility computing model that builds on the maturation of the Web, combining rapid scalability, proliferation of the Internet, unprecedented self-service and elegant web-based applications. It allows users to execute complex computing tasks without the need to understand the underlying technology. This talk presents an overview of cloud computing, including its advantages in many environments. Also included is an overview of the technical components of a cloud computing environment, some of which include the hardware, virtual image management, resilience and automation, security and service management.

Brief Bio - Sandra K. Johnson is a Senior Technical Staff Member at IBM and is part of University Alliances with a focus on sub-Saharan Africa. Her previous assignments include working as the Chief Technology Officer, Global Small and Medium Business for IBM Systems and Technology Group, the Linux Performance Architect, and managing the Linux Performance, WebSphere Database Development, and Java Server Performance teams within IBM development and research organizations. She has conducted research in a number of computer related areas and was part of the design team that developed the prototype for the IBM Scalable Parallel Processor (SP2), the base machine for “Deep Blue”, IBM’s world famous chess machine.

Dr. Johnson is a member of the IBM Academy of Technology, which consists of the top 1% of IBM’s over 250,000 technical professionals. She has received numerous technical and professional awards, and is a Master Inventor, with 40 patents issued and pending. She has authored and co-authored over 80 publications, is Editor-in-Chief of the book Performance Tuning for Linux Servers, and is author of Inspirational Nuggets and GREGORY: The Life of a Lupus Warrior.



.....
Optimizing Performance of Cache Memory Systems in Multicore Processors

Dr. Krishna Kavi
Univ. of North Texas
Apr 19th, 2011

Abstract - This talk focuses on techniques to improve cache memory performance in multicore processors. It is an understatement to say that the performance of multicore systems is limited by their memory systems’ performance. Our research has developed both hardware and software solutions to improve the performance of (L1 and L2) cache memories. Software solutions include profiling of data access patterns, relocating data, and restructuring code to improve performance. Hardware solutions include customizing cache address mapping (or indexing) for different threads and/or different objects within an application, and the simultaneous existence of multiple address mappings. We are developing a program analysis tool that helps with our hardware and software solutions. Gleipnir is built on top of a widely used program analysis tool called Valgrind. When fully developed, Gleipnir can be used to obtain very fine grained information with each memory access, including the program variable associated with that access, the function and thread that caused the access.

Localities exhibited by data depend on object types and how they are accessed in an application. Better performance can be achieved by spreading data accessed by applications more uniformly across the cache and minimize cache conflicts. Code and data restructuring techniques that rely on profiled information on data accesses can minimize conflict misses and improve uniformity of cache accesses. Uniformity of accesses can also be achieved using custom indexing for each application. We are also investigating the use of multiple indexing schemes (or multiple decoders) with cache memories. Performance can also be improved if cache memories are partitioned and reconfigured optimally to meet divergent needs of data types and access patterns. Combining data and code restructuring with reconfigurable caches can lead to even better performance.

Brief Bio - Dr. Krishna Kavi is currently a Professor of Computer Science and Engineering and the Director of the NSF Industry/University Cooperative Research Center for Net-Centric Software and Systems at the University of North Texas. During 2001-2009, he served as the Chair of the department. He also held an Endowed Chair Professorship in Computer Engineering at the University of Alabama in Huntsville, and served on the faculty of the University Texas at Arlington. He was a Scientific Program Manger at US National Science Foundation during 1993-1995. He served on several editorial boards and program committees.



Large-Scale Cell Tracking in Time-Lapse Microscopy Images for Stem Cell Engineering and Discovery

Dr. Zhaozheng Yin

Missouri S&T

Sep 13th, 2011

Abstract - Vision-based object detection and tracking techniques play an important role in a broad range of civilian and military applications such as industry inspection, surveillance and battlefield awareness. In this talk, I will introduce a new tracking system that is able to track dense object populations (hundreds to thousands) and determine their spatiotemporal histories over extended periods of time (days to weeks). This system is being tested in biomedical research that directs the migration and proliferation of stem cells to meet research and clinical demands on tissue engineering.

Major challenges to existing tracking techniques, in dealing with stem cells in microscopy images, are caused by the special microscopy imaging process and the complexity of cell behaviors (shape deformation, object occlusion and cell mitotic events). To address these difficulties, I first establish a scientific understanding of phase contrast microscope's optical properties for modeling its image formation process. A linear imaging model is found to well explain the phase contract imaging system. Using this model, I formulate a quadratic optimization function with sparseness and smoothness regularizations to restore artifact-free microscopy images. The removal of artifacts allows for obtaining high quality object segmentation by simply thresholding the restored image. Then we apply data association algorithms on segmented object candidates and solve the problem of object tracking by using linear programming.

Brief Bio - Zhaozheng Yin is an Assistant Professor of Computer Science at Missouri S&T. His research interests encompass the fields of Computer Vision, Pattern Recognition, and Image/Signal Processing. In particular, he has been working on robust, efficient single or multi-camera visual information processing for segmenting, detecting, tracking objects, and describing their behaviors, with applications on biomedical imaging, surveillance, multimedia and video/image scene understanding.

Yin received his BS degree in Automatic Control from Tsinghua University, MS degree in Electrical and Computer Engineering from University of Wisconsin-Madison, and Ph.D. in Computer Science and Engineering from Penn State University in 2009. He was a postdoctoral fellow in the Robotics Institute at Carnegie Mellon University from 06/2009-06/2011. He received the best doctoral spotlight award in CVPR2009 and he was in the finalist of young scientist award in MICCAI2010.



Cyber-Physical Systems: From Computing to Tangible Physical Effects

Dr. Sahra Sedigh

Missouri S&T

Sep 27th 2011

Abstract - Modern critical infrastructure networks are cyber-physical systems that utilize intelligent embedded devices, communication capability, and often distributed computing to streamline and fortify their operation. Smart grids and intelligent water distribution networks serve as practical examples. The benefits of using cyber infrastructure include greater autonomy and a potential increase in the efficacy of physical operations. The downsides include increased complexity; and more importantly, imperfection of the control and decision support offered.

This talk presents techniques for characterizing the effects of introducing “intelligence” to physical infra-

structure systems. Two case studies will be presented. The first illustrates qualitative analysis of an intelligent water distribution network, with focus on automated identification and mitigation of failure. The second case study centers on a quantitative reliability model that captures the gains and risks involved in replacing a physical system with its cyber-physical counterpart.

Brief Bio - Dr. Sahra Sedigh is an Associate Professor of Electrical and Computer Engineering and a Research Investigator with the Intelligent Systems Center at the Missouri University of Science and Technology. Her current research centers on development and modeling of dependable networks and systems, with focus on critical infrastructure. She received the B.S. degree from Sharif University of Technology and the M.S. and Ph.D. degrees from Purdue University, all in electrical engineering. In Nov. 2009, she was selected as one of 49 participants in the National Academy of Engineering's First Frontiers of Engineering Education Symposium. She held a Purdue Research Foundation Fellowship from 1996 to 2000; and is a member of HKN, IEEE, ACM, and ISIS.

.....



Challenges in Simulating Large Computer Networks

Dr. David Nicol
Univ. of Illinois at Urbana Champaign
Oct 11th, 2011

Abstract - Discrete-event simulation is commonly used to study the behavior of communication networks. However, devising meaningful simulation models for large-scale systems is difficult, and is a topic of considerable concern and debate. Problems include the transient nature of network behavior, statistical problems in making meaningful quantifications of estimated metrics, the tremendous amount of computational work often associated with network simulations, and differences in time-scale between inter-related activities. This talk describes some of these problems, and research efforts underway to address them.

Brief Bio - David M. Nicol is Professor of Electrical and Computer Engineering at the University of Illinois, Urbana-Champaign. His research interests encompass modeling and simulation, high performance computing, and security. He was elected Fellow of the IEEE, Fellow of the ACM, and was the inaugural recipient of the ACM SIGSIM Distinguished Contributions Award.

.....



A Scalable Architecture for High-Throughput Regular-Expression Pattern Matching

Dr. Ron Cytron
Washington Univ. in St. Louis
Oct 25th, 2011

Abstract - Regular expressions specify patterns of interest in many computer science applications. We present and evaluate an architecture for high-throughput pattern matching of regular expressions. Our approach matches multiple patterns concurrently, responds rapidly to changes in the pattern set, and is well suited for synthesis in an ASIC or FPGA. Our approach is based on an easily pipelined state-machine representation that uses encoding and compression techniques to improve density. We have written a compiler that translates a set of regular expressions and optimizes their deployment in the structures used by our architecture. We analyze our approach in terms of its throughput, density, and efficiency. We present experimental results from an implementation in a commodity FPGA, showing better throughput and density than the best known approaches.

Brief Bio - Ron K. Cytron is a professor of computer science and engineering at Washington University. His research interests include optimize middleware for embedded and real-time systems, fast searching of unstructured data, hardware/runtime support for object-oriented languages, and computational political science. Ron has served as a technology advisor and has worked as a software engineer at Exegy, Inc., a startup company in St. Louis that is commercializing applications accelerated in reconfigurable logic. Ron has over 100 publications and 5 patents. He has received the SIGPLAN Distinguished Service Award and is a corecipient of SIGPLAN Programming Languages Achievement Award. He is a Fellow of the ACM.



.....
Where the Rubber Meets the Code – Static Code Analysis for Software Assurance in the Acquisition Life Cycle

Dr. Paul Croll
Computer Sciences Corporation
Nov 8th, 2011

Abstract - Finding vulnerabilities in code through product testing is often too little, too late. Static code analysis addresses weaknesses in program code that might lead to vulnerabilities and affords the opportunity to uncover such weaknesses early in and throughout the life cycle. Such analysis may be manual, as in code inspections, or automated through the use of one or more tools. Automated static code analyzers typically check source code but there is a smaller set of analyzers that check byte code and binary code, especially useful when source code is not available (e.g., for COTS components).

This presentation describes current state of practice in static code analysis for software assurance and makes recommendations regarding use of static analysis methods and tools during acquisition life cycle.

Brief Bio - Paul Croll is the current IEEE Computer Society Vice President for Technical and Conference Activities, and a Fellow in CSC's Defense Group where he is responsible for researching, developing and deploying systems and software engineering practices, including practices for cybersecurity. Paul has over thirty-five years experience in mission-critical systems and software engineering. His experience spans the full life cycle and includes requirements specification, architecture, design, development, verification, validation, test and evaluation, and sustainment for complex systems and systems-of-systems.

Paul was most recently Chair of the Technical Council on Software Engineering and is also the current Chair of the IEEE Software and Systems Engineering Standards Committee. Paul is also the past Chair and current Vice Chair of the ISO/IEC JTC1/SC7 U.S. Technical Advisory Group (SC7 TAG). Paul is a Senior Member of the IEEE and a member of the Computer Society's Golden Core.



.....
Cloud Computing Workshop

Dr. Mukesh Mohania
IBM Research
Dec 5th, 2011

Abstract - Cloud computing offers an exciting opportunity to bring on-demand applications to customers and is being used for delivering hosted services over the Internet and/or processing massive amounts of data for business intelligence. In this workshop, we will discuss the architecture of cloud computing, MapReduce, and Hadoop. We will then discuss how the cloud infrastructure can be used for data management services, such data cleansing, data correlation and validation, and how the massive amount of data can be processed over cloud for various business

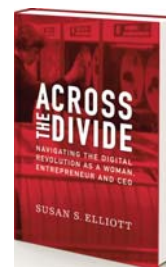
intelligence applications such as customer churn analysis, social network analysis, etc., and how the cloud can be used for 'Active' Data Archival for near real-time data access. We will finally discuss a few applications that require cloud infrastructure for processing structured and unstructured data for business analytics.

Brief Bio - Mukesh Mohania received his Ph.D. in Computer Science & Engineering from Indian Institute of Technology, Bombay, India in 1995. He was a faculty member in University of South Australia from 1996-2001. Currently, he is an STSM and IBM Master Inventor and is leading Information Management Software and Research group. He has worked extensively in the areas of distributed databases, data warehousing, data integration, and autonomic computing. He has published more than 100 papers and also filed more than 40 patents in these or related areas, and more than 10 have already been granted. He received the best paper award for his XML and data integration work in CIKM 2004 and CIKM 2005, respectively. He received an award from IBM Tivoli Software in 2004 for his research contribution to Policy Management for Autonomic Computing product. He was also a recipient of the "Excellence in People Management" award in IBM India in 2007. He received the "Outstanding Innovation Award" from IBM Corporation in 2008 for his Context-Oriented Information Integration work, and Technical Accomplishment Award in 2009 for his Policy work. He is an ACM Distinguished Speaker, and a member of IBM Academy of Technology.



Department Guest Speaker Susan S. Elliott

<https://www.susanelliott.com/the-story/>



Susan visited our campus on Nov 3 to give an inspirational talk to the CS 01 class, new freshmen and transfer students, upon invitation by Clayton Price. While here, she also gave a talk to the IEEE club that evening upon invitation by Dr. Dan Lin. Her speeches were warm, engaging, enthusiastic, and very inspirational indeed. She was received well by both groups, and even sold copies of her new book to students.

This is the story of a woman pioneer who got in on the ground floor of the digital revolution and became one of its leaders. Susan S. Elliott's adventure started because she did not want to attend typing school after graduating from college. She achieved a coveted programming position with IBM in 1958, where she learned IBM's inaccurate assumption that there were not going to be many computers. Having to leave IBM after eight years because she was pregnant, but still wanting to continue working, she founded her own business in 1966.

With a genuine love of work and an insatiable drive to create solutions that had not been imagined before, she built her company, SSE, with one of the original IBM PCs, undeterred by others' admonitions that PCs would never provide a solid business base. With an entrepreneurial spirit and a team of exceptional people, Susan S. Elliott built a successful business that is recognized worldwide as a technology leader. *Across the Divide* chronicles her unique story, her experiences as a woman working in the last fifty years of the digital revolution, and the challenges she faced in growing a globally successful IT company.

Brief Bio - Susan S. Elliott went to work for IBM as a programmer in 1958 after graduating from Smith College. After being forced to leave IBM because she was pregnant, she formed Systems Service Enterprises, Inc. (SSE) in 1966 and continued consulting. She refocused her business in 1983 with one of the original IBM PCs. Elliott grew SSE into a national enterprise recognized globally for its work in application development, education and network infrastructure, and accomplished the unusual transition of President and CEO from mother to daughter.

Now Chairman of SSE, Elliott has served as Chairman of the Federal Reserve Bank of St. Louis. She is on the board of the St. Louis Science Center and has served on the boards of Ameren, Angelica, Webster University, Regional Business

Council (RBC), St. Louis Regional Chamber & Growth Association (RCGA), the St. Louis Zoological Foundation and the Visiting Nurse Association (VNA).

She is married to Howard Elliott, Jr., a retired executive of Laclede Gas Co., with whom she has two daughters, Kathryn Elliott Love, Partner in the international law firm of Bryan Cave LLP, and Elizabeth Elliott Niedringhaus, SSE President and CEO.

.....

Computer Science Student Organizations

.....

Association for Computing Machinery (ACM)

Led by their president, Sarah Jameson, the Missouri S&T Student Chapter of the Association for Computing Machinery (ACM) is the largest and most active computing organization on campus. Backing Sarah in leading the organization to success are her fellow officers: George Mausshardt (Vice President), Alex Bertels (Secretary), Doug McGeehan (System Admin), Kyle Jamison (Assistant System Admin), Michael Clarke (Treasurer), and Dr. Wei Jiang (Faculty Advisor). This semester has been a great success. With over 70 members, Missouri S&T ACM has grown tremendously this last Fall Semester.

ACM hosts various events during the school year. These events are geared towards students who would like to learn more about and have fun in their college career. During the Fall 2011 Semester, ACM has hosted variety of events: Graphics on the Grass, ACM Career Fair Dinner, MegaMinerAI (our very own AI competition), and MinerLAN (our very own LAN Event). ACM also works on several projects that may be featured in the Computer Science building. We are still working on the ever cumbersome ACM Soda Machine where you can vend a soda from anywhere, as long as you are on the school network. Our Arcade Machine is still entertaining many students with the likes of Metal Slug, Sonic, and Street Fighter.

Next semester will feature over 16 meetings, more projects for students to get involved with, and more fun! However, none of this would be possible without our sponsors, Sandia National Laboratories and Cerner Corporation. We would like to thank everyone for helping support our organization.

Graphics on the Grass - Hosted as a fall kickoff event, Graphics on the Grass opens the new school year with a bang! Two projectors are shown on the side of the Computer Science building and then hooked up to various systems. The purpose of the event is to attract anyone that is interested in the world of technology. The event was a success with over 60 people attending and over 30 people becoming members. This is all on the second day of school.

ACM Career Fair Dinner - Another huge event ACM hosts is our bi-annual ACM Career Fair Dinner. The purpose of this event is to help students get in contact with possible employers in a more informal atmosphere.

This Fall, ACM partnered with Materials Advantage to make the dinner an even bigger success. Over 35 students attended from both organizations to talk to representatives from Sandia National Laboratories and Cerner.

MinerLAN – MinerLAN is an event held at the end of the semester to help relieve students of the nightmare that is the end of school. This Fall’s MinerLAN featured Starcraft 1 as a blast to the past for gaming. Even though attendance was down more than normal, the event was a success with our winners receiving Amazon gift cards.

.....

Association for Computing Machinery-Women (ACM-W)

This year, ACM-W has devoted special efforts to support female students in the department. We conducted surveys to obtain opinions and suggestions from female students. We also invited our department chair to the meeting to address the raised concerns. Moreover, in spring 2012, we plan to hold the CRA-W Distinguished Lecture Series to invite successful women to our campus to share their stories. Last, we are also happy to have our former president Arej Muhammed back to the team. She received her MS degree this summer and has now started her PhD study in our department.

.....

Missouri S&T IEEE Computer Society Student Branch

Moving into its third year and its most exciting year yet, the Missouri University of Science and Technology IEEE – Computer Society (S&T IEEE-CS) is one of the fastest growing computer organizations on campus. The Student elections held during the month of October infused the organization with new blood while retaining the experience of the old. After taking over the mantle from the past president, the current President Lokesh Krishna Ravichandran and his bunch of dedicated officers have started their term in style.

The start of the new term was marked by the first general meeting, attended by the heads of various student organizations. The significant event of the meeting was the felicitation ceremony in which the past officers were felicitated for their services to the organization. The IEEE-Xtreme programming event that took place in the same month was organized in a fabulous manner with the officers orchestrating the event, by the minute, every minute for the span of 24 hours.

The IEEE-CS invited Mrs. Susan Elliott, Chair of SSE and author of *Across the Divide*, to speak on her life and about her new book. The discourse by Mrs Susan Elliott was held before a huge number of audiences crossing the 50 mark and garnering students from diverse fields.

Humungous arrays of events are in store for the coming days and the officers of S&T IEEE – CS aim to make it one of the most successful years for the organization. Bharath Kumar Samanthula (Vice President), Thomas Yeggy (Vice President), Simas Das (Secretary), Eric Barnes (Treasurer), Justin Kellog (Publicity Committee), Mason Vrobel (Financial Committee), Mitchell Miller (Web Administrator) and Dr. Dan Lin (Faculty advisor) have pledged allegiance to this cause.

The officers would like to thank the patrons of S&T IEEE-CS and would like to request their continued support for future ventures.

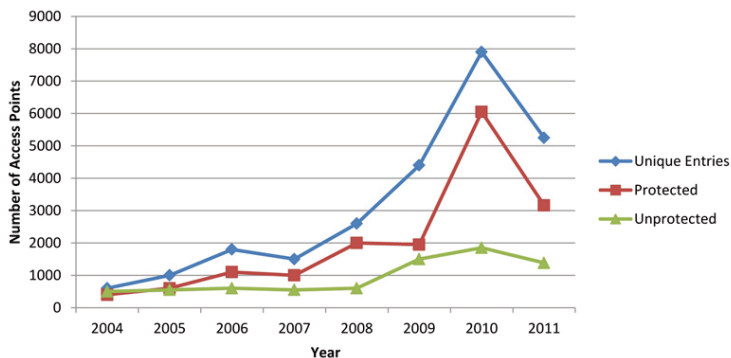
Association for Computing Machinery SIG-Security (ACM SIG-Sec)

The Missouri S&T Association for Computing Machinery (ACM) student branch Special Interest Group: Security (SIG Sec) is a student group focused on computer & network security. Founded nine years ago, the organization is currently chaired by Jeffery Shelburg and Michael Wisely, with Dr. Daniel Tauritz as faculty advisor. SIG Sec meetings are typically bi-weekly, featuring a wide variety of speakers on topics ranging from software vulnerabilities and real-world tools to security projects and research. The group also works on its own security projects, such as building cantennas (directional antennas made from soup, coffee or Pringles cans that increase the gain of wireless cards), wireless auditing (mapping open wireless access points so we can inform the owners), and the SIG Sec “Capture the Flag” computer security challenge (controlled environment competition where participants compete to be the first to penetrate a protected computer system).

Highlights of the 2011-2012 academic year so far:

- 8th Annual Rolla Wireless Security Audit
Part 1: Cantenna Building Party led by the SIG Sec Officers
Part 2: Wireless Security Audit Competition

Wireless Access Point Found by Year



- A smorgasbord of mini-presentations by S&T students who interned over the summer at the Center for Cyber Defenders, Sandia National Laboratories, Albuquerque, NM.
- Presentation by William Atkins, member of technical staff at Sandia National Laboratories and an alum of our department, on recent Certificate Authority Security blunders.

For more information see S&T’s ACM SIG Security website at: <http://acm.device.mst.edu/security/>

Missouri S&T 2011 AI Tournament

Winter Semester 2003 gave birth to a new S&T tradition: the Artificial Intelligence Tournament Series, created and organized by Dr. Daniel Tauritz and hosted by S&T’s Department of Computer Science. This series follows a tradition of in-class tournaments in Computer Science course CS347 – Introduction to Artificial Intelligence, but aims to broaden that scope by inviting campus-wide participation in public tournaments and having formal awards ceremonies. This tournament gives students, faculty and staff a chance to test their skills in designing & implementing Artificial Intelligence by having their creations compete against each other and with human beings. Typically, each academic year a new challenge in the form of a (board) game, is chosen to be solved during that year’s tournament(s). Three winners are chosen each tournament and presented with trophies & prizes. Each semester the name of the first place winner is engraved on a perpetual plaque and displayed in the glass trophy case on the second floor of the CS Building.

Previous years have featured the board games Abalone, Chess, Othello, Backgammon, and Mancala. In spring 2011 the 12th tournament in the series was held, featuring the board game Chess, a classic challenge in the field of Artificial Intelligence and a perennial favorite of the students.

The winners were:

- First place – Brian Goldman for his computer player; Brian is pursuing an M.S. in Computer Science at S&T
- Second place – Thomas Guenther for his computer player; Thomas is pursuing a graduate certificate in Computational Intelligence at S&T
- Third place – Aaron Powers for his computer player; Aaron is pursuing a Graduate Certificate in Computational Intelligence and an M.S. in Computer Science, both at S&T

Thanks to S&T's CS Department for sponsoring the tournament including prizes!

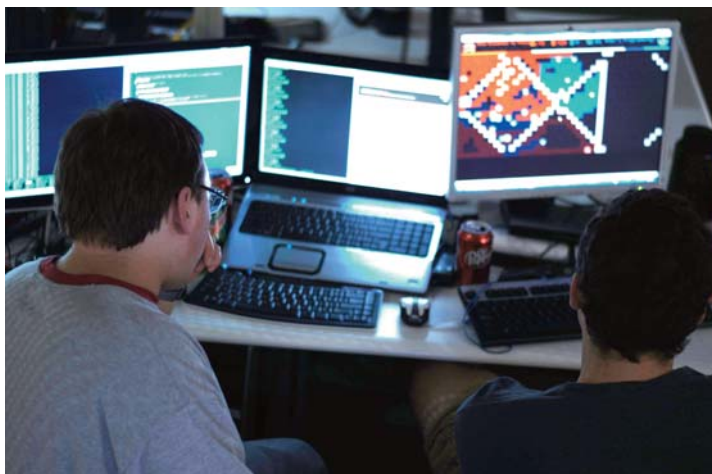
The next tournament is scheduled for Saturday April 21st 2012 and tentatively the challenge will again be Chess. Additional information on the AI Tournament Series can be found at <http://web.mst.edu/~tauritzd/AI-Tournament/>.

NOTE: Dr. Tauritz is always looking for (corporate) sponsors for the Artificial Intelligence Tournament Series (great publicity!). For more information, E-mail him at: tauritzd@mst.edu.

Association for Computing Machinery SIG-Game (ACM SIG-Game)

SIG-Game is a student interest group focused on the design and creation of Artificial Intelligence programming competitions, with the main focus being MegaMinerAI. MegaMinerAI is a team based competition with a focus on strategy heuristics. For 24 hours, teams develop an AI for a unique game API designed by the SIG-Game Dev team. The development time is concluded by a tournament among the competitors, with prizes for the top three teams. MegaMinerAI is open to anyone to compete, but only students are eligible for prizes.

This semester's competition was named MegaMinerAI 8: BotNet. Teams of 2 to 3 students worked through the night writing the best strategy they could to control as many "computers" as possible in an effort to gather "Byte Dollars" faster than their opponent. Whichever team could use their "viruses" to create and maintain the largest connected network won.



MegaMinerAI 8 was the most successful MegaMinerAI competition ever, with total of 31 paying teams and about 83 total competitors, surpassing last semester's record breaking competition with 19 teams and about 47 competitors. We also had our highest number of external competitors, with 3 teams from Mizzou, 2 from

Garmin, as well as a few independent entries from other organizations. We would like to thank our sponsors, Tradebot, Garmin, and S&T's CS department, for their support. The next MegaMinerAI is scheduled for April 14th-15th, 2012. If you are interested in competing, or just looking for more information, feel free to visit our website at <http://MegaMinerAI.com> or email us at siggame@mst.edu.



The 2011 Spring Semester Career Fair Dinner Made Possible by Garmin

Thanks to all that attended this year's ACM Career Fair Dinner. S&T's ACM student chapter would also like to thank Garmin who sponsored the dinner. In total we had 29 students attend along with 5 employers (Garmin, Cerner, GE Aviation, ADTRAN, TradeBot & Sandia National Labs). The semester's dinner was held at Alex's Pizza in Rolla.



The night was a great success and thanks everyone for coming!

The 2011 Fall Semester Career Fair Dinner

ACM's Fall 2011 Career Fair Dinner was deemed a success by its members. We tried something different this year by partnering with the students of Materials Advantage (MA) in order to make it more worthwhile for the attending employers. Sandia National Laboratories was a particular favorite with Will Atkins telling stories of his own time here at Missouri S&T. Spring 2012 is expected to be even more successful. We will once again be partnering with MA with Sandia National Laboratories, Garmin and a few others expected to attend.

Thank you,

Sarah Jameson
President ACM Missouri S&T

Selected Graduate Certificate Programs In Computer Science

What is a Graduate Certificate Program?

Graduate Certificate programs give students the opportunity to increase their knowledge in specific areas of interest. These courses provide students with the latest knowledge and skills in strategic areas of computing and are presented by Missouri University of Science and Technology instructors that are experts in their fields. Most of the courses will be offered through distance education over the internet. Where there is sufficient interest, some courses may be taught by traditional instruction methods at Missouri S&T off site locations such as Ft. Leonard Wood, St. Louis, and Springfield, MO.

ADMISSION REQUIREMENTS:

Graduate Certificate Program, Entrance Requirements & Course Descriptions:

The only entrance requirements for students entering a graduate certificate program is that they satisfy the prerequisites for any course they take in the program. Partial course descriptions are provided in this brochure (Graduate Certificate Program Brochure). Complete course descriptions are provided online at <http://registrar.mst.edu/cataloginfo/cataloginfo.html>.

.....
The Software Design and Development Certificate provides an attractive option for the working professional to expand their experience in Software Engineering. The core of four classes gives a treatment of software project management in its many roles, from overall project management and process improvement to the management of individual lifecycle components, including software deployment and evolution. Specialized coursework gives depth in advanced object-oriented design, software quality and testing theory and practice, and an advanced treatment of software metrics.

Software Testing and Quality Assurance (CS 307): It covers unit testing, subsystem testing, system testing, object-oriented testing, testing specification, test case management, software quality factors and criteria, software quality requirement analysis and specification, software process improvement, and software total quality management.

Object Oriented Analysis and Design (CS 308): This course will explore principles, mechanisms, and methodologies in object-oriented analysis and design. An object-oriented programming language will be used as the vehicle for the exploration.

Software Engineering II (CS 406): A quantitative approach to measuring costs/productivity in software projects. The material covered will be software metrics used in the life cycle and the student will present topical material.

Software Requirements Engineering (CS 409): This course will cover advanced methods, processes, and technique for discovering, analyzing, specifying and managing software requirements of a software system from multiple perspectives. It will discuss both functional and non-functional requirements analysis.

.....
The Wireless Networks and Mobile Systems Certificate is designed to provide the working professional with an intensive treatment in wireless systems and applications. Program coverage includes network architecture and protocols, computer communication and networking basics, principles of network security, and techniques for preventing, detecting and recovering from attacks, as well as advanced topics that address the specific issues and challenges in the wireless and mobile environment, including wireless network provisioning and deployment, location and mobility management, security and privacy, attacks and countermeasures, mobile computing applications, and data management in networked sensor systems.

Computer Communications and Networks (CS 365): Network architecture model including physical protocols for data transmission and error detection/correction, data link concepts, LAN protocols, internet working, reliable end to end service, security, and application services. Students will implement course concepts on an actual computer network.

Computer Security (CS 463): The course presents various vulnerabilities and threats to information in cyberspace and the principles and techniques for preventing and detecting threats, and recovering from attacks. The course deals with various aspects and layers of security: data-level, network-level, system-level, and application-level security.

Mobile and Sensor Data Management (CS 467): Architectures of mobile computing systems; Mobile-IP support in mobile computing systems; location data management, Broadcasting and indexing, replication control; caching, fault tolerance and reliability of mobile systems; adhoc and sensor routing schemes, key management. .

Advanced Network Security (CS 468): Network security issues such as authentication, anonymity, traceback, denial of service, confidentiality, forensics, etc. in wired and wireless networks. Students will have a clear, in-depth understanding of state of the art network security attacks and defenses.

.....

Information Assurance & Security Officer Essentials Certificate protecting information systems is key to protecting the nation's critical infrastructures. Only through diligence and a well-trained workforce will we be able to adequately defend the nation's vital information resources.

Intellectual Property for Computer Scientists (CS 317): A presentation of the relationship between the law of intellectual property and computer science. Topics include the application of copyright principles to computer programs, protection of computer programs through patents and trade secret law, and the effect of various agreements which are frequently encountered by the computer scientist.

Security Operations & Program Management (CS 362): An overview of information security operations, access control, risk management, systems and application life cycle management, physical security, business continuity planning, telecommunications security, disaster recovery, software piracy, investigations, ethics and more. There will be extensive reporting, planning and policy writing. Prerequisite: Writing emphasized course AND Operating System course AND Computer Networking course.

Trustworthy, Survivable Computer Networks (CpE 349): Basic issues in network management, testing, and security.

Network-Centric Systems Reliability & Security (CpE 449/ SE 449): Network-centric systems comprise a diverse category of large and complex systems whose primary purpose is to provide distributed, network-type services.

The following pre-requisite courses are specifically required as part of the CNSS certification but are not part of the certificate.

Introduction to Operating Systems (CS 284): This course teaches the concepts, structure, and mechanisms of Operating Systems. Topics include process management, concurrency, synchronization, deadlock, multithreading, memory management, scheduling, and internet working. Special emphasis is given to Unix and its modern-day derivatives.

Computer Communications and Networks (CS 365): Network architecture model including physical protocols for data transmission and error detection/correction, data link concepts, LAN protocols, internet working, reliable end to end service, security, and application services. Students will implement course concepts on an actual computer network.

.....
Computational Intelligence Certificate This graduate certificate program provides practicing engineers the opportunity to develop the necessary skills in the use and development of computational intelligence algorithms based on evolutionary computation, neural networks, fuzzy logic, and complex systems theory. Engineers can also learn how to integrate common sense reasoning with computational intelligence elective courses such as data mining and knowledge discovery.

Core Courses

Computational Intelligence (CpE 358/ EE367/ SysEng 367): Introduction to Computational Intelligence (CI), Biological and Artificial Neuron, Neural Networks, Evolutionary Computing, Swarm Intelligence, Artificial Immune Systems, Fuzzy Systems, & Hybrid Systems. CI application case studies covered include digital systems, control, power systems, forecasting and time-series predictions. Prerequisite: Stat 217. (Co-listed with EE 367)

And select one of the following:

Introduction to Artificial Intelligence (CS 347): A modern introduction to AI, covering important topics of current interest such as search algorithms, heuristics, game trees, knowledge representation, reasoning, computational intelligence, and machine learning. Students will implement course concepts covering selected AI topics. Prerequisite: CS 253

Evolutionary Computing (CS 348): Introduces evolutionary algorithms, a class of stochastic, population-based algorithms inspired by natural evolution theory (e.g., genetic algorithms), capable of solving complex problems for which other techniques fail. Students will implement course concepts, tackling science, engineering and/or business problems. Prerequisites: CS 253 and a statistics course

Introduction to Neural networks and Applications (SysEng 378/ EE 368): Introduction to artificial neural network architectures, adaline, madaline, back propagation, BAM, and Hopfield memory, counter-propagation networks, self organizing maps, adaptive resonance theory, are the topics covered. Students experiment with the use of artificial neural networks in engineering through semester projects. Prerequisite: Math 204 or 229.

Elective Courses (Select two courses not taken as a core course):

Evolvable Hardware (EE/CpE/Sys Eng 301): This course deals with adaptive evolvable systems operating in a changing environment. Components/building blocks approach for the design of evolvable systems and the mathematical theory of evolvable machines and the idea of virtual reconfigurable circuits for the design of more adaptive, competitive and innovative engineering products will be taught. Prerequisites: CpE 358/ EE 367/SysEng 367

Introduction to Artificial Intelligence (CS 347): A modern introduction to AI, covering important topics of current interest such as search algorithms, heuristics, game trees, knowledge representation, reasoning, computational intelligence, and machine learning. Students will implement course concepts covering selected AI topics. Prerequisite: CS 253

Evolutionary Computing (CS 348): Introduces evolutionary algorithms, a class of stochastic, population-based algorithms inspired by natural evolution theory (e.g., genetic algorithms), capable of solving complex problems for which other techniques fail. Students will implement course concepts, tackling science, engineering and/or business problems. Prerequisites: CS 253 and a statistics course

Advanced Topics in Artificial Intelligence (CS 447): Advanced topics of current interest in the field of artificial intelligence. This course involves reading seminal and state-of-the-art papers as well as conducting topical research projects including design, implementation, experimentation, analysis, and written and oral reporting components. Prerequisite: CS 347 or CS 348 or CpE 358.

Advanced Evolutionary Computing (CS 448): Advanced topics in evolutionary algorithms, a class of stochastic, population-based algorithms inspired by natural evolution theory, capable of solving complex problems for which other techniques fail. Students will conduct challenging research projects involving advanced concept implementation, empirical studies, statistical analysis, and paper writing. Prerequisite: CS 348

Adaptive Critic Designs (SysEng/CpE/EE 458): Review of Neurocontrol and Optimization, introduction to Approximate Dynamic Programming (ADP), Reinforcement Learning (RL), combined concepts of ADP and RL, Heuristic Dynamic Programming (HDP), Duel Heuristic Programming (DHP), Global Dual Heuristic Programming (GDHP) and case studies. Prerequisites: SysEng/CpEng/EE 368

Data Mining and Knowledge Discovery (SysEng 404/ CpE 404/ CS 434): Data mining and knowledge discovery utilizes both classical and new algorithms, such as machine learning and neural networks, to discover previously unknown relationships in data. Key data mining issues to be addressed include knowledge representation and knowledge acquisition (automated learning). Prerequisites: CS 304 or 347, Stat 215

Neural Networks for Control (EE 337): Introduction to artificial neural networks and various supervised and unsupervised learning techniques. Types of neural nets architecture used in control. Identification and adaptive control using neural networks. Case studies and laboratory projects. Prerequisite: EE 231

Introduction to Neural networks and Applications (SysEng 378/ EE 368): Introduction to artificial neural network architectures, adaline, madaline, back propagation, BAM, and Hopfield memory, counter-propagation networks, self organizing maps, adaptive resonance theory, are the topics covered. Students experiment with the use of artificial neural networks in engineering through semester projects. Prerequisite: Math 204 or 229.

Markov Decision Processes (CpE/SysEng/EE 457): Introduction to Markov Decision Processes & Dynamic Programming. Application to Inventory Control & other optimization & control topics.

Advanced Neural Networks (SysEng 478): Advanced artificial neural network architectures, namely; Radial-Basis Function Networks, Support Vector Machines, Committee Machines, Principal Components Analysis, Information-Theoretic Models, Stochastic Machines, Neurodynamic Programming, and Temporal Processing are the topics covered. Prerequisite: SysEng 378 or equivalent neural network course.

.....
Systems and Software Architecture Certificate The systems and software architect fills a critical role in today's development process, transforming market inputs into the requirements and architecture specification of a product that independent (often remote) development teams can implement. Requests from industrial partners have led to a focused graduate certificate training program on Systems and Software Architecture containing coursework as follows:

Software Intensive Systems Architecting (SysEng 470, LEC 3.0): Provides the basic tools and concepts of architecting complex software intensive systems. The following topics are covered under four main sections: Architecting Process, Architecting Heuristics, Architecting Patterns and Frameworks, and Architecture Assessment. Offered via distance and on-campus.

Software Requirements Engineering (CmpSci 409, LEC 3.0): Software Requirements Engineering covers all the activities involved in discovering, analyzing, specifying and managing software requirements for a software system from multiple perspectives. Students will study how to elicit, analyze, specify, validate, and manage software requirements using advanced software requirements engineering methods. Offered via distance and on-campus.

Object-Oriented Analysis and Design (CmpSci 308, LEC 3.0): This course will explore principles, mechanisms, and methodologies in object-oriented analysis and design. An object-oriented programming language will be used as the vehicle for the exploration. Offered via distance and on-campus.

Model Based Systems Engineering (SysEng 435/CmpSci 405, LEC 3.0): Provides the student with an understanding of the use of models to represent systems and the underlying system elements, components, etc. The student will gain proficiency in using a systems modeling language and how it can be used to shift systems engineering from a document centric paradigm to one that is model centric. Offered via distance and on-campus.

Departmental Research Laboratories & Highlights

Experimental Computation Laboratory
(ECL)/FACTS Interaction Laboratory (FIL)

<http://filpower.mst.edu/>

Mission: This mission of the ECL is to explore experimental, cross-disciplinary approaches to problems primarily in distributed, embedded systems management and security. The FIL applies these approaches to the emerging smart grid.

Faculty Researchers: Bruce McMillin (Director), Wei Jiang and Sriram Chellappan (CS), Mariesa Crow, Sahra Sedigh and Jonathan Kimball (ECE)

Current Projects:

- National Science Foundation Engineering Research Center: Future Renewable Electric Energy Delivery and Management (FREEDM) System
- Advanced military installations that integrate renewable energy and advanced energy storage technologies
- Common Correctness for Protecting Confidentiality of Critical Infrastructure Systems
- GAANN: Information and System Assurance for Critical Infrastructures
- Information Flow Models for Cyber-Physical Infrastructures
- CPS Small: Foundations: Reliability Models of Cyber-Physical Infrastructures

Research Highlight:

A Secure and Content-based Framework to Identify and Share Needed Information

Wei Jiang

Information analysis and communication play significant roles in decision making, especially in battle-grounds and situations where national security is under threat. In many situations when information in consideration is sensitive/confidential, it is in our best interests to analyze and share only needed information to minimize the potential of security breach regarding other irrelevant but sensitive information. Thus, the goal of this project is to investigate methodologies and develop an advanced communication framework that enables different entities in distributed environments to identify, share and analyze only needed information, without disclosing other unwanted but sensitive information.

Current Funding Sources:

- National Science Foundation (NSF)
- Air Force Research Laboratory (AFRL)
- Leonard Wood Institute
- Department of Defense/National Security Agency (DoD/NSA)
- Missouri S&T Intelligent Systems Center
- Missouri S&T Energy Research and Development Center

Natural Computation Laboratory (NC-LAB)

<http://web.mst.edu/~tauritzd/nc-lab/>

Mission: The mission of the NC-LAB is to develop novel types of computational problem solving methods inspired by nature which are both more powerful and user-friendlier than the current state-of-the-art, and to apply them to real-world problem solving. Since the lab's founding in 2002, its computational problem solving method of choice has been Evolutionary Computing.

Faculty Researchers: Dr. Daniel Tauritz (Lab Director), Dr. Bruce McMillin, Dr. Thomas Weigert, Dr. Mariesa Crow (Department of Electrical & Computer Engineering), Dr. Matt Insall (Department of Mathematics & Statistics), Dr. Ray Luechtefeld (Department of Organizational Leadership, University of La Verne)

Current Projects:

- Computational Intelligence Techniques for Situational Awareness in Computing Networks
- Coevolutionary Automated Software Correction
- Fitness-Guided Fault Localization
- Self-Configuring Evolutionary Algorithms
- Virtual Facilitator
- Automated Partial Credit Grader
- Configuring and Benchmarking Evolutionary Algorithms

Current Funding Sources:

- National Science Foundation (NSF)
- Sandia National Laboratories (SNL)
- Computing Research Association Committee on the Status of Women in Computing Research (CRA-W)
- S&T Intelligent Systems Center (ISC)



“NC-LAB moving into new digs in the Missouri Enterprise Building”

Web and Wireless Computing Laboratory

<http://web.mst.edu/~cswebdb/about.html>

Mission: The W2C lab, started in 2001, is designed to carry out research in the area of Web data management and wireless computing including sensor networks. Our focus is on scientific research to advance the state of art in these two areas. The current researchers are pursuing their PhD/MS/BS degree in different areas of interest to W2C lab. The lab is well-equipped with over 25 3.2 Ghz PCs, 5 Dell Servers, linux machines, laptops etc. The lab has a wireless sensor network test-bed consists of Crossbow sensor motes. Lab has graduated 5 PhD and 16 MS thesis students and currently 6 PhD, 7 MS thesis and 3 BS students are doing their research in the lab.

Faculty Researchers: Sanjay K Madria (Director) and Sriram Chellappan

Research Collaborators from S&T: Fikret Ercal, Thomas Weigert, Sriram Chellappan, Maggie Cheng, Jag Sarangapani and Maciej Jan Zawodniok

External Collaborators: Takahiro Hara (Osaka University) and Mark Linderman (AFRL)

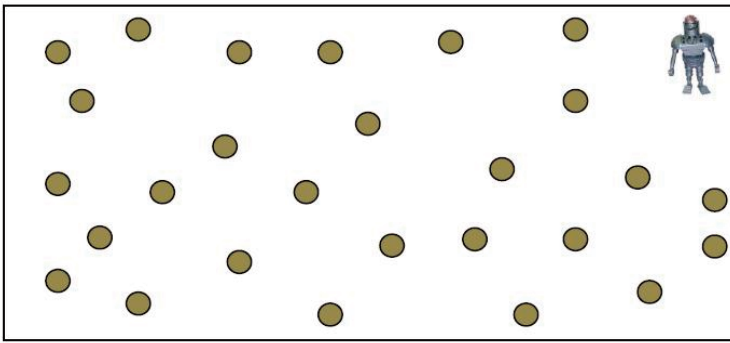
Current Projects:

- Sensor Computing
 - Secure Data Aggregation in Wireless Sensor Networks
 - Dynamic Social Grouping in Wireless Sensor Networks
 - Outlier Detection in Wireless Sensor Networks
 - Wireless Sensor Network Infrastructure & Protocols for mine safety
 - Data Characteristic Guided Compression for Stream-Based Systems
 - Defending against Location Disclosure Attacks
- Mobile Computing
 - An incentive based routing protocol in MANET'S
 - Privacy Ensured Service Discovery in Pervasive Computing Environment
 - P2P Collaborative Information Management
 - A Resource-Efficient Adaptive Caching Scheme for Mobile Ad-Hoc Networks
- Web Computing
 - Incrementalisation and Caching in Java Query Language
 - XML join based on content and structure for XML data integration

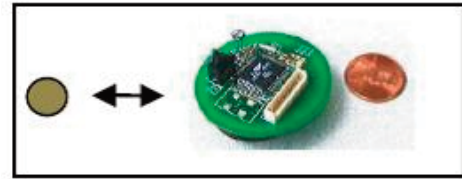
Research Highlight:

Location Privacy in Sensor Networks Sriram Chellappan

The premise of this project is to protect wireless sensor networks deployed by the Army against a new kind of threat called Adversarial Localization. Adversarial localization refers to attacks where an adversary attempts to disclose physical locations of sensors in a deployed wireless sensor network. These days, sensor networks are becoming indispensable to the Army for many missions. While there are protocols available for secure communications of sensors in the network, the issue of physical location of sensors has never been addressed.



An adversary in a wireless sensor network



A wireless sensor

Our research group is actively investigating this problem. We have defined a model for adversarial localization, where we consider an adversary moving in the sensor network detecting signals emitted by the sensors as part of their normal communication. By measuring raw physical properties of signals like Angle of Arrival, Signal Strength of the detected signal, the adversary will aim to discover sensor positions. We first analyze the feasibility of the attack and derive critical insights on the nature and success of the attack. We then design a protocol executed by sensor themselves to defend against such an attack. The core challenge comes from the sensors performing two conflicting objectives simultaneously: localize the adversary, and hide from the adversary. The principle of the proposed defense protocol, LPPT (Location Privacy Preserving Tracking), is to allow sensors intelligently predict their own importance as a measure of these two conflicting requirements. Only a few important sensors will participate in any message exchanges. This ensures high degree of adversary localization, while also protecting location privacy of many sensors. We currently have a test-bed that implements the attack model. On-going work is to design a test-bed that executes the defense protocol to see its performance.

Current Funding Sources:

- National Science Foundation (NSF)
- Department of Energy (DOE)
- Air Force Research Laboratory (AFRL)
- University of Missouri Research Board (UMRB)
- Hengsoft

Pervasive and Mobile Computing Laboratory

Mission: Pervasive computing explores the task of integrating technology into an environment, such that a multitude of computing devices are available to proactively perform services for users, thereby lightening the users' workload. The emergence of pervasive systems has been characterized as the third wave in computing, after the mainframe era (one computer, many users) and the personal computer era (one computer, one user). Pervasive computing is the next natural step, as a single user is in control of numerous computing elements.

The terms "ubiquitous computing" and "pervasive computing" have been used somewhat interchangeably in the literature. We draw a distinction between the two: "pervasiveness" refers to invisibility and proactiveness - where the computer dissolves into the fabric of the surroundings and requires minimal stimulus from the user, while "ubiquity" characterizes availability. To be truly pervasive, computing should be seamlessly and invisibly integrated into the lives of its users, necessitating computational intelligence that predicts the needs and desires of the user and can independently carry out services for the user, based on

surrounding context. Pervasive computing also leverages distributed computing, to delegate computational tasks to remote and/or heterogeneous computing resources.

These areas of computing can be leveraged in concert to achieve the goal of pervasive computing: balancing proactiveness of services and transparency of operation to saturate an environment with computing agents that automate the trivial daily tasks of life.

A major open field is related a delicate issue faced by pervasive computing: which choices can be delegated to the system (in the form of local clients, neighboring peers, or a central server) and which must be performed by the user. It is evident that the goal of pervasive computing is to maximize the former and minimize the latter. This often demands more intelligent algorithms, architectures and technologies than are presently available. In order to create a system that proactively carries out tasks, yet remains mostly transparent to the user, the following two challenges should be addressed:

- The computing agents need to be able to predict the user's intent based on history and context-awareness.
- A reliable method for integrating all the computing agents into a seamless entity needs to be designed.

Faculty Researchers: Ali Hurson (Lab Director), Dan Lin, Sanjay Madria, Sahra Sedigh, and Zhaozheng Yin.

Current Projects:

- Privacy-preserving location information publishing
- Constraint-based indexing and querying of moving objects
- Information routing in vehicular ad-hoc networks
- Preserving data privacy in the cloud
- Active sensor networks and interoperability of sensor networks
- Mobile agent security
- Data broadcasting in traffic control
- Tracking Humans in the Social World by Fusing Heterogeneous Sensor Data
- Pervasive cyberinfrastructure for personalized learning and instructional support (PERCEPOLIS)
- Secure data aggregation in wireless sensor networks
- Dynamic social grouping in wireless sensor networks
- An incentive based routing protocol in MANET
- A resource-efficient adaptive caching scheme for mobile ad-hoc networks
- wireless sensor network infrastructure & protocols for mine safety

Research Highlight:

PERCEPOLIS: Pervasive Cyberinfrastructure for Personalized Learning and Instructional Support **Sahra Sedigh and Ali R. Hurson**

Recent studies of undergraduate education have identified “linearity” of traditional curricula as contradictory to the body of knowledge on how students learn. A networked model has been proposed, where the components form a cohesive and strongly-interconnected whole and learning in one subject reinforces and supports learning in other subjects. A similar paradigm shift is needed in instruction, where the majority of endeavors undertaken by faculty members are carried out in disjoint and isolated fashion. Collaboration,

at best, is typically limited to sharing of instructional content for specific courses, mainly within a program, resulting in duplication of effort and inconsistency from one offering of the course to the next. The pressing need for a highly-trained workforce in fields related to science and technology exacerbates the detrimental effect of this inefficiency, especially for smaller institutions.

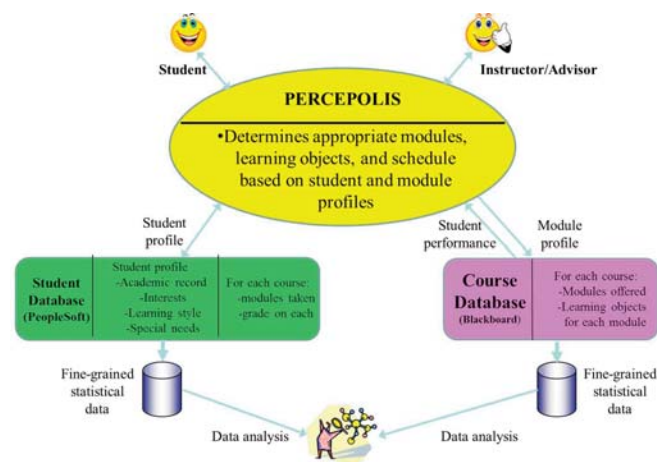
Advances in databases; computational intelligence; and especially pervasive computing, which allows “anytime, anywhere” transparent access to information; provide fertile ground for radical changes in pedagogy. Cyberinfrastructure leveraging these technological advances can yield improvements in both instruction and learning, support a networked curricular model, facilitate collaboration within and among groups of students and instructors, and provide continual access to instructional material. The trajectory followed by each student through the curriculum can be intelligently personalized, based on prior knowledge and skills, learning styles, and interests of the student, among other attributes.

The goal of our research is to develop Pervasive Cyberinfrastructure for Personalized Learning and Instructional Support (PERCEPOLIS), which leverages technological advances to facilitate personalized learning in higher education, while supporting a networked curricular model. Fundamental to PERCEPOLIS is:

- a) A modular approach to course development.
- b) Blended instruction, where students are responsible for perusing certain learning artifacts outside of class. Used in conjunction with the cyberinfrastructure, blended learning shifts the focus of face-to-face classroom meetings from lecture to active learning, interactive problem-solving, and reflective instructional tasks.

The novelty of PERCEPOLIS lies in its ability to leverage pervasive and ubiquitous computing and communication through the use of intelligent software that considers a student’s academic profile and interests, as well as supplemental information such as his or her learning style, to customize course content. Assessments that gauge the student’s mastery of concepts are used to allow self-paced progression through each course. Furthermore, the cyberinfrastructure facilitates the collection of data on student performance and learning at a resolution that far exceeds what is currently available. We believe that such an infrastructure will accelerate the acquisition of knowledge and skills critical to professional practice, while facilitating the study of how this acquisition comes about, yielding insights that may lead to significant changes in pedagogy.

As depicted below, the proposed cyberinfrastructure is in the form of middleware that links data-bases, e.g., PeopleSoft, and instructional platforms; e.g., Blackboard, currently in use at academic institutions, facilitating incremental adoption of the networked and modular curricular model at low cost. Moreover, the ability to connect tools already in use, without requiring customized computing resources, enables instructors at different academic institutions to collaborate on and exchange educational materials and data, creating an environment conducive to collaboration on educational research.



Current Funding Sources:

- National Science Foundation (NSF)
- Department of Education (DOE)
- Oak Ridge National Laboratory (ORNL)
- Missouri University of Science and Technology

McDonnell Douglas Foundation Software Engineering Laboratory

<http://web.mst.edu/~fliu/selab.html>

Mission: McDonnell Douglas Foundation Software Engineering Laboratory was established in 1996 to enhance the capabilities for teaching and conducting research in software engineering at Missouri University of Science and Technology.

Faculty Researchers: Prof. Frank Liu, Thomas Weigert, Bruce McMillin

Current Projects:

- Advanced Landmine Detection Simulator
- Ergonomic Analysis Based on Assembly Simulation with Motion Capture
- A Low-Cost Motion Tracking System for Virtual Reality Applications
- Web-based Collaborative Decision Making based on Computational Argumentation and Its Application in Air Traffic Control
- CAD Model Based Simulation of Manufacturing Operations Using Dynamic Data Configuration and Real-Time Motion Capture

Current Funding Sources:

- Leonard Wood Institute
- Boeing Co.
- Rockwell Collins Co.
- Spirit Aerospace Co.
- National University Transportation Center (Missouri University of Science and Technology)
- Intelligent Systems Center (Missouri University of Science and Technology)

2011 Faculty Publications

by Research Area

Computational Intelligence, Control & Optimization, Computer Vision, Bioinformatics **Faculty: Jagannathan, Kessentini, Leopold, Madria, Tauritz, Weigert, Yin**

Ryoma Bise, Zhaozheng Yin, Takeo Kanade, Reliable cell tracking by global data association. In Proceedings of the 8th IEEE International Symposium on Biomedical Imaging (ISBI), pp1004-1010, Chicago, IL, USA, 2011.

Ryoma Bise, Takeo Kanade, Zhaozheng Yin, Seungil Huh, Automatic Cell Tracking Applied to Analysis of Cell Migration in Wound Healing Assay. In Proceedings of the 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, pp6174-6179, Boston, MA, USA, 2011.

David Andrew Cape and Daniel R. Tauritz, Probabilistically Interpolated Rational Hypercube Landscape Evolutionary Algorithm. In Proceedings of the 13th Annual Conference Companion on Genetic and Evolutionary Computation (GECCO '11), pages 807-808, Dublin, Ireland, July 12-16, 2011.

A. Coalter and J. Leopold, "ROAR: A Reference Ontology for Anatomical Relations", *Proceedings of the 2011 IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB)*, Paris, France, pp. 176-183, April 11-15, 2011.

T. Dierks, B. Brenner, and S. Jagannathan, "Discrete time optimal control of nonholonomic mobile robot formations using linearly parameterized neural networks", *International Journal of Robotics and Automation*, vol. 26, no. 1, pp. 76-85, 2011. (invited)

T. Dierks and S. Jagannathan, "Online optimal control of nonlinear discrete-time systems using approximate dynamic programming", *Journal of Control Theory and Applications*, vol. 9, no.3, pp.361-369, August 2011.

T. Dierks, B. Thumati, and S. Jagannathan, "An online model-based fault accommodation scheme for nonholonomic mobile robots in formation", *Journal of Defense Modeling and Simulation*, Accepted for publication in August 2010, to appear in July 2011 or Oct 2011. (invited).

M. Faunes, M. Kessentini, H. Sahraoui, and M. Boukadoum, Software Clustering by Example; In 20th International Conference on Genetic Algorithms (ICGA) and the 16th Annual Genetic Programming Conference (GP) (GECCO2011), ACM.

S. Ferrari, S. Jagannathan and F. Lewis, "Approximate dynamic programming and reinforcement learning: editorial", *Journal of Control Theory and Applications*, vol. 9, no.3, pp.309, August 2011.

Brian W. Goldman and Daniel R. Tauritz, Self-Configuring Crossover. In Proceedings of the 13th Annual Conference Companion on Genetic and Evolutionary Computation (GECCO '11), pages 575-582, Dublin, Ireland, July 12-16, 2011.

Brian W. Goldman and Daniel R. Tauritz, Meta-Evolved Empirical Evidence of the Effectiveness of Dynamic Parameters. In Proceedings of the 13th Annual Conference Companion on Genetic and Evolutionary Computation (GECCO '11), pages 155-156, Dublin, Ireland, July 12-16, 2011.

Lisa M. Guntly and Daniel R. Tauritz, Learning Individual Mating Preferences. In Proceedings of the 13th Annual Conference on Genetic and Evolutionary Computation (GECCO '11), pages 1069-1076, Dublin, Ireland, July 12-16, 2011.

G. Halligan, B. T. Thumati and S. Jagannathan, "A novel fault diagnostics and prognostics scheme using a nonlinear observer with artificial immune system as an online approximator", *IEEE Transactions on Control Systems Technology*, accepted for publication, Sept. 2011.

Seungil Huh, Sungeun Eom, Ryoma Bise, Zhaozheng Yin, Takeo Kanade, Mitosis detection for stem cell tracking in phase-contrast microscopy images. In Proceedings of the 8th IEEE International Symposium on Biomedical Imaging (ISBI), pp. 2121-2127, Chicago, IL, USA, 2011.

Anil Kakrala, Sanjeev Agarwal, Sanjay Madria, Mobile Agent Based Collaborative Computing Framework for Handling Constraint Resources, Ubiquitous Multimedia and Mobile Agents: Models and Implementations, IGI Global, USA, 2011.

Takeo Kanade, Zhaozheng Yin, Ryoma Bise, Seungil Huh, Sungeun Eom, Michael Sandbothe, Mei Chen, Cell Image Analysis: Algorithms, System and Application. In Proceedings of IEEE Workshop on Applications of Computer Vision (WACV), pp. 374-381, Kona, HI, USA, 2011.

Dai Fei Elmer Ker, Lee Weiss, Silvina Junkers, Mei Chen, Zhaozheng Yin, Michael Sandbothe, Seungil Huh, Sungeun Eom, Ryoma Bise, Elvira Highley, Takeo Kanade, Phil Campbell., An Engineered Approach to Stem Cell Culture: Automating the Decision Process for Real-time Adaptive Subculture of Stem Cells. PLoS ONE, Volume 6, Number 11, November 2011.

L. Lee, J. Leopold, and R. Frank, "Protein Secondary Structure Prediction Using BLAST and Relaxed Threshold Rule Induction From Coverings", *Proceedings of the 2011 IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB)*, Paris, France, pp. 7-14, April 11-15, 2011.

S. Mehraeen, S. Jagannathan, and M. L. Crow, "Decentralized dynamic surface control of large scale interconnected systems in strict feedback form by using neural networks with asymptotic stabilization", *IEEE Transactions on Neural Networks*, to appear in August 2011.

S. Mehraeen and S. Jagannathan, "Decentralized near optimal control of a class of interconnected nonlinear discrete-time systems by using online Hamilton-Bellman-Jacobi formulation", *IEEE Transactions on Neural Networks*, to appear in Oct 2011.

David Nodland, H. Zargarzadeh, A. Ghosh, and S. Jagannathan, Neuro-optimal control of an unmanned helicopter", *Journal of Defense Modeling and Control*, accepted for publication, August 2011. (invited paper)

Ruwen Qin, Jing Fu, and Zhaozheng Yin, Pattern Planning and Optimization of Charged Particle Beam Scanning in Nanomanufacturing. 15th International Conference on Mechatronics Technology, Melbourne, Australia, Nov, 2011.

T. Weigert, Q. Tang, and K. Lian, "State-of-charge Prediction of Batteries and Battery-Supercapacitor Hybrids using Artificial Neural Networks", *Journal of Power Sources*, 196(8), 4061, 2011.

Josh L. Wilkerson and Daniel R. Tauritz, A Guide For Fitness Function Design. In Proceedings of the 13th Annual Conference Companion on Genetic and Evolutionary Computation (GECCO '11), pages 123-124, Dublin, Ireland, July 12-16, 2011.

Hao Xu, S. Jagannathan, F. L. Lewis, "Stochastic optimal control of unknown networked control systems in the presence of random delays and packet losses", *Automatica*, accepted for publication, July 2011.

Q. Yang and S. Jagannathan, "Reinforcement learning controller design for affine nonlinear discrete-time systems using online approximators", *IEEE Transactions on Systems, Man and Cybernetics: Part B*, to appear, August 2011.

Zhaozheng Yin, Takeo Kanade, Restoring artifact-free microscopy image sequences. In Proceedings of the 8th IEEE International Symposium on Biomedical Imaging (ISBI), pp. 909-913, Chicago, IL, USA, 2011.

Zhaozheng Yin, Dai Fei Ker, Silvina Junkers, Takeo Kanade, Mei Chen, Lee Weiss, Phil Campbell, Data-driven Prediction of Stem Cell Expansion Cultures. In Proceedings of the 33rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, pp. 3577-3580, Boston, MA, USA, 2011.

Zhaozheng Yin, Dai Fei Elmer Ker, Takeo Kanade, Restoring DIC Microscopy Images from Multiple Shear Directions. In Proceedings of the 22nd Biennial International Conference on Information Processing in Medical Imaging (IPMI), pp. 384-397, Monastery Irsee, Germany, 2011.

Information Assurance, Infrastructure Protection, Cyber-Physical Systems, Reliability Faculty: Chellappan, Jagannathan, Jiang, Lin, Liu, McMillin, Sedigh, Tauritz

Ravi Akella and Bruce McMillin, "Verification and Protection of Confidentiality in an Advanced Smart Grid," *Proceedings of the 45th Hawaii Conference on System Sciences* (to appear).

Jonathan J. Blount, Daniel R. Tauritz and Samuel A. Mulder, Adaptive Rule-Based Malware Detection Employing Learning Classifier Systems: A Proof of Concept. In Proceedings of the 35th IEEE Annual Computer Software and Applications Conference Workshops (COMPSACW '11), pages 110-115, Munich, Germany, July 18-21, 2011.

Kenneth Fletcher and Xiaoqing Frank Liu, "Security Requirements Analysis, Specification, Prioritization and Policy Development in Cyber-Physical Systems," The First International Workshop on Safety and Security in Cyber-Physical Systems, Jeju Island, South Korea, June, 2011.

Thoshitha Gamage, Ravi Akella, Tom Roth, and Bruce McMillin, "Information Flow Security in Cyber-Physical Systems", *Proceedings of the 7th Annual Cyber Security and Information Intelligence Research Workshop* (to appear).

Thoshitha Gamage, Tom Roth, and Bruce McMillin, "Confidentiality Preserving Security Properties for Cyber-Physical Systems," *Proceedings of the 2011 Computers, Software, and Applications Conference*, (to appear).

Wenjun Gu, Sriram Chellappan, Xiaole Bai and Hongang Wang, *Scaling Laws of Key Pre-distribution Protocols in Wireless Sensor Networks*, to appear in IEEE Transactions on Information Forensics and Security.

Gary Halligan and S. Jagannathan, "PCA-based fault isolation and prognostics with application to pump", *International Journal of Advanced Manufacturing Technology*, vol. 55, no. 5, pp. 699-707, 2011.

Wei Jiang and Bharath K. Samanthula, "A Secure and Distributed Framework to Identify and Share Needed Information", the Third IEEE International Conference on Privacy, Security, Risk and Trust (PASSAT11), MIT, Boston, USA, October 9-11, 2011.

Wei Jiang and Bharath K. Samanthula, "N-Gram Based Secure Similar Document Detection", the 25th Annual WG 11.3 Conference on Data and Applications Security, Richmond, Virginia, July 11-13, 2011.

J. Lin, S. Sedigh, and A. Miller, Integrated cyber-physical simulation of intelligent water distribution networks. In *Matlab. InTech*, 2011.

J. Lin, S. Sedigh, and A. R. Hurson. An agent-based approach to reconciling data heterogeneity in cyber-physical systems. In Proceedings of the 20th IEEE International Heterogeneity in Computing Workshop (HCW '11), pages 93-103, Anchorage, USA, May 2011.

J. Lin, S. Sedigh, and A. Miller, A semantic agent framework for cyber-physical systems. In A. Elci, M. T. Kone, and M. A. Orgun, n, editors, *Semantic Agent Systems: Foundations and Applications*. Springer-Verlag, 2011.

J. Lin and S. Sedigh, Reliability modeling for intelligent water distribution networks. *International Journal of Performability Engineering*, Special issue on Performance and Dependability Modeling of Dynamic Systems, 7(5):467-478, Sept. 2011.

J. Lin, S. Sedigh, and A. R. Hurson, Ontologies and decision support for failure mitigation in intelligent water distribution networks. In Proceedings of the 45th Hawaii International Conference on System Sciences (HICSS-45), Maui, USA, Jan. 2012, to appear.

J. Lin, S. Sedigh, and A. Miller, A game-theoretic approach to decision support for intelligent water distribution. In Proceedings of the 44th Hawaii International Conference on System Sciences (HICSS-44), pages 1-10, Kauai, USA, Jan. 2011, best paper nominee.

P. Maheshwari, B. Seol, J. Lee, J. Lim, S. Sedigh, and D. Pommerenke, Software-based instrumentation for localization of faults caused by electrostatic discharge. In Proceedings of the 13th IEEE International High Assurance Systems Engineering Symposium (HASE '11), Boca Raton, USA, Nov. 2011, invited.

Mummoorthy Murugesan, Wei Jiang, Erhan Nergiz and Serkan Uzunbaz, "k-out-of-n Oblivious Transfer based on Homomorphic Encryption and Solvability of Linear Equations", ACM Conference on Data and Application Security and Privacy (ACM CODASPY 2011), San Antonio, TX, February 21-23, 2011.

Tu A. Nguyen, Xin Qiu, Thoshitha T. Gamage, M. L. Crow, Bruce M. McMillin, and A. C. Elmore, Microgrid Application With Computer Models and Power Management Integrated Using PSCAD/EMTDC, *Proceedings of the 2011 North American Power Symposium*, Arlington, TX, Boston, MA, 2011.

Prathima Rao, Dan Lin, Elisa Bertino, Ninghui Li, Jorge Lobo, "Fine-Grained Integration of Access Control Policies", *Computer & Security*, 2011.

A. Soylemezoglu, S. Jagannathan and C. Saygin, "Mahalanobis-Taguchi system as a multi-sensor based decision making prognostics tool for centrifugal pump", *IEEE Transactions on Reliability*, accepted for publication, April 2011.

Mobile & Pervasive Computing, Internet & Web & Cloud Computing, Databases **Faculty:** Hurson, Lin, Liu, Madria, Sedigh, Weigert

F. Bastianini, G. Pascale, and S. Sedigh, Cost-effectiveness of structural health monitoring in low sensor count installations using a wireless autonomous SHM WASHM device. In *Proceedings of the European Workshop on Cultural Heritage Preservation and Training (EWCHP '11)*, Berlin, Germany, Sept. 2011.

F. Bastianini, S. Sedigh, and G. Pascale, Cost-effective dynamic structural health monitoring with a compact and autonomous wireless sensor system. In *Proceedings of the International Symposium on Nondestructive Testing of Materials and Structures (NDTMS '11)*, Istanbul, Turkey, May 2011.

Kenneth K Fletcher and Xiaoqing (Frank) Liu, Cloud Security Requirements Analysis and Security Policy Development using HOOMT. A book chapter in book: *Cloud Computing: methodology, System, and Application*, edited by Lizhe Wang, Jinjun Chen, and Boualem Benatallah, CRC Press, 2011.

Lasanthi Heendaliya, Dan Lin, Ali Hurson, "Optimizing Predictive Queries on Moving Objects under Road-network Constraints", the 22nd International Conference on Database and Expert Systems Applications (DEXA), Vol. 1, pages 247-261, 2011.

Alex Hindle, Jie Shao, Dan Lin, Jiaheng Lu, Rui Zhang, "Clustering Web Video Search Results based on Integration of Multiple Features". *World Wide Web Journal (WWWJ)*, 2011.

Rong Hu, Jianxun Liu, Xiaoqing Frank Liu, A Trustworthiness Fusion Model for Service Cloud Platform Based on D-S Evidence Theory. *Proc. of First IEEE/ACM Workshop on the application of Social Networking concepts to Cluster, Cloud, Grid and Services Computing. CCGRID 2011: 566-571*, May 2011.

E. Jean, S. Sedigh, A. R. Hurson, and B. Shirazi, Tools and techniques for interoperability and dynamic reconfiguration of pervasive systems. In M. Denko and M. S. Obaidat, editors, *Pervasive Computing and Networking*. John Wiley & Sons, 2011.

Yechun Jiang, Jianxun Liu, Mingdong Tang, and Xiaoqing Liu, "An Effective Web Service Recommendation Method based on Personalized Collaborative Filtering," *Proc. of 2011 IEEE International Conference on Web Services (ICWS)*, research track, 2011. (Acceptance rate: $38/277 = 13.7\%$)

Guosheng Kang, Jianxun Liu, Mingdong Tang, Xiaoqing Liu, Kenneth Fletcher, "Web Service Selection for Resolving Conflicting Service Requests," *Proc. of 2011 IEEE International Conference on Web Services (ICWS)*, application and experience track, 2011.

Dan Lin, Christian S. Jensen, Rui Zhang, Lu Xiao, Jiaheng Lu, "A Moving-Object Index for Efficient Query Processing with Peer-Wise Location Privacy", In *Proceedings of International Conference on Very Large Data Bases (VLDB)*, Istanbul, Turkey, 2012.

Xiaoqing (Frank) Liu and Nektarios Georgalas, Specification of Non-functional Requirements and their Trade-offs in Service Contracts in the NGOSS Framework. In book: *Engineering Reliable Service Oriented Architecture-Managing Complexity and Service Level Agreements*, edited by Nikola Milanovic, Information Science Reference, IGI Global, PA, USA, 2011.

Xiaoqing (Frank) Liu, Rubal Wanchoo, Ravi Santosh Arvapally, "Empirical Study of an Intelligent Argumentation System in Multi-Criteria Decision Making," *Proc. of the 2011 International Conference on Collaboration Technologies and Systems (CTS'2011)*, Philadelphia, Pennsylvania, USA. May 2011,

Xiaoqing (Frank) Liu, Ravi Santosh Arvapally, "Web-based Intelligent Argumentation and Collaborative Decision Support System," Proc. of The 2011 International Conference on Collaboration Technologies and Systems (CTS'2011), Philadelphia, Pennsylvania, USA, May, 2011.

P. Maheshwari, T. Li, J. Lee, B. Seol, S. Sedigh, and D. Pommerenke, Software-based analysis of the effects of electrostatic discharge on embedded systems. In Proceedings of the 35th IEEE International Computer Software and Applications Conference (COMPSAC '11), pages 436-441, Munich, Germany, July 2011.

Venkata Krishna Suhas Nerella, Sanjay Madria, Thomas Weigert, Performance Improvement for Collection Operations Using Join Query Optimization", in IEEE Computer Software and Applications Conference (COMPSAC2011), Munich, Germany, July 2011.

Nilesh Padhariya, Anirban Mondal, Vikram Goyal, Roshan Shankar, Sanjay Kumar Madria, EcoTop: An Economic Model for dynamic processing of top-k Queries in Mobile-P2P Networks, in 16th Intl Conference on Database Systems for Advanced Applications (DASFAA 2011), Hong Kong, 2011.

Jianzhong Qi, Rui Zhang, Lars Kulik, Dan Lin, Yuan Xue, "The Min-dist Location Selection Query", In International Conference on Data Engineering (ICDE), 2012.

Smitha Sundareswaran, Anna Squicciarini, Dan Lin, Shuo Huang, "Promoting Distributed Accountability in the Cloud", IEEE International Conference on Cloud Computing, 2011.

Anna Squicciarini, Dan Lin, Alessandro Mancarella, "PAIM: Peer-based Automobile Identity Management in Vehicular Ad-hoc Network", the 35th IEEE Computer Software and Applications Conference (COMPSAC), 2011.

Anna Squicciarini, Smitha Sundareswaran, Dan Lin, Josh Wede, "A3P: Adaptive Policy Prediction for Shared Images on Content Sharing Sites" (Best Paper Award), 22nd ACM Conference on Hypertext and Hypermedia, 2011.

Waraporn Viyanon and Sanjay Madria, XML Similarity Detection and Measures, to appear as book chapter in XML Data Mining: Models, Methods, and Applications, a book published by IGI Global, 2011.

C. Shaun Wagner, Sahra Sedigh, A.R. Hurson, and B. Shirazi, "A Survey of Techniques for Improving Search Engine Scalability through Profiling, Prediction, and Prefetching of Query Results". In Samee U. Khan, Lizhe Wang, and Albert Y. Zomaya, editors, Scalable Computing and Communications: Theory and Practice. John Wiley & Sons, 2012.

S. White, S. Sedigh, and A. R. Hurson, Security and privacy in cloud computing. In K. X. Yang and L. Liu, editors, Service Oriented Methodology and Technologies for Cloud Computing. IGI Global, 2012, to appear.

Rui Zhang, Jiangzhong Qi, Dan Lin, Wei Wang, Raymond Wong, "A Highly Optimized Algorithm for Continuous Intersection Join Queries over Moving Objects", VLDB Journal, 2011.

Networking & Sensors

Faculty: Chellappan, Hurson, Jagannathan, Madria, Sedigh

Roy Cabaniss, James M. Bridges, Andrew Wilson, Sanjay Madria, DSG-N2: A Group-Based Social Routing Algorithm, in the proceedings of IEEE International Conference on Wireless Communication and Networking Conference, Mexico, March 2011.

Neelanjana Dutta, Raghavendra Kotikalapudi, Abhinav Saxena and Sriram Chellappan, A Multi-tiered Architecture for Content Retrieval in Mobile Peer-to-Peer Networks, in Proc. of International Conference on Mobile Data Management (MDM), Short Paper, 2011.

B. Eslamnour, S. Jagannathan, and M. Zawodniok, "Dynamic channel allocation in wireless networks using adaptive learning automata", International Journal of Wireless Information Networks, Published electronically, Digital Object Identifier (DOI) 10.1007/s10776-011-0146-0, June 2011.

Wenjun Gu, Neelanjana Dutta, Sriram Chellappan and Xiaole Bai, *Providing End-To-End Secure Communications in Wireless Sensor Networks*, to appear in IEEE Transactions on Network and Service Management.

Arun Gunasekaran, Peter Chulick, Sahra Sedigh, and A.R. Hurson, "Military Standard Sensor Nodes for the Smart-Brick Structural Health Monitoring Platform". International Workshop on Structural Health Monitoring, Stanford, CA, 2011.

Dan Hirsch and Sanjay K Madria, A Cooperative Game Theoretic Approach for Data Replication in Mobile Ad-Hoc Networks, to appear in proceedings of 7th International Conference on Collaborative Computing (CollaborateCom 2011), USA

E. Jean, I. Rauschert, R. Collins, A.R. Hurson, S. Sedigh, and Y. Jiao, "RISN: An Efficient Sensor Network Overlay With Support For Autonomous And Distributed Applications", International Journal of Communications, Network and System Sciences, Vol. 4, No. 1, Pages 1-16, January 2011.

Priya Kasirajan, Carl Larsen, and S. Jagannathan, "A new data aggregation scheme via adaptive compression for wireless sensor networks", ACM Transactions on Sensor Networks, accepted for publication, August 2011.

Mohan Kumar, Sharma Chakravarthy, Sanjay K Madria, Mark Linderman, Waseem Naqvi, Middleware for Supporting Content Sharing in Dynamic Networks, to appear in Middleware Services and Applications, Milcom 2011, USA

Hemant Meka, Lekshmi Manian Chidambaram, Sanjay Madria, Mohan Kumar, Mark Linderman and Sharma Chakravarthy, ROMAN: Routing and Opportunistic Management of Airborne Networks, in IEEE proceedings of International Symposium on Collaborative Technologies and Systems (CTS 2011), Philadelphia, USA.

R. Parthasarathy, B. Shirazi, N. Peterson, W. Song, and A. Hurson, "Management and Security of Remote Sensor Networks in Hazardous Environments using Over the Air Programming", Journal of Information Systems and e-Business, special issue on CSIIR, 2011.

Nayot Poolsappasit, Vimal Kumar, Sanjay Madria, Sriram Chellappan, Secure Sensor Cloud, in proceedings of 8th International Workshop on Secure Data Management 2011 to be held with VLDB 2011.

Nayot Poolsappasit and Sanjay K Madria, A Secure Data Aggregation based Trust Management Approach for Dealing with Untrustworthy Motes in Sensor Network, in 40th IEEE International Conference on Parallel Processing (ICPP 2011), Taiwan.

C. Saygin and S. Jagannathan, "Radio frequency identification (RFID) enabling lean manufacturing", International Journal of Manufacturing Research, vol. 6, no. 4, pp. 321-336, 2011.

Tommy Szalapski and Sanjay K Madria, Energy-efficient Real-Time Data Compression in Wireless Sensor Networks in proceedings of 12th IEEE International Conference on Mobile Data Management, MDM 2011, Sweden (BEST PAPER AWARD).

E. Taqieddin, A. Miller and S. Jagannathan, Survivability and reliability analysis of the trusted link state protocol for wireless ad hoc networks", International Journal of Wireless and Mobile Networks, vol. 3, no. 2, pp. 77-89, April 2011.

A. Vijay, P. Chulick, S. Sedigh, and A. R. Hurson. Military-standard sensor nodes for the SmartBrick structural health monitoring platform. In Proceedings of the 8th International Workshop on Structural Health Monitoring (IWSHM '11), Stanford, USA, Sept. 2011.

A. Vijay, P. Chulick, and S. Sedigh. The SmartBrick wireless sensor node for high-resolution structural health monitoring. In Proceedings of the 18th International SPIE Symposium on Smart Structures and Materials and Nondestructive Evaluation and Health Monitoring, San Diego, USA, March 2011.

Changqing Xu, Xiaole Bai, Lei Ding, Jin Teng, Sriram Chellappan, and Dong Xuan, *Directed-Coverage in Wireless Sensor Networks: Concept and Quality*, Ad Hoc & Sensor Wireless Networks (AHSWN), Vol. 11, No. 3-4, pp. 173 – 197, 2011.

Software Engineering

Faculty: Kessentini, Liu, Madria, Morales, Tauritz, Weigert

S. Baranov, V. Kotlyarov, and T. Weigert, "Test Automation with Verifiable Coverage Criteria", 8th International Andrei Ershov Memorial Conf., Novosibirsk, June 2011.

S. Baranov, V. Kotlyarov, and T. Weigert, "Verifiable Coverage Criteria for Automated Testing", 15th International Conference on System Design Languages", Toulouse, July 2011.

S. Van Baelen, S. Gerard, I. Ober, T. Weigert, H. Espinoza, and I. Ober, "Model Based Architecting and Construction of Embedded Systems", Springer Lecture Notes in Computer Science, 2012.

T. Cottenier, A. van den Berg, and T. Weigert, "Managing Feature Interactions with Transactional Regions Aspect-oriented Software Development 2012, Potsdam, March 2012.

M. Faunes, M. Kessentini, and H. Sahraoui, Search-based software clustering by example. In 21th Annual International Conference on Computer Science and Software Engineering (CASCON2011), ACM.

A. Ghannem, M. Kessentini, and G. Boussaidi, Detecting model refactoring opportunities using genetic programming. In 21th Annual International Conference on Computer Science and Software Engineering (CASCON2011), ACM.

M. Kessentini, W. Kessentini, and H. Sahraoui, Design Defects Detection and Correction by Example, to appear in Journal of Automated Software Engineering, Springer, 2011.

M. Kessentini, H. Sahraoui, and M. Boukadoum, Transformation by Example, to appear in IEEE Transactions on Software Engineering, IEEE, 2011.

M. Kessentini, H. Sahraoui, and M. Boukadoum, Search-Based Model Transformation by Example, to appear in Software and System Modeling Journal-Special Issue of MODELS08, Springer, 2011.

M. Kessentini, H. Sahraoui, and M. Boukadoum, Example-based Model Transformation Testing, Journal of Automated Software Engineering, Volume 18, Number 2, pages 199-224, Springer, 2011.

M. Kessentini, H. Sahraoui, M. Boukadoum, and M. Wimmer, Design Defect Detection Rules Generation: A Music Metaphor. In 15th IEEE European Conference on Software Maintenance and Reengineering (CSMR2011), pages 241-248, IEEE, March 2011.

M. Kessentini, H. Sahraoui, M. Boukadoum, and M. Wimmer, Search-based Design Defects Detection by Example. In 14th IEEE International Conference on Fundamental Approaches to Software Engineering (FASE2011), pages 401-415, IEEE, 2011.

M. Kessentini, W. Kessentini, H. Sahraoui, Mounir Boukadoum, and Ali Ouni, Refactoring by Example; In 19th IEEE International Conference on Program Comprehension (ICPC2011), pages 81-90, IEEE.

V. Nerella, S. Madria, and T. Weigert, "Exploring Caching for Efficient Collection Operations, "Automate Software Engineering Conference", Kansas City, Nov. 2011.

T. Ovatman, T. Weigert and F. Buzluca, "Exploring Implicit Parallelism in Class Diagrams", Journal of Systems and Software, 84(5): 821- 834, 2011.

J. Nelson Rushton, A. Ricardo Morales, "Lightweight Formal Verification for Tail Recursive Loops", International Conference on Software Engineering Research and Practice (SERP), 2011.

Swetha Surapaneni, Venkata Krishna Suhas Nerella, Sanjay Madria, Thomas Weigert, Exploring Caching in Programs, to appear in 26th ACM/IEEE Automated Software Engineering (ASE 2011), USA

Josh L. Wilkerson and Daniel R. Tauritz, Scalability of the Coevolutionary Automated Software Correction System. In Proceedings of the 13th Annual Conference Companion on Genetic and Evolutionary Computation (GECCO '11), pages 243-244, Dublin, Ireland, July 12-16, 2011.

Programming Languages, Computer Graphics, Virtual Reality, Education & Misc.

Faculty: Hurson, Leopold, Liu, Sabharwal, Sedigh, Weigert

A. Bahmani, S. Sedigh, and A.R. Hurson, "Context-Aware Recommendation Algorithms for the PERCEPOLIS Personalized Education Platform", *Frontiers in Education Conference*, October 2011.

A. Bahmani, S. Sedigh, and A.R. Hurson, Context-aware recommendation algorithms for the PERCEPOLIS personalized education platform. In *Proceedings of the 41st IEEE Frontiers in Education Conference (FIE '11)*, pages F4E-1- F4E-6, Rapid City, USA, October 2011.

Abhinav Chadda, Wenjuan Zhu, Ming, Leu, Xiaoqing F. Liu, Design, Implementation, and Evaluation of Optical Low-Cost Motion Capture System, *Proceedings of the ASME 2011 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2011 August 29-31, 2011*, Washington, DC, USA

T. Cottenier, A. van den Berg, and T. Weigert, "Separation of Concerns with Transactional Regions", *15th International Conference on System Design Languages*, Toulouse, July 2011.

A.R. Hurson, S. Sedigh, L. Miller, and B. Shirazi, Enriching STEM Education through personalization and teaching collaboration. In *Proceedings of the 7th IEEE International Workshop on Pervasive Learning, Life, and Leisure (PerEL '11)*, pages 543- 549, Seattle, USA, March 2011, invited.

C. Sabharwal and J. Leopold, "Reducing 9-Intersection to 4-Intersection for Identifying Relations in Region Connection Calculus", *Proceedings of the 24th International Conference on Computer Applications in Industry and Engineering (CAINE 2011)*, Honolulu, Hawaii, Nov. 16-18, 2011.

C. Sabharwal, J. Leopold, and Nathan Eloe, "A More Expressive 3D Region Connection Calculus", *Proceedings of the 2011 International Workshop on Visual Languages and Computing (in conjunction with the 17th International Conference on Distributed Multimedia Systems (DMS'11))*, Florence, Italy, Aug. 18-20, 2011.

S. Sedigh, Smart technology - applications and infrastructure (panel). In *Proceedings of the 35th IEEE International Computer Software and Applications Conference (COMPSAC '09)* and *Proceedings of the 9th International Symposium on Applications and the Internet (SAINT '09)*, page 522, Munich, Germany, July 2011.

Wenjuan Zhu, Abhinav Chadda, Ming C. Leu, and Xiaoqing F. Liu, "Real-Time Automated Simulation Generation Based on CAD Modeling and Motion Capture", Accepted for publication in *Journal of Computer Aided Design and Applications*, Sept., 2011.

Wenjuan Zhu, Ming C. Leu, Xiaoqing F. Liu, Raghavendra Kotikalapudi, Hui He, Sheela Surisetty, Jerry D. Plunkett, Greg Pierson, Bradley M. Davis, "Low-Cost, High-Fidelity Virtual Landmine Detection Training System," *The 2011 International Conference on Computer Graphics and Virtual Reality (CGVR'11)* and the *2011 World Congress in Computer Science, Computer Engineering, and Applied Computing (WORLDCOMP'11)*, Las Vegas, July, 2011.

Wenjuan Zhu, Anup M Vader, Abhinav Chadda, Ming C Leu, Xiaoqing F Liu, and Jonathan B Vance, "Wii Remote based low-cost motion capture for automated assembly simulation", Accepted for publication in the *Journal of Virtual Reality*, Springer, Sept. 2011.

Donations From Alumni and Friends

Under \$100

Abernathie, Dale Allen; 1991
Adelsberger, Edwina R
Albarelli, Ryan Michael; 2003
Albers, James Edward; 1986
Anderson, Glenn R; 1973
Andrews, Ryan Thomas; 2007
Bardsley, David Scott; 1984
Becker, Kathryn A; 1976
Beckerle, Kelly Marie; 1988
Beckerle, Timothy Gerard; 1990
Beckmeyer, Russell R; 1971
Bennett, Carol Ann; 1992
Bergfeld, John J G; 1971
Bevans, Stanley Wayne; 1985
Bier, Patrick K; 1975
Birdsell, Clifford J; 1982
Blum, Anthony Franco; 2005
Bogender, Shawn Robert; 1996
Booth, Brian David; 1997
Bowman, Charles S; 1986
Brady, Amber Megann; 1983
Brady, Kevin E
Brown, Daniel J; 1974
Bruns, Barbara E; 1981
Bruns, Randall T; 1981
Buckley, Jared Roger; 1996
Buehler, Douglas P; 1979
Butler, Ralph M; 1981
Butler, Tracye Denton; 1985
Byrd, Alicia Kathleen; 1998
Byrd, Samuel Martin; 1998
Caldwell, Diane Marie; 1986
Canis, Walter; 1972
Cape, David Andrew; 2006
Clifton, Arlene K; 1972
Cochran, Stephen Anthony; 1992
Colter, Kim D; 1973
Cordes, Glenn E; 1960
Cothern, Douglas K; 1978
Court, Micahel R; 1973
Cox, David Duane; 1983
Dagestad, Pamela S; 1978
Danz, Steven William; 1987
Daum, Marilyn S; 1980
Debner, David E; 1968
Denney, Stephen Kent; 1994
Doerer, Daniel Michael; 1988
Drake, Michael Edward; 1994
Drewes, Laurie Ann; 1985
Drewes, Mark Kenneth; 1985
Duffey, Daniel James; 1988

Duncan, Junetta Alisa; 1999
Duncan, Thomas Shearer; 1990
Dyer, Andrew Shawn; 1988
Dziedzic, Charla C; 1983
Eaton, Daryl Ann; 1970
Edwards, Harry K; 1964
Erickson, Alan G; 1975
Erickson, Christina K; 1975
Erickson, Rodney J; 1983
Estep, Ronald L; 1971
Evans, Jesse D; 1965
Farley, Mary Ann; 1984
Fieseler, Catherine N; 1980
Foehrweiser, Roger Keith; 1987
Folta, Joseph E; 1976
Ford, Raymond F; 1970
Frager, Alan R; 1974
Galli, Donald H; 1974
Gauss, Montie J; 1973
Gavin, Darla Spencer; 1986
Gebhardt, Thomas V; 1978
Giana, Fiorella; 2005
Goetz, Carl Evan; 1984
Grose, Daniel W; 1977
Grotefendt, Judith R; 1974
Grotefendt, Rande H; 1973
Hancock, Scott Eric; 1987
Handy, Wallace William; 2005
Haring, James Donald; 1989
Harrington, Daniel L; 1983
Harrington, Laura Ellen; 1983
Hayden, Bruce Jeffrey; 1983
Hiebert, Gregory Lee; 1982
Hiebert, Yoelit Hannah; 1981
Hilleary, Cynthia S; 1976
Hillhouse, Michael D; 1975
Hilliard, Anthony Wayne; 2000
Hilliard, Nieccole Marie; 1997
Hughes, Jason Michael; 1995
Huhman, Jacob Wilson; 2009
Johnson, Andrew J; 1974
Kammer, Sally A; 1991
Kennedy, Kelly Ann; 1986
Kester, Paul Allen; 1999
Kim, Sophia Younjoo; 2003
King, Janet Rimmey; 1980
Kinser, Colby Evan; 1988
Kinser, Lynne D; 1992
Krasner, Herbert C; 1973
Krupa, Andrea L
Kuebler, Kenneth L; 1970
Lang, Stephen A; 1979
Langer, Richard B; 1983

Laufman, Anne E; 1983
Le, Sean Michael; 2002
Lenz, Sandra M; 1974
Lewick, Taylor Aaron; 1999
Li, Shuhong; 2002
Linck, Deborah Kay; 1982
Linck, Dennis Wayne; 1985
Lindesmith, Lisa Chon; 1990
Lindesmith, Stanley Benson; 1990
Lindsay, Elaine C.
Lindstrom, John A; 1973
Livaudais, Joan Marie; 1986
Livaudais, Ron Mark; 1983
Loesch, Janet L; 1980
Loesch, Terry L; 1980
Ludwig, Karen S; 1979
Ludwig, Michael F; 1978
Marburger, Karla L; 1984
Martin, Bennie F; 1986
Maurseth, Jerome A; 1974
Mausshardt, Charles; 1983
Mausshardt, Denise Ann; 1983
McBride, Gregory C; 1975
McCleary, Ronnie Neil; 1973
McCormick, C. Craig; 1968
McLaughlin, Ellen; 1989
McLaughlin, Matthew; 1992
Mease, Derek Ryan; 2005
Mersinger, Rozann P; 1981
Miller, Gretchen Rose; 2002
Mills, Edward L; 1956
Miskell, Lynn Rene; 1983
Mitchell, Deborah Gay; 1984
Moore, Joseph R; 1972
Moser, John Richard; 1984
Murrish, Jeremy L; 1997
Nagawiecki, Amy Lynn; 1984
Nagawiecki, Gregory Edwin; 1984
Nierengarten, John A; 1970
Novak, Stanley Frank; 1986
Oldroyd, Juanice E; 1983
Omohundro, Warren C; 1975
Ott, James W; 1975
Ott, Mary A; 1977
Otto, David L; 1968
Pankey, Tina Marie; 2006
Parrett, Alan V; 1984
Parrett, Minh T; 1979
Parsons, Clyde T; 1972
Parthasarathy, Murali; 1995
Pile, Thomas N; 1979
Plag, Darlene Gail; 1981
Plag, Mark Douglas; 1981

Post, Mark K; 1978
Puleo, Peter A; 1983
Rafferty, Patrick V; 1975
Rainey, Karen Lynn; 1998
Reed, Danny A; 1978
Reinhardt, James Gerard; 1986
Reunert, Philip Peter; 1984
Richesson, Jennifer Jo; 1994
Robertson, Kevin Dale; 1997
Rodgers, Sondra K; 1978
Rose, Jeffrey L; 1975
Sanders, Roger D; 1979
Santos, Carmela Rosario; 1996
Schafale, Richard G; 1973
Schaper, Gary E; 1993
Schuehler, David Vincent; 1993
Schuessler, Dawn E; 1974
Schuessler, Richard B; 1972
Shen, Chang; 1997
Sherman, Jason Alan; 1997
Shi, Yuning; 2000
Siever, William Michael; 2000
Simon, Dennis M; 1976
Simon, Kimberly M; 1976
Simpson, John Lawrence; 1997
Sisko, Bruce Peter; 1987
Skupnik, Nicholas George; 2001
Slane, Jeffrey Robert; 2006
Smith, Paul Thomas; 1984
Snow, Bruce Floyd; 1977
St. John, Charlotte Rose; 2009
Stager, Scott P; 1970
Steffan, Michael Roy; 1969
Tang, Cynthia; 1985
Thill, Daniel Gerard; 2003
Thill, Laura Maria; 2000
Thomas, Gary W; 1978
Turner, Sherry L; 1985
Utrecht, Daniel J; 1982
Umstead, Christopher; 1985
Underwood, Diane E; 1981
Van De Mark, Michelle Marie-Swenty; 2006
Veden, Leonard S; 1973
Vora, Chetan Bharat; 1997
Webster, Jacquelyne L; 1969
Wegman, John L; 1975
Wells, Curtis L; 1970
White, James J; 1974
Wieberg, Peggy A; 1986
Woodward, Michael G; 1987
Workman, J. Douglas; 1971
Wurtzler, Pamela H; 1981

\$100 Plus

Abshier, John C; 1983
Adelsberger, John J.
Alexander, Mary C.; 1971
Anderson, Phillip L.; 1985
Bailey, Wayne P; 1976
Bardsley, Jeannine M.; 1983
Beckmeyer, Margy R.; 1973
Bevans, Judy Kay; 1985
Bischel, Pat Oscar; 1987
Bousman, W. Thomas; 1968
Brandon, Dwight W.; 1983
Brenneke, Kenneth J.; 1978
Brewer, David W.; 1969
Brune, William K; 1973
Burgdorf, Erick D; 1980
Chao, Kuo-Ting; 1994
Chen, Emy A-Mei; 1974
Chrisman, George F.; 1969
Codespoti, Daniel J; 1974
Cook, Aaron L; 1977
Cook, Thomas Edward; 1985
Cox, Steven George; 1998
Crane, Lynn Anne; 1984
Crume, James L; 1981
Demieville, Cory Alan; 2006
Doerr, Jerry W; 1967
Drake, Sandra Jo; 1993
Dupont, Steven J; 1974
Dvorak, Anthony Scott; 2008
Dziedzic, Daniel A; 1983
Eaton, William A; 1970
Ellis, Michael E; 1976
Fellows, William Joseph; 1998
Fieseler, Wayne G; 1981
Finfrock, Don C; 1968
Fisher, Michael S; 1971
Freiberger, Keith; 1984
Ganofsky, John R; 1978
Gantt, James D; 1972
Gavin, James Douglas; 1987
Geigel, Christopher; 2000
Gentry, Timothy W; 1977
George, John Scott; 1972
Goertzen, Patrick H; 1982
Gorzycza, Joseph A; 1974
Gordon, John Harrison; 1988
Graham, David Brian; 1983
Graves, Kyle Eugene; 1991
Hagedorn, Gerald Lynn; 1996
Haines, Benjamin John; 1985
Hall, Allyson Taylor; 1997
Hall, John W; 1981
Hammond, Patrick Lewis; 2005
Harrison, Robert M; 1974
Hedgpeth, Jeffrey Joe; 1996

Heerboth, Peter Nicholas; 2003
Hicks, Richard Jay; 1989
Hilleary, Alexander L; 1976
Hoelscher, John C; 1972
Howard, Steven R; 1981
Huff, Donald Leroy; 1993
James, David Loren; 1985
Jeffries, Matthew S; 1985
Joe Miner,
Jones, David S; 1964
Kammer, Darren R; 1991
Keep, Andrew William; 1999
Kercher, Bruce Edward; 1999
Kerns, Randy G; 1974
Klemmer, Susan H; 1966
Lang, Elizabeth A; 1981
Lenz, Richard G; 1974
Lindsey, Regulah M; 1982
Livaudais, Joan Marie; 1986
Livaudais, Ron Mark; 1983
Loesch, Janet L; 1980
Loesch, Terry L; 1980
Lorenzen, Stanley D; 1975
Lovitt, John R; 1970
Lyon, James S; 1972
Magee, Michael W; 1978
Martin, Dennis Gerard; 1984
Maxwell, Shonie Christine; 1994
McClanahan, Ronald D; 1977
McClenning, John C; 1991
McMahon, Thomas Patrick; 1995
McMillin, Bruce
McNally, John Michael; 1983
Menke, Elaine A; 1973
Menkel, Phillip Louis; 1998
Messmer, Kevin Michael; 1988
Mike, Robar Thomas; 1999
Miller, Joseph Earl; 2003
Montague, Michael W; 1973
Morey, Michael Garvin; 1989
Muldoon, Mary Ellen; 1991
Murrish, Sherri Dawn; 1996
Musial, Christopher; 1982
Nau, Steven N; 1970
Nekorchuk, Russell L; 1970
Newcomer, John; 1989
Nichols, Byron K; 1973
Nolde, Keith A; 1974
Owensby, Roger Wayne; 1986
Pace, Gary Glen; 1984
Parker, Jerre L; 1984
Phillips, William Anthony; 1993
Phipps, Neil Alan; 2001
Piper, Timothy Edward; 1996
Polton, Stacey Ann; 1986
Porter, David Bryan; 1988

Potzmann, Kim J; 1970
 Pratt, Michael L; 1978
 Randazzo, Vincent A; 1989
 Reed, Danny A; 1978
 Rehkop, Thomas G; 1974
 Reinhardt, Mary Jane; 1986
 Rider, Adam Clinton; 1993
 Rodgers, Michael A; 1978
 Roth, Michael A; 1972
 Rothschild, Susan H; 1974
 Sage, Barry E; 1980
 Scherer, Keith W; 1982
 Scherer, Kenneth Paul; 1982
 Schneider, Susan; 1982
 Schumacher, John James; 1988
 Serban, Cristina; 1993
 Shaver, Brian Joseph; 2005
 Sigman, Scott Lee; 1999
 Sirbu, Mihai G; 1993
 Smith, Brian Lynn; 1987
 Smith, Houstin G; 1981
 Smith, Johanna Marie; 1985
 Smith, Todd Walker; 1985
 Sosa, Jason Heyn; 2005
 Spradlin, Charles; 1983
 Squires Foelsch, Karen; 1989
 St. Clair, Mrs. Daniel (Jean); 1975
 Stahl, Joseph W; 1969
 Stanek, Graig Steven; 2004
 Stark, John Evan; 1989
 Steffan, Cheryl A; 1969
 Stocking, Terry Lee; 1989
 Stone, John Edward; 1994
 Sullivan, Kevin Dennis; 1995
 Sun, Aggie Yee-Chun; 1988
 Szygenda, Ralph James; 1970
 Tadda, George P; 1989
 Taylor, Robert P; 1987
 Taylor, Timothy Topper; 1987
 Thornton, Jeffrey A; 1980
 Toombs, Howard L; 1976
 Trampe, Michael Ronald; 1993
 Umphreys, Ray E; 1974
 Vahle, Michael O; 1971
 Veach, Alva Lester; 1992
 Wasleski, Steven Francis; 1987
 Watson, Lowell R; 1979
 Watson-Hajjar, Susan Elaine; 1983
 Webster, William D; 1969
 Williams, Nelson; 1972
 Winfield; Scott B; 1973
 Woytus, John Martin; 1987
 Wurtzler, Daniel R; 1982
 Zike, David Scott; 1982
 Zlatic, Milton T; 1971

Organizations

AT&T Foundation
 Anheuser-Busch Foundation
 BASF Corporation
 Boeing Company
 Boeing Foundation
 Caterpillar Foundation
 ConocoPhillips
 DST Systems Inc.
 Employee's Community Fund of Boeing Co.
 Express Scripts Foundation
 ExxonMobil Foundation
 Fidelity Charitable Gift Fund
 Freeport-McMoRan Incorporated
 Garmin International Inc.
 Harris Foundation
 IBM
 John Deere Foundation
 MasterCard International Inc.
 McKesson Foundation, Inc.
 Microsoft Corporation
 Monsanto Fund
 Northrop Grumman Foundation
 Pearson Educational Measurement
 Raytheon Company
 San Antonio Area Foundation
 Texas Instruments Foundation
 Tradebot Systems Inc.
 Union Pacific Corporation
 Verizon Foundation
 Wells Fargo Foundation



The Computer Science Department New Technology Space Classroom



Before renovations



During renovations



During renovations



After renovations

Thanks For Your Generosity

Computer Science alumni pledged \$21,765 and the department received \$23,230 at the time of calling for a total of \$44,995 in gifts during the 2010-2011 fiscal year. ***Thank you for your generosity!*** We used your support last year to fund scholarships to undergraduate students. ***The students are the real beneficiaries of your phonathon gifts.*** Your gifts provide scholarship support, new laboratory equipment, new faculty development, and student activities. Your support makes a big difference on our ability to say yes to the students. This year, we will begin calling our alumni on January 9, 2012. When the phone rings, please take a moment to share some of your Rolla experiences with a current student, and say, "Yes," when asked for a pledge. Taxpayer support accounts for less than 30 percent of the university's revenue, making your contribution a vital ingredient in the revenue pie. ***Your gift continues to matter very much!*** Private funding helps distinguish Missouri S&T from other universities, increasing the value of our education. Any amount you give will be appreciated, and most importantly, your participation will help make us a leader in alumni giving among public universities.

**Missouri University of Science and Technology
Computer Science Department**

**325 Computer Science Building
500 West 15th Street
Rolla, MO 65409-0350**

Phone: 573-341-4491

Fax: 573-341-4501

E-mail: csdept@mst.edu

Web site: <http://cs.mst.edu/>

NONPROFIT ORG.
U.S. POSTAGE
PAID
PERMIT 170
ROLLA MO

Keep in touch with Computer Science Department

We enjoy keeping you informed about Computer Science at Missouri S&T. We'd like to hear from you, too! Let us know where you are and what you are doing! If you have received an award, promotion, or have family or professional news you would like to share, please complete this form and mail to: Computer Science Department, Missouri University of Science and Technology, 500 West 15th Street, 325 Computer Science Department, Rolla, MO 65409-0350. Or, if you prefer, you can e-mail us your comments at csdept@mst.edu. Thanks for keeping in touch. It's always good to hear from old friends.

Name: _____ Phone: _____

E-mail: _____ Graduation Year and degree(s): _____

Mailing Address: _____

Job Title: _____

Business name and address: _____

News or comments: _____
