Computer Science and Software Engineering

Faculty

Kai Chang (Professor and Dept Chair), 334-844-6310, changka@auburn.edu
Software engineering and testing; software comprehension and visualization tools; software complexity metrics; computer supported cooperative work; artificial intelligence; expert systems; information assurance education, The Distributive Collaborative Writing Aid.

Myoung An (Associate Research Professor), 617-590-6943, myoung.an@auburn.edu
Time-frequency analysis, Clifford algebras, noncommutative group harmonic analysis, digital signal processing, image processing, software engineering.

Sanjeev Baskiyar (Associate Professor) 334-844-6306, baskisa@auburn.edu
Computer architecture, real-time and embedded computing, scheduling, cloud and high performance computing, energy aware computing, secondary storage.

Saad Biaz (Associate Professor) 334-844-6307, biaz@auburn.edu
Autonomous unmanned flight, UAV collision avoidance, transport protocols, congestion control on very high speed networks, wireless networking; mobile computing; distributed systems; computer architecture; TCP issues over wireless networks. routing protocols for adhoc networks and performance of transport protocols over Bluetooth technology.

Homer Carlisle (Emeritus Professor), 334-844-6308, carliwh@auburn.edu
Programming languages; languages and algorithms for distributed and parallel processing; operating systems. parallel computation and the software testing of Ada programs, compilation for distributed processor evaluation of programs.

Richard Chapman (Assoc Prof), 334-844-6314, chapmro@auburn.edu
VLSI CAD tool design; formal methods; high level synthesis; history of computing; wireless security, Ubiquitous computing; wireless and mobile networks; information assurance; human-computer interaction; software engineering specific to these systems; and system software.

James Cross (Professor), 334-844-6315, crossjh@auburn.edu
Software visualization, reverse engineering, testing, and integrated development environments Software engineering: design methodology, testing, reverse engineering, and CASE tools, maintenance, and testing of Ada software, e-GRASP.

Munawar Hafiz (Assistant Professor), 334-844-6348, mzh0003@auburn.edu
Software engineering, security, patterns, software architecture, program analysis, program transformation, programming language, compiler, parallel programming, web services.
Dean Hendrix (Associate Professor), 334-844-6305, hendrtd@auburn.edu
Software engineering; software visualization; software metrics; reverse engineering; program understanding; markup languages; programming languages; secure software development. GRASP Project.

Wei-Shinn Ku (Associate Professor), 334-844-6341, weishinn@auburn.edu
Spacial/temporal data management, mobile data, information security/privacy, mobile computing; location-based services; geographic information systems.

Alvin Lim (Associate Professor) 334-844-6326, limalvi@auburn.edu
Cyber-physical systems, high performance computing, self-organizing sensor-actuator networks, mobile and pervasive computing, wireless networks, reliable and dynamically reconfigurable distributed systems, complex distributed systems, databases, performance measurement and analysis.

Daniela Marghitu (Coordinator), 334-844-6386, marghda@auburn.edu
Object oriented program analysis, design, and development, software usability and accessibility, assistive technologies, education technology K12 inclusive computing outreach and curriculum; web application development.

Hari Narayanan (Watson Professor) 334-844-6312, naraynh@auburn.edu
Human-computer interaction, learning technologies, cognitive science artificial intelligence, computer science & software engineering education.

Jeff Overbey (Assistant Professor) 334-844-8834, jlo0012@auburn.edu
Refactoring tools and IDEs, analysis and transformation of C and Fortran, and Eclipse-based tooling, Parsing theory, program transformation, static analysis, parallel and high-performance computing; software engineering, programming languages, compilers.

Xiao Qin (Associate Professor), 334-844-6327, xqin@auburn.edu
Parallel and distributed systems, real time computing, storage, computer security, fault tolerance, reliability modeling, performance evaluation, energy-efficient parallel disk systems and reliability models of fault-tolerant storage systems.

Cheryl Seals (Associate Professor), 334-844-6319, sealscd@auburn.edu
Game design & development and cultural computing, human computer interaction, end user programming, visual programming.

David Umphress (Associate Professor), 334-844-6335, umphrda@auburn.edu
Software engineering and processes, mobile computing, Android, data mining, software process, cybersecurity, mobile device software development, Java, Google, secure software development.

Levent Yilmaz (Associate Professor), 334-844-6343, yilmale@auburn.edu
Modeling and computer simulation, agent-directed simulation, complex adaptive systems simulation theory and methodology, software engineering, formal methods, modeling and design.

Weikuan Yu (Associate Professor), 334-844-6330, wkyu@auburn.edu
Cloud computing and security, high performance computing, programming models, file systems, storage, parallel I/O, computational biology, parallel and distributed Computing, fault tolerance and security, network and grid, reconfigurable computing with FPGA.

Facilities

- **jGRASP Lab**: Research is focused on Graphical Representations of Algorithms, Structures and Processes and has produced jGRASP, a Java-based integrated development environment. jGRASP provides automatic generation of software visualizations to improve the comprehensibility of software. jGRASP produces Control Structure Diagrams (CSDs) for Java, C, C++, Objective-C, Ada, and VHDL; Complexity Profile Graphs (CPGs) for Java and Ada; UML class diagrams for Java; and has dynamic object viewers that work in conjunction with an integrated debugger, workbench, and interactions for Java. The viewers include a data structure identifier mechanism which recognizes objects that represent traditional data structures such as stacks, queues, linked lists, binary trees, and hash tables, and then renders them in an intuitive presentation view which is updated as the program executes. jGRASP is freely available (jgrasp.org). Contact James Cross.

- **IMPACT (Innovations in Mobile Pervasive Agile Computing Technologies)**: The mission of IMPACT is to be a leading research center enabling mobile and embedded systems that are wirelessly networked and that interact directly with people, for civilian and military applications. Contact Drew Hamilton.

- **Information Assurance Center**: The objective of the Information Assurance Center (IAC) is to study and develop new techniques of assuring secure and accurate data transmission and reception. Contact Drew Hamilton.

- **Smart UAVs Center**: the objective of the Smart UAVs center (SUAV) is to design, evaluate, and implement new techniques to allow autonomous, efficient, and secure flight of unmanned aerial vehicles (UAVs). Contact Saad. Biaz

- **Parallel and Distributed Computing**: This area is of pivotal importance as CPU frequency has stopped increasing and the growth of computing power is now relying on interconnecting multi- and many-core systems, either locally in a system-area network or geographically distributed on the wide-area network. Contact Sanjeev Baskiyar.

- **Databases and Data Mining**: Work in this area involve security and privacy, use Markov Chain Monte Carlo methods for RFID data cleansing, lightweight query integrity assurance solutions which can be adopted by mobile devices for significantly increasing the security and usage of mobile applications, data mining and predictive analytics that can assist state revenue agencies in identifying tax noncompliance and meaningfully affect future adherence to tax laws. Contact David Umphress
• 3-D Virtual Environments: This area of research and development may be the next generation of human/computer interaction, replacing a desktop with an interactive and augmented reality. Contact Homer Carlisle

• Intelligent and Interactive Systems Lab: This lab carries out research on human computer interaction, learning technologies, cognitive science and artificial intelligence. Projects include designing virtual science laboratories for use by over 2000 middle school students in Wisconsin, testing an innovative computing education pedagogy at 15 institutions in eight states, developing intelligent driver simulations for South Korea and advanced interface design for programming environments. Contact Hari Narayanan.

• The Auburn M&S Lab conducts research in simulation theory and methodology development, complex adaptive systems, and agent-directed simulation. Decision makers increasingly encounter challenging policy problems that involve systems composed of large number of diverse interacting elements. To address these problems, major advances in computational simulation technologies are catalyzing research in science of complexity, enabling engineers and scientists to create large numbers of virtual system agents and set them to interact with each other in simulated worlds. Among such problem domains that require timely or even urgent policy formation and informed decision-making include long-term climate change, innovation dynamics, healthcare systems, disaster management, environmental protection, economic forecasting, energy security (including generation, distribution, storage and utilization of energy), the dynamics of conflicts, the design of financial regulatory systems, and the epidemiology of diseases. Contact: Levent Yilmaz

• Security-oriented Program Transformation: This project combines the skill-set from multiple areas and sub-areas: software engineering, security, programming languages, program analysis and program transformation. The goal is to explore opportunities to automatically transform programs to introduce security properties. This tools produced will allow developers to design secure systems (similar to refactoring tools), and retrofit security to their existing systems. Contact Munawar Hafiz.

• Security for Web Services and Cloud Computing: Cloud computing is essentially distributed computing gone web. This project explores data security and application security issues in cloud computing paradigm. Contact Munawar Hafiz

• PASL (Parallel Architecture and System Lab): The Parallel Architecture and System Laboratory, includes the CUDA Teaching Center for many-core programming with NVIDIA GPGPU processors and a 30-Teraflop, 80-node hexcore CPU+GPGPU computer cluster for multidisciplinary research. These facilities are equipped with cutting-edge 40-Gbps InfiniBand and 10Gigabit Ethernet networks that connect all the computer nodes together. Contact Weikuan Yu