Research Highlights

The NC State University Department of Computer Science is one of the oldest and largest computer science departments in the nation, and research is central to the success of the department. The department’s research productivity continues to grow with annual research expenditures in the range of $9 to $10 million, and we now have an all time high of almost $36 million in active research grants. This ranks us well within the top 20 for sponsored research funding among computer science departments in colleges of engineering. Faculty research interests range from theory and algorithms, bioinformatics, high-performance and power-aware systems, to advanced analytics research, to artificial intelligence, serious games, graphics and visualization, networks, security, software engineering, and computer-based education. Please see the list of select representative research projects that appear on page three of this newsletter.

In the 2009-2010 academic year, faculty as a group published 46 refereed journal papers, 176 refereed conference and workshop papers, five books and nine book chapters and other edited works. They also produced over 80 other publications, tutorials, editorials, news articles, or media appearances. Over the academic year, faculty gave over 200 professional talks related to their research and educational activities. Seventeen of our faculty serve as editors, and on editorial boards of leading professional publications (33 functions), and as members and officers in the most prestigious professional societies and organizations in their areas of specialty.

Undergraduate enrollment increased in the fall of 2009 to 630 students, and the percentage of females increased slightly, which can be attributed in part to an increased focus on outreach efforts. In 2009-2010, we awarded 102 BS degrees, including the first in the Computer Science Game Development Concentration.

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Research Faculty

Annie I. Antón, Professor
PhD, Georgia Institute of Technology, 1997
Software engineering, requirements engineering, information privacy and security, policy

Kemafor Anyanwu, Assistant Professor
PhD, University of Georgia, 2007
Semantic computing: semantic Web, databases, data mining, information retrieval, services computing

Dennis R. Bahler, Associate Professor
PhD, University of Virginia, 1987
AI: constraint processing, machine learning, hybrid neural-symbolic computing

Donald Bitzer, Distinguished University Research Professor, PhD, University of Illinois, 1960
Convolutional codes, signal processing for biological systems, computer-based education

Franc Brglez, Research Professor
PhD, University of Colorado, 1970
Distributed and collaborative workflows, databases, and groupware for the Internet

Rada Y. Chirkova, Associate Professor
PhD, Stanford University, 2002
Database performance, query-processing efficiency by designing and materializing views

Jon Doyle, SAS Professor of Computer Science
PhD, Massachusetts Institute of Technology, 1980
Artificial Intelligence, mathematical and philosophical foundations, rational agents, decision making

Rudra Dutta, Associate Professor
PhD, North Carolina State University, 2001
Network design: optical, wireless sensor and mesh networks; future Internet design

Robert Fornaro, Professor
PhD, The Pennsylvania State University, 1969
Networks and applications of real-time embedded computer systems, wireless sensor systems

Vincent Freeth, Associate Professor
PhD, University of Arizona, 1996
Operating sys., compilers, programming languages—distributed & parallel computing, embedded systems

Edward Gehring, Associate Professor
PhD, Purdue University, 1979
Hardware support for memory management, object-oriented software systems—performance studies

Xiaohui (Helen) Gu, Assistant Professor
PhD, University of Illinois, 2004
Distributed systems, operating systems, computer networks

Khaled Harfoush, Associate Professor
PhD, Boston University, 2002
Computer networking, Internet measurements, peer-to-peer systems, routing protocols

Christopher G. Healey, Associate Professor
PhD, University of British Columbia, Canada, 1996
Visualization & computer graphics: methods for rapidly, accurately, effectively visualizing large complex datasets

Steffen Heber, Associate Professor
PhD, Universität Heidelberg, Germany, 2001
Algorithms to compare and analyze gene order permutations, animation dev. for bioinformatics education

Thomas L. Honeycutt, Associate Professor
PhD, North Carolina State University, 1969
Management information systems, computer modeling and simulation, computer literacy

Xuxian Jiang, Assistant Professor
PhD, Purdue University, 2006
Virtual machines and security

Highlights (cont.)

Demand for our undergraduates continues to be very strong, and the average annual starting salary for our undergraduates increased this year to over $57,000. The top employers for this year’s students are Fidelity Investments, IBM, NetApp, Cisco and SAS Institute.

Our graduate program continues to grow with an overall enrollment of over 520 students. Applications for admission to the graduate program for fall 2010 are up 18% over last year. Applications for the PhD program alone are up 25% over fall 2008. In 2009-2010 we awarded 126 masters (25 with thesis), and 26 PhD degrees, a rate in line with that in the top 30 computer science departments in the nation.

In 2009-2010 our faculty received a number of prestigious awards and honors: Dr. Harry Perros became the department’s 5th IEEE Fellow; Dr. Xuxian Jiang became the department’s 20th NSF CAREER Award winner; Dr. Annie Antón was named a Distinguished Scientist by the Association for Computing Machinery (ACM); Dr. Tao Xie was named a Sigma Xi Outstanding Young Researcher, and was appointed to the ACM History Committee as the ACM SIGSOFT History Liaison; Dr. Donald Bitzer, Distinguished University Professor at NC State, was one of the inaugural inductees into the UIUC Engineering Hall of Fame, and he was honored as inventor of PLATO, and co-inventing the flat-panel gas plasma display, at the Computer History Museum (Silicon valley, CA); Dr. R. Michael Young was named a 2010 GlaxoSmithKline (GSK) Faculty Fellow, and was named Research Director for 2009 for the Triangle Game Initiative; Ms. Margaret Heil, lecturer and associate director for the Computer Science Senior Design Center, was named an NC State Outstanding Teacher for 2009-2010; Dr. George Roukas was named an IEEE Communications Society Distinguished Lecturer for 2010 and 2011; Nine faculty members: Drs. Kemafor Anyanwu, Rada Chirkova, Patrick Drehel, Helen Gu, Christopher Healey, Xiaosong Ma, Mladen Vouk, Laurie Williams, and Tao Xie, received 2009 IBM Faculty Awards totaling $267,000; Drs. Edward Gehringer and Xiaohui (Helen) Gu received Google Research Awards totaling over $85,500; and Dr. Nagiza Samatova co-mentored a team of high school students (Yekaterina “Katie” Shpanskaya and Neil Shah) who won second place in the Siemens Competition in Math, Science and Technology.

Our students received numerous awards as well: graduate students Zhenhuan Gong and Ben Smith were awarded prestigious 2010 IBM Ph.D. Fellowship Awards; second year doctoral student Jennifer Robison was recognized with the Best Student Paper Award at the International Conference on Affective Computing & Intelligent Interaction (ACII-2009); Andy Meneely, a doctoral candidate, won first place in the poster and presentation portion of the ACM Student Research Competition at the 41st ACM Technical Symposium on Computer Science Education (SIGCSE 2010); a team made up of Kelsey Hawkins, Drew Boyuka and Stuart Robinson won first place at the UNC site in the ACM “Battle of the Brains” competition; and senior Brittany Strachan was named to the ACC Women’s Basketball All-Academic Team.

The department experienced several faculty additions during the year. We welcomed Drs. Emerson Murphy-Hill, and David Roberts, assistant professors, in August, 2010, and Dr. Michael Rappa, Distinguished University Professor in March, 2010. In August 2009, we welcomed Dr. Sarah Heckman, a three-time graduate of NC State, and the department’s first teaching assistant professor. We also welcomed Ms. Suzanne Balik, lecturer, in August, 2009, and Ms. ToniAnn Marin, undergraduate lab coordinator and lecturer, in January, 2010. We now have about 40 tenure/tenure-track faculty, 10 lecturers and adjuncts, and about 31 research, development, information technology and administrative staff.

I would like to take this opportunity to thank all our students, faculty and staff for making 2009-2010 a success; and our alumni, corporate friends and partners for their continued support.

Mladen Vouk
Professor and Department Head
Selected Research Projects

Complete list with abstracts is at http://www.csc.ncsu.edu/research/

TC: Large: Collaborative Research: Trustworthy Virtual Cloud Computing, Peng Ning, Xuxian Jiang, Mladen Vouk. $1,523,685 by National Science Foundation.

IC-CRIME: Interdisciplinary Cyber-Enabled Crime Reconstruction Through Innovative Methodology and Engagement, David Hinks (Lead-Textiles), R. Michael Young, Timothy Buie. $1,400,000 by National Science Foundation.

High-Performance Data Analytics with Demonstrations to DOE-Mission Applications, Nagiza Samatova. $1,120,002 by Oak Ridge National Laboratories & UT-Battelle, LLC.

Computer-aided Human Centric Situation Awareness, Peng Ning, R. Michael Young. $979,463 by Pennsylvania State University.

NetSE: Large: Collaborative Research: Platya: From Position to Place in Next Generation Networks, Injong Rhee, Munindar Singh. $706,167 by National Science Foundation.

Quality of Information-Aware Networks for Tactical Applications (QUANTA), Munindar Singh. $689,029 by Penn State University (Army Research Laboratory).


Collaborative Research: Automatic Extraction of Parallel I/O Benchmarks From HEC Applications, Xiaosong Ma, Frank Mueller. $499,999 by National Science Foundation.

HCC: Small: Plan-Based Models of Narrative Structure For Virtual Environments, R. Michael Young. $497,860 by National Science Foundation.


HCC: Small: Modeling Student Affect in Game-Based Learning Environments, James Lester. $464,422 by National Science Foundation.

CAREER: Towards Exterminating Stealthy Rootkits – A Systematic Immunization Approach, Xuxian Jiang. $424,166 by National Science Foundation.

CSR: Small: Online System Anomaly Prediction and Diagnosis for Large-Scale Hosting Infrastructures, Xiaohui (Helen) Gu. $405,000 by National Science Foundation.

Collaborative Research: CPATH II: Incorporating Communication Outcomes into the Computer Science Curriculum, Mladen Vouk, Michael Carter (co-PI) Grad. $353,881 by National Science Foundation.

CSR: Small: Collaborative Research: Hybrid Opportunistic Computing For Green Clouds, Xiaosong Ma, Xiaohui (Helen) Gu (co-PI). $320,000 by National Science Foundation.


Use of Affordable Open Source Systems by Rural/Small-Practice Health Professionals, Laurie Williams, Mladen Vouk. $298,713 by Agency for Healthcare Research and Quality – NIH.


SHF: Small: Collaborative Research: Constraint-Based Generation of Database States for Testing Database Applications, Tao Xie. $249,880 by National Science Foundation.

Production and Assessment of Student-authored Wiki Textbooks, Edward Gehringer. $110,518 by National Science Foundation.

Network Visualization and Optimization through Accurate Traffic Characterization, Harry Perros (co-PI), Mihail Devetsikiotis. $38,400 by Center for Advanced Computing & Communication (CACC).
Matthias Stallmann, Professor  
PhD, University of Colorado, 1982  
Algorithm design and analysis of both serial and parallel models of computation.

William J. Stewart, Professor  
PhD, Queen’s University, Northern Ireland, 1974  
Performance evaluation of computer sys., numerical lineal algebra, computer operating systems.

Alan L. Tharp, Professor  
PhD, Northwestern University, 1969  
File and data structures, man-machine interfaces, database management systems.

David Thuente, Professor  
PhD, King’s College, England, U.K., 1976  
Communication system design, simulation, performance models; media access control protocols.

Mladen Vouk, Professor  
PhD, Georgia Institute of Technology, 1997  
Software engineering, scientific workflows and cloud computing, computer-based education.

Benjamin Watson, Associate Professor  
PhD, Georgia Institute of Technology, 1997  
Relationships between computer graphics and design.

Laurie Williams, Associate Professor  
PhD, University of Utah, 2000  
Agile software processes, software security, open software systems, healthcare information technology.

Tao Xie, Associate Professor  
PhD, University of Washington, 2005  
Automated software testing and verification, mining software engineering data.

R. Michael Young, Associate Professor  
PhD, University of Pittsburgh, 1997  
AI: planning & plan recognition, natural language processing, dev. of human-computer interaction.

Ting Yu, Associate Professor  
PhD, University of Illinois, 2003  
Security, trust management and privacy protection in open systems, semi-structured databases.

Emeritus Faculty

Wushow Chou, Professor Emeritus  
PhD, University of California - Berkeley, 1968

Edward W. Davis, Professor Emeritus  
PhD, University of Illinois, 1972

Robert E. Funderlic, Professor Emeritus  
PhD, University of Tennessee, 1970

David F. McAllister, Professor Emeritus  
PhD, UNC Chapel Hill, 1972

Woodrow Robbins, Professor Emeritus  
PhD, Syracuse University, 1971

Senior Faculty Profiles

Dr. Annie Antón, professor of Computer Science and recognized expert in privacy policy, received her PhD, MS and BS from the College of Computing at the Georgia Institute of Technology. Her research focuses on methods and tools to support the specification of complete, correct behavior of software systems used in environments that pose risks of loss as a consequence of failures and misuse, including web-based and e-commerce systems in which the security of personal and private information is particularly vulnerable. Antón is the founder and director of ThePrivacyPlace.org, co-founder and co-director of the NC State’s E-Commerce Studio, and co-founder of the Symposium on Requirements Engineering for Information Security. In 2002, she coordinated NC State’s successful application for a National Security Agency Center of Academic Excellence designation in Information Assurance Education. She is an associate editor for IEEE Transactions on Software Engineering, the cognitive issues subject area editor for the Requirements Engineering Journal, and a member of the International Board of Referees for Computers & Security. She serves on several boards including DHS Data Privacy and Integrity Advisory Committee, an Intel Advisory Board, CRA Board of Directors, Distinguished External Advisory Board for the TRUST Research Center, Electronic Privacy Information Center Advisory Board, Future of Privacy Forum Advisory Board, IDA/DARPA Information Science and Technology (ISAT) study group, US ACM Public Policy Council Executive Committee, and Georgia Tech Alumni Association Board of Trustees.

Dr. Robert D. Rodman, professor of Computer Science and respected authority on computational linguistics, received his PhD in linguistics, and his MA and BA in mathematics, from UCLA. His research interests in computational linguistics includes voice recognition, lip synchronization for visual speech synthesis, emotion recognition, speaker verification and speaker identification with emphasis on forensic applications. He is co-author of the best selling introductory textbook An Introduction to Language, presently in its ninth edition and having sold more than one million copies worldwide. While at NC State, Dr. Rodman has published two additional books, edited three books and produced about 70 research articles for journals and conference proceedings. In the course of his research he has collaborated with scholars from China, Finland, Greece, Korea, Iran, Singapore and the UK. Dr. Rodman is a founding member of the North Carolina Japan Center, has an extensive consulting practice, concentrating on forensic linguistics, and has testified as an expert witness on numerous occasions. He is a member of the Academy of American Forensic Sciences and the Forensic Expert Witness Association, and serves as an associate editor of the journal Speech Technology. Dr. Rodman received a Teleclass Recognition Award from the North Carolina Microelectronics Center for his contributions to distance education, and was honored by the Oxford English Dictionary for coining a new term Montague grammar in one of his research publications. Dr. Rodman writes radio scripts for short, ‘user friendly’ science programs, and has published two mystery novels that employ some of the scientific knowledge he has accumulated in their plots and characters.

New Faculty Profiles

Dr. Emerson Murphy-Hill joined the faculty as an assistant professor in August, 2010. He received his BS in Computer Science from Evergreen State College in 2004, and completed his PhD at Portland State Univ. in 2009. He was previously a postdoctoral research fellow in the Software Practices Lab at the University of British Columbia. His area of expertise is software engineering, especially the intersection of human-computer interaction and software engineering.

Dr. Michael Rappa, a Distinguished University Professor, joined the department in March, 2010. Dr. Rappa received his PhD from the University of Minnesota in 1987. He is founder and director of the Institute for Advanced Analytics (IAA) at NC State. In partnership with SAS Institute, he led the development of NC State’s Master of Science in Analytics, the first such degree program of its kind in the nation.

Dr. David Roberts joined the faculty as an assistant professor in August, 2010. Dr. Roberts received his BA from Colgate University in 2003, and completed his PhD at the School of Interactive Computing at Georgia Tech in 2010. His current research interests are in the area of machine learning and artificial intelligence and their applications to the design of interactive technological experiences such as computer games, interactive dramas, or training scenarios.