Research Highlights

NC State University’s Department of Computer Science is celebrating its 40th birthday! The department was formally established in the fall of 1967 and is one of the oldest and largest computer science departments in the nation. We consistently rank among the leading producers of the computer science talent that fuels an economic engine anchored in the Research Triangle Park and extending across the globe.

2006–07 was an outstanding academic year for our department. Our faculty and students received a number of prestigious awards and recognitions, we experienced continuing significant growth in our graduate program and had a healthy 24 percent increase in research funding. We also added new and talented faculty and started several new centers.

Our research productivity again increased over the last year. We had over $22M in active research grants. Research-related expenditures (from all sources) exceeded an estimated $7.5M, and we received over $4M in in-kind funding. Our research interests range from theory and algorithms to bioinformatics, high-performance and power-aware systems, artificial intelligence, graphics and visualization, networks, security, software engineering, and computer-based education. A list of
select representative projects is provided on the next page. During the past year, our faculty published over 59 refereed journal papers, 154 refereed conference and workshop papers, 2 books, and 15 book chapters and other edited works. They also produced over 60 other publications, tutorials, editorials, and news articles and made media appearances and gave over 180 professional talks related to their research and educational activities. We have 16 faculty serving as editors or on editorial boards of leading professional publications (27 functions). They also serve as members and officers in most of the prestigious professional societies and organizations in their areas of specialty.

Our graduate program continues to grow. During 2006–07, we conferred a record 18 PhD degrees; we expect more this year. We received 1,030 applications for admission to the graduate program in 2007 and estimate that the PhD enrollment will approach 150 and the overall graduate program will grow to over 430 for Fall 2007.

Our facilities house more than 30 research groups, laboratories and centers. Additions during the year include the Center for Open Software Engineering (COSE, pronounced “cozy”) under the direction of Dr. Laurie Williams, the Digital Games Research Center (DGRC) under the direction of Dr. Michael Young and NC State’s award-winning Virtual Computing Laboratory (VCL) development group, which is directed by Aaron Peeler. We celebrated the official grand opening of the Center for Visualization & Analytics (CVA), directed by Theresa-Marie Rhine and housed in the Renaissance Computing Institute (RENCI) at NC State.

In 2006–07, faculty and students received a number of outstanding awards and accolades. Dr. Donald Bitzer was inducted into the Consumer Electronics Hall of Fame. Drs. Munindar Singh, Frank Mueller, Harry Perros, George Rouskas, Laurie Williams and Michael Young received prestigious IBM Faculty Awards. Dr. Annie Antón was appointed to serve on the Department of Homeland Security’s Data Privacy and Integrity Advisory Committee. In June, she testified at a Congressional Hearing on Social Security Number privacy held by the House Committee on Ways and Means Subcommittee on Social Security. Dr. Michael Young was named editor-in-chief of the Journal of Game Development. Graduate students Travis Breaux and Sarah Heckman received prestigious IBM PhD Fellowship awards, Nikhil Baradwaj and Lina Battestilli won the 2006 Pollock Best Thesis Awards, and Kristy Boyer and Laurie Jones received very prestigious NSF Graduate Research Fellowships. The Virtual Computing Laboratory was awarded the Computerworld Honors Program Laureate Medal for Technical Innovation.

We went through important personnel changes. Two of our faculty, Drs. Ed Davis and Alan Tharp (former department head), joined Dr. David McAllister in phased retirement. Dr. Robert Funderlic (emeritus, former department head), Ms. Joyce Hatch (director of Undergraduate Advising) and Ms. Carol Holloman (director of Finances) retired. Three faculty left for other venues, but remain affiliated with the department through their adjunct status. Dr. Jun Xu joined Google, Dr. Peter Wurman joined Kiva Systems, and Dr. Jaewoo Kang joined Korea University in Seoul.

We are very proud to announce that this fall two new faculty joined our department—Drs. Nagiza Samatova and Kemafar Anyanwu, and Dr. Xiaohui Gu will be joining us in January 2008. We now have 41 faculty involved in research, 16 lecturers and adjuncts, and about 25 research, information technology and administrative support staff.

I would like to take this opportunity to thank all our students, faculty and staff for making the last year a success, and our alumni for supporting us, and to wish them a wonderful new academic year.

Mladen Vouk
Professor and Department Head
Selected Research Projects

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


Intelligent Human-Machine Interface and Control for Highly Automated Chemical Screening Processes, Robert St. Amant, David Kaber, Mo-Yuen Chow. NSF ($786,000, 10/1/2004 – 9/30/2007)


CAREER: The Test-Driven Development of Secure and Reliable Software Applications, Laurie Williams. NSF ($405,889, 4/1/2004 – 03/31/2009)


CAREER: Assisted Navigation in Large Visualization Spaces, Christopher Healey. NSF (ACIR/ACR), ($370,403, 2/1/2001 – 1/31/2008)

A Bioinformatics Computing Cluster for NC State University, Steffen Heber. NC Biotechnology Center ($227,029, 2/1/2007 – 1/31/2008)

CTER: Metamorphic Worm Detection, Douglas Reeves. NSF ($137,057, 8/15/2006 – 07/31/2008)


Dimensioning Access Networks Subject to Percentile End-to-End Delay SLAs, Harry Perros, Yannis Viniotis. Center for Advanced Computing & Communication ($40,000, 7/1/2007 – 6/30/2008)

Faculty (cont.)

Steffen Heber, Assistant Professor
PhD, Universität Heidelberg, Germany, 2001
Algorithms to compare and analyze gene order permutations, EST assembly, analysis of alternative splicing

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

S. Purushothaman Iyer, Professor
PhD, University of Utah, 1986
Programming and specification languages, software model-checking, probabilistic models of concurrency

Jaewoo Kang, Assistant Professor (until Jan. 2007)
PhD, University of Wisconsin, 2003
Data integration, model management, query optimization, semi-structured data management, text mining

James C. Lester, Associate Professor
PhD, University of Texas, 1994
Artificial intelligence, intelligent user interfaces, intelligent tutoring systems, computational linguistics

Xiaosong Ma, Assistant Professor (joint appointment with ORNL), PhD, University of Illinois, 2003
High performance computing, parallel I/O, storage systems, scientific data management

Richard Mayr, Assistant Professor
PhD, TU–München, Germany, 1998
Formal verification, logic, automata theory, term rewriting, Markov chains, stochastic games

David F. McAllister, Professor
PhD, UNC Chapel Hill, 1972
Stereo computer graphics, speech processing, online publishing, numerical analysis

Frank Mueller, Associate Professor
PhD, Florida State University, 1994
Compilers and code optimization, concurrent and distributed/real-time and embedded systems

Peng Ning, Associate Professor
PhD, George Mason University, 2001
Computer and network security; intrusion detection, security in sensor and ad hoc networks

Harry Perros, Alumni Distinguished Graduate Professor, PhD, Trinity College, Ireland, 1975
Performance analysis of optical networks, performance monitoring of grids, queueing networks

Douglas S. Reeves, Professor
PhD, The Pennsylvania State University, 1987
Network security, peer-to-peer computing and overlay networks, real-time communication

Injong Rhee, Associate Professor
PhD, UNC Chapel Hill, 1994
Computer/wireless/sensor networks, multimedia networking, distributed systems, operating systems

Robert D. Rodman, Professor
PhD, University of California, Los Angeles, 1972
Spoken natural language dialogue and voice I/O sys., applying AI to error recovery in speech recognition

George N. Rouskas, Professor
PhD, Georgia Institute of Technology, 1994
Network architectures and protocols, optical networks, grid computing, scheduling

Nagiza Samatova, Associate Professor (joint apt. w/ORNL), PhD, Russian Acad. of Sci. (CCAS), 1993
Systems biology and bioinformatics, scalable data analytics, data management and data integration
Senior Faculty Profiles

Robert J. Fornaro received his B.A. in mathematics from St. Vincent College, Latrobe, PA and his M.A. in mathematics and Ph.D. in computer science from Penn State in 1969. Fornaro joined the department in 1969 as one of its first Ph.D.s. In addition to teaching, Dr. Fornaro directed a variety of research projects involving real time operating systems and data communications. He also served for nine years as director of Undergraduate Programs. In 1994, along with Dr. Alan Tharp, he formed the Senior Design Center. Fornaro is currently a professor and director of the Senior Design Center. Local industries support the Center financially in the form of unrestricted gift contributions to the Excellence in Undergraduate Computer Science Education Fund. To-date contributions to the Center, including endowments, are well in excess of $1M. In 2005 and 2006, Dr. Fornaro mentored award-winning project teams that took First Place in the IEEE Computer Society International Design Competition. This was the first time that students from any university in the world placed first in the competition in two consecutive years. Dr. Fornaro’s current teaching and research activities focus on operating systems and application software for wireless sensor systems.

Mladen A. Vouk received his B.S. and Ph.D. from the King’s College, University of London, U.K. and an M.S. in computer science from NC State. He joined the faculty at NC State in 1985. He became associate vice provost for Information Technology in 2002 and was appointed Computer Science department head in 2006, after serving two years as interim department head. Dr. Vouk is known for his work in improving math and science education through computer-assisted instruction and environments, as well as his work in the areas of software reliability engineering and scientific computing. He is co-founder and former co-director of the department’s first Software Engineering Laboratory, founder and former director of the NC State Multimedia and Networking Laboratories, and former technical director of the NC State Center for Advanced Computing and Communication. Dr. Vouk is an IEEE Fellow and member of the IEEE IFIP on Numerical Software (recipient of the IFIP Silver Core); the IEEE Reliability, Communications, Computer and Education societies; the IEEE TC on Software Engineering; ACM; ASQ; and Sigma Xi.

New Faculty Profiles

Dr. Nagiza Samatova - August 2007. B.S. from Tashkent State University, Uzbekistan in 1991. Ph.D. in mathematics from Russian Academy of Sciences, Moscow in 1993. M.S. in computer science from University of Tennessee, Knoxville in 1998. She is also a senior research scientist at Oak Ridge National Laboratory. Research interests include systems biology and bioinformatics, scalable data analytics, data management.

Dr. Kemafor Anyanwu - August 2007 B.S. in biochemistry from University of Nigeria, Nsukka, Nigeria in 1989 and Ph.D. in computer science from the University of Georgia in 2007. Her research interests are semantic Web, databases and bioinformatics. Her research results have been published in the World-Wide Web conferences and other venues.

Dr. Xiaohui Gu - January 2008. B.S. from Peking University, Beijing, China in 1999. Ph.D. in computer science from the University of Illinois in 2004. She was a research staff member at IBM T. J. Watson Research Center 2004–2007. Research interests include all areas of computer systems, with focus on data stream processing, autonomic computing, peer-to-peer and service overlay networks.

Contributions from Steve Chall, Kristen Jeffers and Theresa-Marie Rhyne
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