DEPARTMENT *of*

COMPUTER SCIENCE

2006-07

Annual Report

PURDUE
UNIVERSITY

TABLE of CONTENTS

The Year in Review

For Purdue Computer Science, 2006-07 was a year of achievements for our outstanding faculty, staff, and students. Most notably, we moved into the new Lawson Computer Science Building. Thanks to all the donors who made this possible. Our department has further grown in size and now boasts a full time faculty strength of 44. The year also saw a change in leadership. Susanne Hambrusch completed a highly productive five year stint as head and has returned to full time teaching and research. It is now my pleasure to serve as the Department Head, with Mike Atallah, Distinguished Professor, as the Associate Head. Tim Korb continues to serve as the Assistant Head. This new leadership team is hard at work crafting a new vision for the department.

Honors and Promotions

Congratulations to Professors Voicu Popescu and Dongyan Xu who were promoted to the rank of Associate Professor with tenure. Popescu's research interests span the areas of computer graphics, visualization, and computer vision. Xu's research focuses on the development of virtualization technologies for computer system security and for virtual distributed computing.

Our faculty has continued their award-winning spree. Mike Atallah was elected as a Fellow of the ACM for his achievements in computer science and information technology and for significant contributions to the mission of the ACM. Atallah's excellence in teaching was noted by the students who placed him among the top teachers in the College of Science. Cristina Nita-Rotaru received recognition for her teaching talents with a Teaching for Tomorrow award that is presented to deserving assistant professors at Purdue. Patrick Eugster won the prestigious NSF career award. Eugster's research is in the area of distributed programming; particularly, fault-tolerant algorithms.

Eugene Spafford received the ACM SIGSAC Outstanding Contributions Award for significant contribution to the field of computer and communication security. Spafford also received the distinctive ACM President's award for having advanced computing technology and enhanced its impact for the benefit of society. The New York City chapter of ISACA granted the Wasserman Award to Spafford based on his accomplishments in the audit, security, and technology fields.

Ashish Kundu, a graduate student working under Professor Elisa Bertino's direction, won the best student paper award for "Secure Dissemination of XML Content using Structure-Based Routing" presented at the 10th IEEE International Enterprise Distributed Object Computing Conference (EDOC 2006). Alexei Czeskis and Ryan Stutsman were selected for Honorable Mentions in the Computing Research Association Outstanding Undergraduate Award for 2007. The CRA Outstanding Undergraduate Award program recognizes students who show outstanding research potential in an area of computing research.

Company representatives dedicate the Harris Corporation classroom

The Future

The leadership team, in cooperation with faculty, students, and staff, is building on the departmental vision established in the strategic plan several years ago. The key components of the updated vision include: a multicore initiative, several interdisciplinary specializations, an integrated five-year BS/MS program in computer science, a revised freshman computer science curriculum, and evolving research directions that build on departmental strengths in both core and interdisciplinary areas.

The multicore initiative recognizes the emergence of advanced multicore microprocessor chips that are now at the heart of desktops and laptops. The interdisciplinary specializations will offer undergraduates an opportunity to acquire in-depth knowledge and skills in areas of relevance to the computing industry. The combined BS/MS program will offer students an opportunity to participate in ongoing research projects and hence the ability to decide whether to pursue a PhD. The changes to the freshman curriculum include a new course in computational thinking, designed to meet the new computing requirement for all College of Science majors. This course will draw examples from a variety of scientific domains and show how computing is used in all of the sciences.

We will keep you informed as the vision unfolds and the department strengthens. As always, we look for your feedback on the current state of the department and suggestions on how we should evolve to provide the best education in this changing and complex world. It is with great enthusiasm that I take on the responsibility to lead this excellent department into new territory with the hope that our alumni and friends will continue to offer their valuable suggestions and provide generous support as they have in the past.

Aditya P. Mathur,
Professor and Head

Faculty Honors

IEEE (Institute of Electrical and Electronics Engineers) Fellows: 7
ACM (Association for Computing Machinery) Fellows: 6
AAAS (American Association for the Advancement of Science) Fellows: 2
Member, National Academy of Engineering: 1
NSF Presidential Young Investigator Awards: 3
NSF CAREER Awards: 11
Journal Editors-in-Chief: 4

Students participate in ROCS (Reaching Out for Computer Science)

Diversity

The Department of Computer Science is committed to diversity in our students, faculty, and staff, supporting both the participation and success of underrepresented minorities as well as addressing the under-representation of women in computer science.

We have redesigned computer science recruiting materials to emphasize the variety of career options available to CS graduates — career options that appeal to a diverse group of students. The department supports a number of events, programs, and other initiatives aimed at increasing the pipeline of women and underrepresented minorities. These initiatives reinforce the fact that successful companies depend on a variety of contributions from a diverse group of employees. Examples of current activities include middle school summer camps to expose underrepresented students to the excitement of computer science, training workshops for high school math teachers to help them link classroom activities to computer science topics, and a student-led high school visitation program called "ROCS: Reaching Out for Computer Science".

We work closely with the Midwest Crossroads AGEP program office at Purdue, offer summer-bridge programs to incoming students, and participate in conferences aimed at recruiting underrepresented minorities. We also host GEM consortium fellows and Science Bound summer interns.

We have an active presence at conferences including the Grace Hopper Celebration of Women in Computing and the CIC Summer Research Opportunities Program (SROP). We visit minority serving institutions and high schools with high enrollment of underrepresented minorities and encourage students to join our program.

The departmental Computer Science Women's Network (CSWN) is an organization of students, faculty, and staff dedicated to helping all members succeed in computer science. Over the past several years we have been successful in hiring outstanding female faculty. We are currently planning a Women in Computer Science career day, targeting high school juniors.

We are hopeful that our current diversity efforts will be fruitful, and we anticipate additional opportunities to foster a more diverse body of students, faculty, and staff in the Department of Computer Science.

Departmental research areas and associated faculty

Bioinformatics and Computational Biology

Grama
Kihara
Pandurangan
Qi
Si
Skeel
Szpankowski
O. Vitek

Computational Science and Engineering

Grama
Hoffmann
Lucier
Sacks
Sameh
Skeel

Databases

Aref
Bertino
Bhargava
Clifton
Elmagarmid
Hambrusch
Neville
Prabhakar
Si
Vitter

Data Mining and Information Retrieval

Clifton
Neville
Qi
Si

Distributed Systems

Bhargava
Eugster
Grama
Hosking
Jagannathan
Nita-Rotaru
Pandurangan
Park
Rego
Xu
Yau

Graphics and Visualization

Aliaga
Hoffmann
Popescu
Sacks
Tricoche

Information Security and Assurance

Atallah
Bertino
Bhargava
Clifton
Fahmy
N. Li
Nita-Rotaru
Park
Prabhakar
Rego
Spafford
J. Vitek
Wagstaff
Xu
Yau

Networking and Operating Systems

Comer
Fahmy
Kompella
Nita-Rotaru
Park
Xu
Yau

Programming Languages and Compilers

Eugster
Hosking
Jagannathan
Z. Li
J. Vitek
Zhang

Software Engineering

Dunsmore
Eugster
Jagannathan
Mathur
Rego
Spafford
J. Vitek
Zhang

Theory of Computing and Algorithms

Atallah
Frederickson
Hambrusch
Pandurangan
Szpankowski
Vitter

Daniel G. Aliaga

Assistant Professor of Computer Science (2003)

Education

BS, Computer Science, Brown University (1991)
MS, Computer Science, University of North Carolina at Chapel Hill (1993)
PhD, Computer Science, University of North Carolina at Chapel Hill (1999)

Academic biography

Professor Aliaga's research activities are in the area of computer graphics, in particular capturing and rendering large complex environments. Applications for his research include telepresence, computer-aided design, and education. Aliaga's work into this general problem overlaps with several fields, including: computer graphics, computer vision, robotics, data compression, and system building.

Aliaga has developed and published several new algorithms for interactively rendering massive geometrical models, recreating complex 3-D environments, visibility culling, reconstructing images, estimating camera pose, calibrating cameras, and compressing images. In addition, he has designed several complete experimental research systems, in collaboration with researchers at University of North Carolina at Chapel Hill, Princeton University, Johns Hopkins University, and Bell Laboratories.

Selected publications

Daniel Bekins and Daniel G. Aliaga, "Build-by-Number: Rearranging the Real World to Visualize Novel Architectural Spaces", *IEEE Visualization*, October 2005.

Daniel G. Aliaga and Ingrid Carlbom, "Build-by-Number: Finding Yourself: Fiducial Planning for Error-Bounded Pose Estimation of a Panoramic Camera in Large Environments", Special Issue of *IEEE Robotics and Automation Magazine: Panoramic Robotics*, December 2004.

Daniel G. Aliaga and Ingrid Carlbom, "Plenoptic Stitching: A Scalable Method for Reconstructing 3D Interactive Walkthroughs", *Proceedings of the ACM SIGGRAPH*, pp. 443–450, 2001.

Walid G. Aref

Professor of Computer Science (1999)

Education

BSc, Computer Science, Alexandria University, Egypt (1983)
MSc, Computer Science, Alexandria University, Egypt (1986)
PhD, Computer Science, University of Maryland at College Park (1993)

Academic biography

Professor Aref's research interests are in extending the functionality of database systems in support of emerging applications, e.g., spatial, spatio-temporal, multimedia, biological, and sensor databases. He is also interested in indexing, data mining, and geographic information systems (GIS). Professor Aref's research has been supported by the National Science Foundation, the National Institute of Health, Purdue Research Foundation, CERIAS, Panasonic, and Microsoft Corp. In 2001, he received the CAREER Award from the National Science Foundation and in 2004, he received a Purdue University Faculty Scholar award. Professor Aref is a member of Purdue's Discovery Park Bindley Bioscience and Cyber Centers. He is on the editorial board of the VLDB Journal, a senior member of the IEEE, and a member of the ACM.

Selected publications

M.Y. Eltabakh, M. Ouzzani, and W.G. Aref, "bdbms -- A Database Management System for Biological Data", 3rd Biennial Conference on Innovative Data Systems Research (CIDR), January 7-10, 2007, Asilomar, California, USA.

Ihab F. Ilyas, Walid G. Aref, Ahmed K. Elmagarmid, Hicham G. Elmongui, Rahul Shah, and Jeffrey Scott Vitter, "Adaptive Rank-aware Query Optimization in Relational Databases", *ACM Transactions on Database Systems (TODS)*, Volume 31, Issue 4, pp 1257--1304, December 2006

X. Xiong, W. G. Aref, "R-trees with Update Memos", IEEE International Conference on Data Engineering, Atlanta, GA, April 2006.

Mikhail Atallah

Associate Department Head
Distinguished Professor of Computer Science (1982)
Professor of Electrical and Computer Engineering (courtesy)

Education

BE, Electrical Engineering, American University in Beirut (1975)
MS, Electrical Engineering and Computer Science, The Johns Hopkins University (1980)
PhD, Electrical Engineering and Computer Science, The Johns Hopkins University (1982)

Academic biography

Professor Atallah's current research interests are primarily in information security, and also include algorithms, parallel computation, and computational geometry. His work in information security centers on protocols for online collaborations between entities that do not completely trust each other, on key management issues in access control, and on watermarking digital objects (particularly non-media, such as relational data and natural language text). A Fellow of both the ACM and IEEE, he has served on the editorial boards of top journals, and on the program committees of top conferences and workshops. He was keynote and invited speaker at many national and international meetings, and a speaker eight times in the Distinguished Colloquium Series of top Computer Science Departments. He was selected in 1999 as one of the best teachers in the history of Purdue University and included in Purdue's *Book of Great Teachers*.

Selected publications

Mikhail J. Atallah, Marina Blanton, Keith B. Frikken, "Efficient techniques for realizing geo-spatial access control", *Proc. of 2d ACM Symposium on Information, Computer andCommunications Security* (AsiaCCS 07), Singapore, March 2007, pp. 82-92.

Umut Topkara, Mikhail J. Atallah, Mercan Topkara, "Passwords decay, words endure: secure and re-usable multiple password mnemonics", *Proc. 22d Annual ACM Symposium on Applied Computing* (SAC07), Seoul, Korea, March 2007, pp. 292-299.

Mikhail J. Atallah, Marina Blanton, Michael T. Goodrich, Stanislas Polu, "Discrepancy-Sensitive Dynamic Fractional Cascading, Dominated Maxima Searching, and 2-d Nearest Neighbors inAny Minkowski Metric", *Proc. 2007 Workshop on Algorithms and Data Structures* (WADS 07), Halifax, Nova Scotia, August 2007, pp. 114-126.

FACULTY

Elisa Bertino

Professor of Computer Science (2004)
Professor of Electrical and Computer Engineering (courtesy)
Research Director of CERIAS

Education
PhD, Computer Science, University of Pisa (1980)

Academic biography

Professor Bertino's research interests cover many areas in the fields of information security and database systems. Her research combines both theoretical and practical aspects, addressing applications on a number of domains, such as medicine and humanities. Current research includes: access control systems, secure publishing techniques and secure broadcast for XML data; advanced RBAC models and foundations of access control models; trust negotiation languages and privacy; data mining and security; multi-strategy filtering systems for Web pages and sites; security for grid computing systems; integration of virtual reality techniques and databases; and geographical information systems and spatial databases.

Bertino serves on the editorial boards of several journals, many of which are related to security, such as the ACM Transactions on Information and System Security, the IEEE Security & Privacy Magazine, and IEEE Transactions on Dependable and Secure Computing. She served as program chair of the 7th ACM Symposium on Access Control Models and Technologies (SACMAT02), and of the 9th International Conference on Extending Database Technology Conference (EDBT 2004). Bertino is a Fellow of the Institute of Electrical and Electronics Engineers and a Fellow of ACM, and received the IEEE Computer Society Technical Achievement award in 2002 for outstanding contributions to database systems and database security and advanced data management systems. She received the 2005 Tsutomu Kanai Award by the IEEE Computer Society for pioneering and innovative research contributions to secure distributed systems.

Selected publications

M.L. Damiani, E. Bertino, B. Catania, P. Perlasca, "GEO-RBAC: a Spatially Aware RBAC", *ACM Transactions on Information and System Security*, Vol. 6, N. 1, February 2007.

R. Bhatti, E. Bertino, A. Ghafoor, "An Integrated Approach to Federated Identity and Privilege Management in Open Systems", Communications of ACM, Vol.50, No.2, February 2007.

M. Scannapieco, I. Figotin, E. Bertino, A. Elmagarmid, "Privacy Preserving Schema and Data Matching", *ACM SIGMOD International Conference on Data Management*, Beijing (China), June 11-14, 2007, ACM Press.

Bharat Bhargava

Professor of Computer Science (1984)
Professor of Electrical and Computer Engineering (courtesy)

Education
BS, Mathematics (Honors), Punjab University (1966)
BE, Electrical and Computer Engineering, Indian Institute of Science (1969)
PhD, Electrical Engineering, Purdue University (1974)

Academic biography

Professor Bhargava conducts research in security and privacy issues in distributed systems. This involves host authentication and key management, secure routing and dealing with malicious hosts, adaptability to attacks, and experimental studies. Related research is in formalizing evidence, trust, and fraud. Based on his research in reliability, he is studying vulnerabilities in systems to assess threats to large organizations. His research has direct impact on nuclear waste transport, bio-security, disaster management, and homeland security.

Bhargava is a Fellow of the IEEE and of the Institute of Electronics and Telecommunication Engineers. In 1999, he received the IEEE Technical Achievement Award for a major impact of his decade long contributions to foundations of adaptability in communication and distributed systems. He has been awarded the charter Gold Core Member distinction by the IEEE Computer Society for his distinguished service. He received Outstanding Instructor Awards from the Purdue chapter of the ACM in 1996 and 1998. He has graduated the largest number of PhD students in the CS department and is active in supporting/mentoring minority students. In 2003, he was inducted into the Purdue's Book of Great Teachers.

He serves on seven editorial boards of international journals. He also serves the IEEE Computer Society on Technical Achievement award and Fellow committees. Professor Bhargava is the founder of the IEEE Symposium on Reliable and Distributed Systems, IEEE conference on Digital Library, and the ACM Conference on Information and Knowledge Management.

Selected publications

M. Hefeeda, B. Bhargava, and D. Yau, "A hybrid architecture for cost-effective on-demand media streaming", *Computer Networks Journal*, Volume 44, pp. 353–382, 2004.

B. Bhargava, X. Wu, Y. Lu, and W. Wang, "Integrating Heterogeneous Wireless Technologies: A Cellular-assisted mobile ad hoc network", *Mobile Networks and Applications: Special Issue on Integration of Heterogeneous Wireless Technologies*, No. 9, pp. 393–408, 2004.

A. Habib, M. Khan, and B. Bhargava, "Edge-to-Edge Measurement-based Distributed Network Monitoring", *Computer Networks*, Volume 44, Issue 2, pp. 211–233, Feb 2004.

Christopher W. Clifton
Associate Professor of Computer Science (2001)

Education
BS, Computer Science and Engineering, Massachusetts Institute of Technology (1986)
MS, Electrical Engineering and Computer Science, Massachusetts Institute of Technology (1986)
MA, Computer Science, Princeton University (1988)
PhD, Computer Science, Princeton University (1991)

Academic biography
Professor Clifton works on challenges posed by novel uses of data mining technology, including privacy-preserving data mining, data mining of text, and data mining techniques applied to interoperation of heterogeneous information sources. Fundamental data mining challenges posed by these applications include extracting knowledge from noisy data, identifying knowledge in

highly skewed data (few examples of "interesting" behavior), and limits on learning. He also works on database support for widely distributed and autonomously controlled information, particularly information administration issues such as supporting fine-grained access control.

Before joining Purdue, he was a principal scientist in the Information Technology Division at the MITRE Corporation. Prior to joining MITRE, he was on the faculty at Northwestern University.

Selected publications

Jaideep Vaidya, Chris Clifton, and Michael Zhu, "Privacy Preserving Data Mining", Volume 19 in *Advances in Information Security*, Springer, New York, 2006.

Wei Jiang and Chris Clifton, "A Secure Distributed Framework for Achieving k-Anonymity", *The VLDB Journal*, VLDB Endowment, 15(4), VLDB Endowment, November 2006.

Murat Kantarcioglu and Chris Clifton, "Privacy Preserving Data Mining of Association Rules on Horizontally Partitioned Data", *Transactions on Knowledge and Data Engineering*, Volume 16, No. 9, pp. 1026-1037, IEEE Computer Society Press, Los Alamitos, CA, September 2004.

Douglas E. Comer
Distinguished Professor of Computer Science (1976)
Professor of Electrical and Computer Engineering (courtesy)

Education
BS, Mathematics and Physics, Houghton College (1971)
PhD, Computer Science, The Pennsylvania State University (1976)

Academic biography
Professor Comer is an internationally recognized expert on computer networking and the TCP/IP protocols. He has been working in this area since the late 1970s, and was a principal investigator on several early Internet research projects. He served as chairman of the CSNET technical committee, chairman of the DARPA Distributed Systems Architecture Board, and was a member of the Internet Activities Board. Professor Comer is currently on leave from Purdue, serving as VP of Research for Cisco Systems.
Professor Comer has created courses on TCP/IP and networking technologies, and consults for private industry on the design of corporate networks. He is well known for his widely adopted series of groundbreaking textbooks on networking and operating systems. Comer's three-volume series *Internetworking with TCP/IP* is often cited as an authoritative reference for the Internet protocols. His texts have been used by fifteen of the top sixteen computer science departments listed in the *U.S.News & World Report* ranking. Comer's research is experimental. He and his students design and implement working prototypes of large, complex systems.
Comer has served as editor-in-chief of *Software: Practice and Experience*. He is a Fellow of the ACM and the recipient of numerous teaching awards.

Selected publications
D. Comer, "Internetworking with TCP/IP Volume 1: Principles, Protocols, and Architecture", Prentice-Hall, Upper Saddle River, NJ, Fifth edition, 2005.

D. Comer, "Essentials Of Computer Architecture", Prentice-Hall, Upper Saddle River, NJ, 2005.

D. Comer, "Consequences Of IPv6 Addressing", *Journal of Internet Technology*, Vol 5:4 (2004), 305-309.

H. E. Dunsmore

Associate Professor of Computer Science (1978)

Education

BS, Mathematics and Physics, University of Tennessee (1968)
PhD, Computer Science, University of Maryland (1978)

Academic biography

Professor Dunsmore's interests include the Internet, Web programming, software engineering, software metrics, object-oriented design and programming, and information systems. He is the Chair of the College of Science (CoS) Undergraduate Education Policy and Curriculum Committee. He is a member of the Executive Council of the Purdue Teaching Academy. Dunsmore was selected Outstanding Teacher in the College of Science at Purdue in 1980. He is a 1996 recipient of the Charles B. Murphy Outstanding Undergraduate Teacher Award. He is a Founding Fellow of the Purdue Teaching Academy and was selected in 1998 as a member of the Purdue chapter of Mortar Board. Dunsmore has been selected as a Top Ten College of Science Teacher for several years and was selected as one of three Outstanding Indiana Information Technology Educators by the Indiana Information Technology Association (INITA). In 2005, he was voted by science alumni as their favorite CS professor. He is a Senior Faculty Mentor in the Purdue Teaching for Tomorrow Program. Dunsmore has extensive legal and industrial consulting experience. He is co-author of the books *Software Engineering Metrics and Models* (with Sam Conte and Vincent Shen) and *Internet Resources for Tourism and Leisure* (with William Theobald).

Ahmed K. Elmagarmid

Professor of Computer Science (1988)
Director of the Cyber Center (2005)

Education

BS, Computer Science, University of Dayton (1977)
MS, Computer and Information Science, The Ohio State University (1981)
PhD, Computer and Information Science, The Ohio State University (1985)

Academic biography

Professor Elmagarmid's research interests focus on applications of database technology to telemedicine, digital government, and electric power management. He has done work in video databases, data quality and confidentiality, and multidatabase systems. He is the director of the Indiana Center for Database Systems. He received a Presidential Young Investigator award from the National Science Foundation, and distinguished alumni awards from Ohio State University and the University of Dayton in 1993 and 1995, respectively. Professor Elmagarmid is the editor-in-chief of *Distributed and Parallel Databases: An International Journal*, editor of *IEEE Transactions on Knowledge and Data Engineering, Information Sciences Journal, Journal of Communication Systems,* and of the book series *Advances in Database Systems*. He has chaired and served on several program committees and served on several editorial boards.

Elmagarmid serves as an industry consultant in the areas of database systems. He has consulted with Telcordia Technology, Bellcore, IBM, CSC, Harris, D. H. Brown and Associates, MCC, Bell Northern Research, Molecular Design Labs, and UniSql to name a few. He is the holder of a recent patent on workflow database technology. In 2006, Professor Elmagarmid became the first director of the newly created Purdue Cyber Center.

Selected publications

M. A. Hammad, M. J. Franklin, W. G. Aref, and A. K. Elmagarmid, "Scheduling for Shared Window Joins Over Data Streams", *Proceedings of the 29th International Conference on Very Large Data Bases (VLDB 2003)*, pp. 297–308, 2003.

I. F. Ilyas, W. G. Aref, and A. K. Elmagarmid, "Supporting Top-k Join Queries in Relational Databases", *Proceedings of the 29th International Conference on Very Large Databases (VLDB 2003)*, pp. 754–765, Berlin, Germany.

E. Bertino, T. Catarci, A. K. Elmagarmid, and M-S, "Hacid: Quality of Service Specification in Video Databases", *IEEE Multimedia*, Volume 10, No. 4, pp. 71–81, October/December 2003.

Patrick Eugster
Assistant Professor of Computer Science (2005)

Education

MS, Computer Science, Swiss Federal Institute of Technology in Lausanne (1998)
PhD, Computer Science, Swiss Federal Institute of Technology in Lausanne (2001)

Academic biography

Professor Eugster's research aims at proposing adequate support for distributed programming. Topics of interest, in the context of distributed settings, include (fault-tolerant) algorithms, (object-oriented) programming languages and abstractions, middleware, and software engineering.

Eugster was educated in Switzerland, and has worked for both Swiss Federal Institutes of Technology in Lausanne (EPFL) and in Zurich (ETHZ), as well as for Sun Microsystems. He has authored over 40 articles, and is a member of ACM and IEEE.

Selected publications

P. Eugster, "Type-based Publish/Subscribe: Concepts and Experiences", *ACM Transactions on Programming Languages and Systems* (TOPLAS), 29(1), January 2007.

P. Eugster, "Uniform Proxies for Java", 21st *ACM Conference on Object-Oriented Programming Systems, Languages, and Applications* (OOPSLA 2006), pages 139-152, October 2006.

P. Eugster, R. Guerraoui, S. B. Handurukande, A.M. Kermarrec, and P. Kouznetsov, "Lightweight Probabilistic Broadcast", *ACM Transactions on Computer Systems* (TOCS), 21(4), pages 341-374, November 2003.

Sonia Fahmy
Associate Professor of Computer Science (1999)

Education

BSc, Computer Science, The American University in Cairo, Egypt (1992)
MS, Computer and Information Science, The Ohio State University (1996)
PhD, Computer and Information Science, The Ohio State University (1999)

Academic biography

Professor Fahmy's research interests lie in the design and evaluation of network architectures and protocols. She is currently investigating Internet tomography, network security, and wireless sensor networks. Her work is published in over 80 refereed papers, including publications in *IEEE/ACM Transactions on Networking, Computer Networks, IEEE INFOCOM*, and *IEEE ICNP*. She received the National Science Foundation CAREER award in 2003 and Schlumberger Foundation technical merit awards in 2000 and 2001. Results of her work were incorporated into the ATM Forum traffic management specifications 4.0 and 4.1, and a patent has been awarded for her work on the ERICA algorithm for network congestion control. She has served on the organizing or technical program committees of several conferences including IEEE INFOCOM, ICNP, BroadNets, and ICDCS. She is a member of the ACM, and a senior member of the IEEE.

Selected publications

S. Fahmy and M. Kwon, "Characterizing Overlay Multicast Networks and their Costs", *IEEE/ACM Transactions on Networking*, 15(2):373-386, April 2007.

O. Younis and S. Fahmy, "FlowMate: Scalable On-line Flow Clustering", *IEEE/ACM Transactions on Networking*, 13(2):288–301, April 2005.

O. Younis and S. Fahmy, "HEED: A Hybrid, Energy-Efficient, Distributed Clustering Approach for Ad-hoc Sensor Networks", *IEEE Transactions on Mobile Computing*, 3(4):366–379, Oct–Dec 2004.

Greg N. Frederickson
Professor of Computer Science (1982)

Education
AB, Economics, Harvard University (1969)
MS, Computer Science, University of Maryland (1976)
PhD, Computer Science, University of Maryland (1977)

Academic biography

Professor Frederickson's areas of interest include the analysis of algorithms, with special emphasis on data structures, and graph and network algorithms. His recent work has focused on designing data structures to dynamically maintain information about graphs, designing optimal algorithms for parametric search problems on trees, and discovering graph decompositions that facilitate fast algorithms for shortest path problems. Frederickson has served on the editorial boards of *SIAM Journal on Computing*, *SIAM Journal on Discrete Mathematics*, and *IEEE Transactions on Computers*, and he currently serves on the editorial board of *Algorithmica*. He has published three books, *Dissections Plane & Fancy*, Cambridge University Press, 1997; *Hinged Dissections: Swinging & Twisting*, Cambridge University Press, 2002; and *Piano-Hinged Dissections: Time to Fold!*, A K Peters, 2006. Professor Frederickson was recognized in 2003-04 as a Top Ten Outstanding Teacher in Science at Purdue, and won the 2004 George Pólya Award from the Mathematical Association of America.

Selected publications

Greg N. Frederickson, "Ambivalent data structures for dynamic 2-edge-connectivity and k smallest spanning trees", *SIAM Journal on Computing*, Volume 26, pp. 484–538, 1997.

Greg N. Frederickson and Roberto Solis-Oba, "Efficient algorithms for robustness in resource allocation and scheduling problems", *Theoretical Computer Science*, Volume 352, pp. 250-265, 2006.

Greg N. Frederickson and Barry Wittman, "Approximation algorithms for the traveling repairman and speeding deliveryman problems", *Proceedings, APPROX and RANDOM 2007*, LNCS 4627, pp. 119-133 , 2007.

Walter Gautschi

Professor Emeritus of Computer Science (1963)
Professor Emeritus of Mathematics

Education

PhD, Computer Science, University of Basel (1953)

Academic biography

Before coming to Purdue, Professor Gautschi did postdoctoral work as a Janggen-Pöhn Research Fellow at the National Institute of Applied Mathematics in Rome and at the Harvard Computation Laboratory. He also held positions at the National Bureau of Standards, American University, Oak Ridge National Laboratory, and the University of Tennessee. Since coming to Purdue, he has been a Fulbright Scholar at the Technical University of Munich and has held visiting appointments at the University of Wisconsin, Argonne National Laboratory, the Wright-Patterson Air Force Base, ETH Zurich, the University of Padova, and the University of Basel. He has been a Fulbright Lecturer, an ACM National Lecturer, and a SIAM Visiting Lecturer. He is, or has been, on the editorial boards of *SIAM Journal on Mathematical Analysis*, *Numerische Mathematik, Calcolo,* and *Mathematics of Computation*, and has served as a special editor for *Linear Algebra and Its Applications*. From 1984 to 1995, he was the managing editor of *Mathematics of Computation* and, since 1991, an honorary editor of *Numerische Mathematik*. In 2001, Professor Gautschi was elected a Corresponding Member of the Bavarian Academy of Sciences and Humanities and, in the same year, a Foreign Member of the Academy of Sciences of Turin.

Selected publications

W. Gautschi, "Orthogonal Polynomials: Applications and Computations", *Acta Numerica*, (A. Iserles, Editor) Cambridge University Press, Cambridge, pp. 45-119, 1996.

W. Gautschi, "The Incomplete Gamma Functions Since Tricomi", *Tricomi's Ideas and Contemporary Applied Mathematics*, pp. 203-237, Atti dei Convegni Lincei, No. 147, Accademia Nazionale dei Lincei, Roma, 1998.

W. Gautschi, "Orthogonal Polynomials: Computation and Approximation", Oxford University Press, 2004.

Ananth Grama
Professor of Computer Science (1996)

Education

BE, Computer Science and Technology, University of Roorkee (1989)
MS, Computer Engineering, Wayne State University (1990)
PhD, Computer Science, University of Minnesota (1996)

Academic biography

Professor Grama's research interests span the areas of parallel and distributed computing architectures, algorithms, and applications. His work on distributed infrastructure deals with development of software support for dynamic clustered and multiclustered environments. More recent work has focused on resource location and allocation mechanisms in peer-to-peer networks. His research on applications has focused on particle dynamics methods, their applications to dense linear system solvers, and fast algorithms for data compression and analysis.

Grama is the co-author of a well known text book, *Introduction to Parallel Computing: Design and Analysis of Algorithms*, with Vipin Kumar, Anshul Gupta, and George Karypis. He is a member of the American Association for Advancement of Sciences and Sigma Xi.

Selected publications

Bogdan Carbunar, Ananth Grama, Jan Vitek, Octavian Carbunar, "Redundancy and Coverage Detection in Sensor Networks", *ACM Transactions on Sensor Networks,* Volume 2, Issue 1, 2006..

Mehmet Koyuturk, Yohan Kim, Shankar Subramaniam, Wojciech Szpankowski, and Ananth Grama, "Detecting conserved interaction patterns in biological networks", *Journal of Computational Biology*, 13(7), 1299-1322, 2006.

Ronaldo Ferreira, Suresh Jagannathan, and Ananth Grama, "Locality in Structured Peer-to-Peer Networks", *Journal of Parallel and Distributed Computing*, Volume 66, Number 2, pages 257-273, 2006.

Susanne E. Hambrusch
Professor of Computer Science (1982)

Education

MS, Computer Science, Technical University of Vienna (1977)
PhD, Computer Science, The Pennsylvania State University (1982)

Academic biography

Professor Hambrusch's research interests are in the area of parallel and distributed computation, data management and data dissemination in mobile environments, and analysis of algorithms. Her research contributions include communication and data dissemination routines for distributed applications, data management techniques for query processing in wireless, mobile environments, and parallel algorithms for image processing and graph problems. Her research has been supported by NSF, Air Force, ONR, DARPA, and Microsoft Corp.
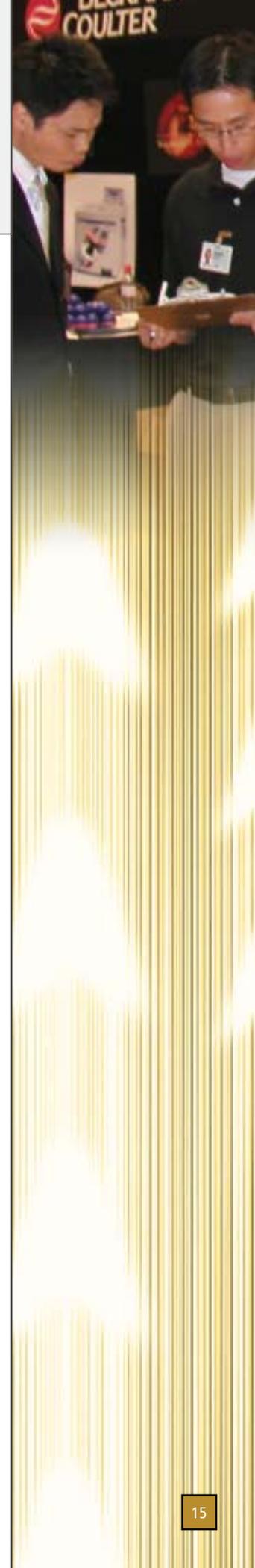
Hambrusch is a member of the editorial board for Parallel Computing and Information Processing Letters, and she also serves on the IEEE Technical Committee on Parallel Processing. As a member of CRA-W, she serves as a director for CRA-W's undergraduate research programs. Her recognitions include inaugural membership in the Purdue University Book of Great Teachers, a 2003 Outstanding Engineering Alumni Award from Pennsylvania State University, and 2004 TechPoint Mira Education Award Winner. She served as the head of the Department of Computer Science from 2002-2007.

Selected publications

Mohamed Mokbel, Xiaopeng Xiong, Walid Aref, Susanne Hambrusch, Sunil Prabhakar, and Moustafa Hammad, "PLACE: A Query Processor for Handling Real-time Spatio-temporal Data Streams", *Proceedings of the 13th International Conference on Very Large Data Bases (VLDB)*, pp. 1377-1380, 2004.

S.E. Hambrusch, C.-M. Liu, and S. Prabhakar, "Broadcasting and Querying Multi-dimensional Index Trees in a Multi-channel environment", *Information Systems*, Vol. 31, pp 870-886, 2006.

Sarvjeet Singh, Chris Mayfield, Sunil Prabhakar, Rahul Shah, Susanne E. Hambrusch, "Indexing Uncertain Categorical Data", *23rd IEEE International Conference on Data Engineering (ICDE 2007)*, 2007.

Christoph M. Hoffmann
Professor of Computer Science (1976)
Director of the Rosen Center for Advanced Computing
Co-director, PLM Center of Excellence

Education
PhD, University of Wisconsin (1974)

Academic biography

Before joining the Purdue faculty, Professor Hoffmann taught at the University of Waterloo, Canada. He has also been a visiting professor at the Christian-Albrechts University in Kiel, West Germany (1980), and at Cornell University (1984–1986). His research focuses on geometric and solid modeling, its applications to manufacturing and science, and the simulation of physical systems. The research includes, in particular, research on geometric constraint solving and the semantics of generative, feature-based design. He is the author of *Group-Theoretic Algorithms and Graph Isomorphism*, *Lecture Notes in Computer Science*, *136*, *Springer-Verlag and of Geometric and Solid Modeling: An Introduction*, published by Morgan Kaufmann Inc. Hoffmann has received national media attention for his work simulating the 9/11 attacks on the Pentagon and the World Trade Center.

Selected publications

C. Hoffmann, "Summary of Basic 2D Constraint Solving", *Intl. J. Prod. Lifecycle Mgmt* 1:2, 2006, 143-149.

C. Hoffmann and N. Stewart, "Accuracy and Semantics in Shape-Interrogation Applications", *Graphical Models* 67:5, 2005, 373-389.

C. Hoffmann, A. Sameh and A. Grama, "High-Fidelity Simulation of Large Scale Structures", *Proc. Comp. Sci — ICCS 2005*, Springer LNCS 3515, 2005, 664-671.

Antony Hosking
Associate Professor of Computer Science (1995)

Education
BSc, Mathematical Sciences, University of Adelaide (1985)
MSc, Computer Science, University of Waikato (1987)
PhD, Computer Science, University of Massachusetts (1995)

Academic biography
Professor Hosking's research lies at the intersection between programming languages and database systems, focusing on the integration of language and database functionality for efficient data management. Particular topics of interest include interpretation, compilation, and optimization of object-oriented persistent/database programming languages, and empirical performance evaluation of experimental prototype systems. His current research explores language and compiler support for run-time object management (e.g., garbage collection, persistence, resilience, distribution and security) in the context of the Smalltalk, Modula-3, and Java programming languages.

Selected publications
Moss JEB, Hosking AL, "Nested transactional memory: Model and architecture sketches", *Science of Computer Programming* 63(2):186-201, December 2006.

Ni Y, Menon V, Adl-Tabatabai A-R, Hosking AL, Hudson RL, Moss JEB, Saha B, Shpeisman T, "Open nesting in software transactional memory", *Proceedings of the ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming* (PPoPP) (San Jose, California, March 2007).

Hosking AL, "Portable, mostly-concurrent, mostly-copying garbage collection for multi-processors", *Proceedings of the 4th ACM SIGPLAN International Symposium on Memory Management (ISMM)* (Ottawa, Canada, June 2006):40-51.

Elias N. Houstis
Professor Emeritus of Computer Science (1984)

Education
BS, Mathematics, University of Athens (1969)
PhD, Mathematics, Purdue University (1974)

Academic biography
Professor Elias Houstis' research interests are in the areas of problem solving environments (PSEs), parallel computation, performance evaluation and modeling, computational intelligence, computational finance, and on-line learning. He is one of the principal designers of several domain specific PSEs (i.e., Parallel ELLPACK, PDELab) and numerous performance evaluation studies of PDE software and parallel architectures. Houstis has been involved in the design of a knowledge-based framework (known as PYTHIA) to support the selection of algorithm and machine pairs for a given class of PDE problems based on performance knowledge. He has published several books and over 120 technical articles. His research has been supported by the Air Force Office of Scientific Research, the Army Research Office, DARPA, DOE, ESPRIT, INTEL, IBM, AT&T, Kozo-Japan, Purdue University, the National Science Foundation, and the Greek Research Foundation.

Suresh Jagannathan

Professor of Computer Science (2002)
Professor of Electrical and Computer Engineering (courtesy)

Education

BS, Computer Science, State University of New York at Stony Brook (1982)
MS, Electrical Engineering and Computer Science, Massachusetts Institute of Technology (1985)
PhD, Electrical Engineering and Computer Science, Massachusetts Institute of Technology (1989)

Academic biography

Professor Jagannathan is interested in the semantics and implementation of high-level programming languages. His work focuses on formal methods for describing and implementing such languages, e.g., type theory, program analysis, abstract interpretation, etc., as well as compiler and runtime techniques that leverage such analyses. He also has an active interest in the specification and implementation of concurrent and distributed systems. One aspect of this research studies the semantics and implementation of lightweight transactional abstractions as an alternative to lock-based synchronization for expressing scalable concurrent applications.

His current research explores new software engineering techniques to infer salient behavioral properties of programs, using a combination of both static and dynamic mining strategies. The applicability of this work lies in improved error detection, test case generation, code quality and maintenance, and security.

Selected publications

Muralikrishna Ramanathan, Ananth Grama, Suresh Jagannathan, "Static Specification Inference Using Predicate Mining", *ACM Conference on Programming Language Design and Implementation* (2007).

Lukasz Ziarek, Philip Schatz, and Suresh Jagannathan, "Stabilizers: A Modular Checkpointing Abstraction for Concurrent Functional Programs", *ACM International Conference on Functional Programming* (2006).

Adam Welc, Antony Hosking, and Suresh Jagannathan, "Transparently Reconciling Locks with Transactions for Java Synchronization", *European Conference on Object-Oriented Programming* (2006).
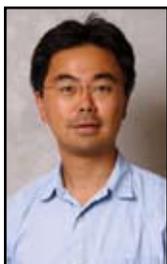
Daisuke Kihara

Assistant Professor of Computer Science (2003)
Assistant Professor of Biological Sciences

Education

BS, Biochemistry, University of Tokyo (1994)
MS, Bioinformatics, Kyoto University (1996)
PhD, Bioinformatics, Kyoto University (1999)

Academic biography

Kihara's research interest is in the area of bioinformatics. In the last decade, a large amount of biological data, such as genome/protein sequences, protein 3-D structures, and pathway data have become available. This data now enables us to employ comprehensive analysis of the relationship between protein sequence, structure and function, evolution of protein families, pathways, and organisms. He is focusing on developing computational methods to predict and analyze protein structure/function, pathway structure, and their applications in genome-scale or pathway/network scale. He has worked recently on protein structure prediction, protein global/local shape comparison, development of prediction method of transmembrane proteins, and its application to genome sequences.

Selected publications

Troy Hawkins, Stan Luban and Daisuke Kihara, "Enhanced automated function prediction using distantly related sequences and contextual association by PFP", *Protein Science*, Volume 15, 1550–1556, 2006.

Yen Hock Tan, He Huang, Daisuke Kihara, "Statistical potential-based amino acid similarity matrices for aligning distantly related protein sequences", *Proteins: Structure, Function, Bioinformatics*, Volume 64: pp. 587–600, 2006.

Jianjun Hu, Yifeng David Yang & Daisuke Kihara, "EMD: an ensemble algorithm for discovering regulatory motifs in DNA sequences", *BMC Bioinformatics,* 7:342. (2006).

Ramana R. Kompella
Assistant Professor of Computer Science (2007)

Education
BTech, Computer Science and Engineering, IIT Bombay (1999)
MS, Computer Science, Stanford University (2001)
PhD, Computer Science, University of California, San Diego (2007)

Academic biography

Professor Kompella's main research area is computer networks. Particular topics of interest include scalable inference mechanisms for fault localization in enterprise as well as backbone networks, scalable streaming algorithms and architectures for various router functions such as traffic measurement, attack detection, packet classification and fair queuing, and finally, designing resource-efficient scheduling algorithms in wireless networks. Many of his past inventions resulted in direct industrial impact. Kompella's dissertation research resulted in the development of sophisticated fault localization tools that can pin-point the location of the failure in large-scale backbone networks. These tools are used daily by a major Internet service provider in their backbone. Along with collaborators at Stanford, he helped pioneer hybrid SRAM-DRAM memory designs for high-capacity high-speed packet buffers in routers. Kompella's past efforts in industry included brief stint at Chelsio Communications Inc. in the design of a high-speed TCP offload engine and a packet-classification co-processor at SwitchOn Networks (acquired later by PMC Sierra).

Selected publications

Ramana Rao Kompella, Jennifer Yates, Albert Greenberg, Alex C. Snoeren, "Detection and Localization of Network Black holes", in the *Proceedings of Infocom*, Anchorage, Alaska, May 2007.

Ramana Rao Kompella, Sumeet Singh, George Varghese, "On Scalable Attack Detection in the Network", in the *Transactions on Networking (ToN)*, February 2007.

Ramana Rao Kompella, Jennifer Yates, Albert Greenberg, Alex C. Snoeren, "IP Fault Localization via Risk Modeling", in the *Proceedings of Second ACM/USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, Boston, MA, May 2005.

Ninghui Li
Assistant Professor of Computer Science (2003)

Education
BS, Computer Science, University of Science and Technology of China (1993)
MS, Computer Science, New York University (1998)
PhD, Computer Science, New York University (2000)

Academic biography

Professor Ninghui Li's research interests are in computer security and applied cryptography. He has worked extensively on trust management and automated trust negotiation, which are approaches to access control in decentralized, open, and distributed systems. His research focuses on role-based access control, online privacy protection, access control policy specification and analysis, and operating system access control. His research is currently supported by three NSF projects and a project funded by IBM. In 2005, he was awarded the NSF CAREER award. Before joining Purdue, he was a research associate in the computer science department of Stanford University. He has served on the program committees of more than two dozen conferences and workshops in information security, including the IEEE Symposium on Security and Privacy, ACM Conference on Computer and Communications Security (CCS), ISOC Network and Distributed System Security Symposium (NDSS), International Conference on Data Engineering, ACM Symposium on Access Control Models and Technologies (SACMAT), and IEEE Computer Security Foundations Workshop (CSFW).

Selected publications

Ninghui Li, Ziad Bizri, and Mahesh V. Tripunitara, "On Mutually-Exclusive Roles and Separation of Duty", *Proceedings of the ACM Conference on Computer and Communications Security (CCS)*, October 2004.

Ninghui Li, John C. Mitchell, and William H. Winsborough, "Beyond Proof-of-compliance: Security Analysis in Trust Management", *Journal of the ACM*, 52(3):474–514, May 2005.

Ninghui Li, John C. Mitchell, and William H. Winsborough, "Design of A Role-based Trust-management Framework", *Proceedings of the 2002 IEEE Symposium on Security and Privacy*, May 2002.
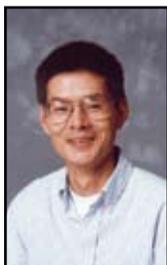
Zhiyuan Li

Professor of Computer Science (1997)
Professor of Electrical and Computer Engineering (courtesy)

Education

BS, Mathematics, Xiamen University (1982)
MS, Computer Sciences, University of Illinois at Urbana-Champaign (1985)
PhD, Computer Sciences, University of Illinois at Urbana-Champaign (1989)

Academic biography

Zhiyuan Li has conducted many years' research on compiler techniques for parallel processing and locality enhancement. Recent focus of his group in this area is on programming interfaces and compiler support for the development of innovative parallel software, targeting both large scale high-end systems and multicore microprocessor chips. In recent years, his group has also designed and implemented compiler-based programming environments and run-time systems for resource-constrained distributed systems such as mobile devices, embedded systems and wireless sensor networks, improving their energy efficiency, reliability and maintainability.

Li received a National Science Foundation Research Initiation Award and a National Science Foundation Career Award in 1992 and 1995, respectively. He was named by Purdue University as a University Faculty Scholar for the years of 2005-2010. Li has served as a program committee member for many international conferences sponsored by IEEE and ACM. He is Program Chair for ACM SIGPLAN/SIGBEG Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES) in 2007. He co-chaired the International Workshop on Languages and Compilers for Parallel Computing in the years of 1997 and 2004 respectively.

Selected publications

Douglas Herbert, Yung-Hsiang Lu, Saurabh Bagchi, Zhiyuan Li, "Detection and Repair of Software Errors in Hierarchical Sensor Networks", P*roceedings of IEEE International Conference on Sensor Networks, Ubiquitous, and Trustworthy Computing (SUTC)*, June 2006.

Cheng Wang and Zhiyuan Li, "Parametric Analysis For Adaptive Computation Offloading", *Proceedings of the ACM SIGPLAN 2004 Conference on Programming Language Design and Implementation (PLDI)*, pp. 119–130, Washington, DC, June 9–11, 2004.

Zhiyuan Li and Yonghong Song, "Automatic Tiling of Iterative Stencil Loops", *ACM Trans. on Programming Languages and Systems*, 26(6), pp. 975--1028, November, 2004.

Bradley J. Lucier

Professor of Mathematics (1981)
Professor of Computer Science (1981)

Education

BSc (Honours), Mathematics, University of Windsor (1976)
SM, Applied Mathematics, University of Chicago (1978)
PhD, Applied Mathematics, University of Chicago (1981)

FACULTY

Academic biography

Professor Lucier has worked for over fifteen years on wavelet and multi-resolution methods for image processing and other applications. He has a particular interest in applications in medical imaging (image compression for telemedicine, tomographic and MRI reconstruction, etc.).

The selected publications below indicate some of these interests. The first paper relates variational problems to wavelet shrinkage. The second paper introduces several results about wavelet methods for medical tomography, especially for Positron Emission Tomography (PET) imaging. The third paper is a study of radiologist performance in interpreting wavelet-compressed mammographic images. The compression method was designed specifically to keep image features that are needed to interpret mammograms.

Selected publications

Antonin Chambolle, Ronald A. DeVore, Namyong Lee, and Bradley J. Lucier, "Nonlinear Wavelet Image Processing: Variational Problems, Compression, and Noise Removal through Wavelet Shrinkage", *IEEE Transactions on Image Processing: Special Issue on Partial Differential Equations and Geometry-Driven Diffusion in Image Processing and Analysis*, 7(3):319–335, 1998.

Namyong Lee and Bradley J. Lucier, "Wavelet Methods for Inverting the Radon Transform with Noisy Data", *IEEE Transactions on Image Processing*, 10(1):79–94, 2001.

Maria Kallergi, Bradley J. Lucier, Claudia G. Berman, Maria R. Hersh, J. Kim Jihai, Margaret S. Szabunio, and Robert A. Clark, "High-performance wavelet compression for mammography: localization response operating characteristic evaluation", *Radiology*, 238(1):62–73, 2006.

Robert E. Lynch

Professor Emeritus of Computer Science and Mathematics (1967)

Education

BS, Engineering Physics, Cornell University (1954)
MA, Mathematics, Harvard University (1961)
PhD, Applied Mathematics, Harvard University (1963)

Academic biography

Professor Lynch has held positions at Brookhaven National Laboratory, Los Alamos Laboratories, Wright-Patterson Air Force Base, the University of Texas, and General Motors Research Laboratories. Areas of his research include differential equations, linear algebra, software for solving elliptic partial differential equations, and computational biology. He and G. Birkhoff have written the monograph *Numerical Solutions of Elliptic Problems*, SIAM Publications, 1985.

Aditya P. Mathur

Department Head Computer Science (1987)
Professor of Computer Science (1987)

Education

BE (Hons), Electrical Engineering, Birla Institute of Technology and Science (1970)
MS, Electrical Engineering, Birla Institute of Technology and Science (1972)
PhD, Computer Science, Birla Institute of Technology and Science (1977)

Academic biography

Professor Aditya Mathur conducts research in the areas of software testing, reliability, and formal approaches for software process control. Mathur has been a crusader for the use of code coverage criteria in the estimation of software reliability or as an orthogonal metric to assess confidence in the reliability estimates. He has proposed the "Saturation Effect" as a motivating device for quantitative test assessment using an increasingly powerful suite of criteria. This device is often used by vendors to enhance marketing of their test tools. Mathur, in collaboration with Raymond DeCarlo, has pioneered research into the use of feedback control in software development.

Selected publications

Scott Miller, Raymond DeCarlo, Joao Cangussu, and Aditya Mathur, "A control-theoretic approach to the management of the software system test phase", *Journal of Software and Systems*, Volume 79, No. 11, pp. 1486-1503 , November 2006.

Joao Cangussu, Raymond DeCarlo, and Aditya P. Mathur, "Using Sensitivity Analysis to validate a State Variable Model of the Software Test Process", *IEEE Transactions on Software Engineering*, Volume 29, No. 5, pp. 430-443, 2003.

Joao Cangussu, Raymond DeCarlo, and Aditya P. Mathur, "A Formal Model of the Software Test Process", *IEEE Transactions on Software Engineering*, Volume 28, No. 8, pp. 782-796, August 2002.

Jennifer Neville

Assistant Professor of Computer Science (2006)
Assistant Professor of Statistics (2006)

Education

BS, Computer Science, University of Massachusetts Amherst (2000)
MS, Computer Science, University of Massachusetts Amherst (2004)
PhD, Computer Science, University of Massachusetts Amherst (2006)

Academic biography

Professor Neville's research focuses on data mining and machine learning techniques for relational data. In relational domains such as bioinformatics, citation analysis, epidemiology, fraud detection, and web analytics, there is often limited information about any one entity in isolation, instead it is the connections among entities that are of crucial importance to pattern discovery. Relational data mining techniques move beyond the conventional analysis of entities in isolation to analyze networks of interconnected entities, exploiting the connections among entities to improve both descriptive and predictive models. Neville's research interests lie in the development and analysis of relational learning algorithms and the application of those algorithms to real-world tasks.

Selected publications

Neville, J. and D. Jensen, "Relational Dependency Networks", *Journal of Machine Learning Research*.

Neville, J. and D. Jensen, "Leveraging Relational Autocorrelation with Latent Group Models", *Proceedings of the Fifth IEEE International Conference on Data Mining* (2005), pp 322–329.

Neville, J., O. Simsek, D. Jensen, J. Komoroske, K. Palmer and H. Goldberg, "Using Relational Knowledge Discovery to Prevent Securities Fraud", *Proceedings of the 11th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* (2005), pp 449–458.
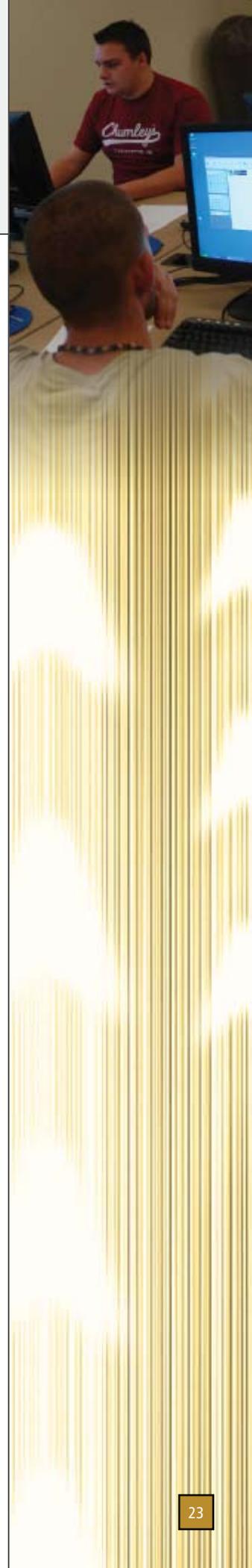
Cristina Nita-Rotaru

Assistant Professor of Computer Science (2003)

Education

BS, Computer Science, Politehnica University of Bucharest (1995)
MS, Computer Science, Politehnica University of Bucharest (1996)
MSE, Computer Science, The Johns Hopkins University (2000)
PhD, Computer Science, The Johns Hopkins University (2003)

Academic biography

Professor Cristina Nita-Rotaru conducts her research within the Dependable and Secure Distributed Systems Laboratory (DS^2). Her research interests lie in designing distributed systems and network protocols and applications that are dependable and secure, while maintaining acceptable levels of performance. Her current research focuses on designing intrusion-tolerant architectures for distributed services that scale to wide-area networks, investigating survivable routing in wireless ad hoc networks, and providing access control mechanisms for secure group communication.

Her work is funded by the Center for Education and Research in Information Security and Assurance (CERIAS), the Defense Advanced Research Projects Agency (DARPA), and the National Science Foundation (NSF).

Selected publications

Yair Amir, Yongdae Kim, Cristina Nita-Rotaru, John Schultz, Jonathan Stanton, and Gene Tsudik, "Secure Group Communication Using Robust Contributory Key Agreement", *IEEE Transactions on Parallel and Distributed Systems* (TPDS), vol. 15, no. 5, pp. 468–480, May 2004.

Yair Amir, Yongdae Kim, Cristina Nita-Rotaru, and Gene Tsudik, "On the Performance of Group Key Agreement Protocols", *ACM Transactions on Information Systems Security (TISSEC)*, vol. 7, no. 3, August 2004.

Yair Amir, Cristina Nita-Rotaru, Jonathan Stanton and Gene Tzudik, "Secure Spread: An Integrated Architecture for Secure Group Communication", In *IEEE Transactions on Dependable and Secure Computing (TDSC)*, vol. 2, no. 3, 2005.

Gopal Pandurangan

Assistant Professor of Computer Science (2002)

Education

BTech, Computer Science, Indian Institute of Technology at Madras (1994)
MS, Computer Science, State University of New York at Albany (1997)
PhD, Computer Science, Brown University (2002)

Academic biography

Professor Pandurangan's research interests are in theoretical computer science and design and analysis of algorithms. In particular, he is interested in randomized algorithms, probabilistic analysis of algorithms, dynamic computer processes, and theory and algorithms for real-world networks. Pandurangan is especially interested in algorithmic and modeling problems that arise in the following application areas: communication networks (especially ad hoc and sensor networks), computational biology and bioinformatics, and Web and Internet algorithms.

Selected publications

C. Bailey-Kellog, S. Chainraj, and G. Pandurangan, "A Random Graph Approach to NMR Sequential Assignment", *Journal of Computational Biology*, Volume 12, No. 6–7, pp. 569–583, 2005.

S. Muthukrishnan and G. Pandurangan, "The Bin-Covering Technique for Thresholding Random Geometric Graph Properties", *Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2005.

G. Pandurangan, P. Raghavan, and E. Upfal, "Building Low-Diameter Peer-to-Peer Networks", *IEEE Journal on Selected Areas in Communications (JSAC)*, Volume 21, No. 6, pp. 995–1002, 2003.

Kihong Park
Associate Professor of Computer Science (1996)

Education
BA, Management, Seoul National University (1988)
MS, Computer Science, University of South Carolina (1990)
PhD, Computer Science, Boston University (1996)

Academic biography

Professor Park's research centers on design and control issues in high-speed multimedia networks including deployable IP QoS, scalable network security, and robust distributed systems.

He has published in major networking venues including ACM SIGCOMM, ACM SIGMETRICS, IEEE ICNP, and IEEE INFOCOM, and has edited two books *Self-Similar Network Traffic and Performance Evaluation* (Wiley-Interscience 2000) and *The Internet as a Large-Scale Complex System* (Oxford University Press 2005) with Walter Willinger at AT&T Research. His doctoral thesis, "Ergodicity and mixing rate of one-dimensional cellular automata" (advisor, Peter Gacs), was on a problem in probability theory going back to von Neumann, with applications to fault-tolerance in large-scale systems.

Park was a Presidential University Fellow at Boston University, a recipient of the NSF CAREER Award, a Fellow-at-Large of the Santa Fe Institute, and has served on several international program committees and government panels. He was chair of the NSF/SFI Workshop, The Internet as a Large-Scale Complex System, held at the Santa Fe Institute in March 2001. He served on the editorial boards of *IEEE Communications Letters and Computer Networks*. His research has been supported by grants from government and industry including the Army, DARPA, ETRI, Intel, NSF, SFI, Sprint, and Xerox.

Selected publications

S. Choi, K. Park and C. Kim, "On the Performance Characteristics of WLANs: Revisited", Proceedings of the *ACM SIGMETRICS 2005*, pp. 97–108, 2005.

A. Lomonosov, M. Sitharam and K. Park, "Network QoS Games: Stability vs. Optimality Tradeoff", *Journal of Computer and System Sciences*, Volume 69, pp. 281–302, 2004.

K. Park and W. Willinger (eds.), "The Internet as a Large-Scale Complex System", *SFI Studies in the Sciences of Complexity*, Oxford University Press, 2005.

Voicu S. Popescu
Associate Professor of Computer Science (2001)

Education
BS, Computer Science, University of Cluj-Napoca, Romania (1995)
MS, Computer Science, University of North Carolina (1999)
PhD, Computer Science, University of North Carolina (2001)

Academic biography
Professor Popescu's research interests span the areas of computer graphics, visualization, and computer vision. His current research projects develop novel camera models for efficient and effective rendering of complex visual effects, a system for rapid photorealistic 3D modeling of large-scale real-world environments, a system that aims to make distance education an integral but unobtrusive part of on-campus education, and a method for high-fidelity general-purpose-visualization of large-scale computer simulations.

Selected publications
Voicu Popescu, Elisha Sacks, and Chunhui Mei, "Sample-Based Cameras for Feed-Forward Reflection Rendering", *IEEE Transactions on Visualization and Computer Graphics*, 1590-1600, Nov-Dec, 2006.

Gleb Bahmutov, Voicu Popescu, and Mihai Mudure, "Efficient Large-Scale Acquisition of Building Interiors", *Computer Graphics Forum*, 25(3):655-662.

Voicu Popescu, Christoph Hoffmann, Sami Kilic, and Mete Sozen, "Producing High-Quality Visualizations of Large-Scale Simulations", *IEEE Visualization Conference*, 575-581, 2003.

Sunil Prabhakar
Associate Professor of Computer Science (1998)

Education
BTech, Electrical Engineering, Indian Institute of Technology (1990)
MS, Computer Science, University of California (1998)
PhD, Computer Science, University of California (1998)

Academic biography
Professor Prabhakar's research focuses on performance and privacy issues in large-scale, modern database applications such as multimedia, moving-object, and sensor databases. The efficient execution of I/O is a critical problem for these applications. The scope of this research ranges from main memory to disks and tertiary storage devices. Sensor and moving object applications are also faced with the need to process large volumes of data in an online manner. The current research effort addresses efficient continuous query evaluation and novel techniques for managing the inherent lack of accuracy for these applications. Prabhakar's interest also lies in the design and development of private databases and digital watermarking techniques for structured (e.g. relational databases) and semi-structured (e.g., XML) data. He is also working on developing advanced databases for biological data. His current focus is on developing a transparent and reliable protein function database. Prabhakar previously held a position with Tata Unisys Ltd.

Selected publications

Yicheng Tu Song Liu, Sunil Prabhakar, Bin Yao, "Load Shedding in Stream Databases: A Control-Based Approach", *Proceedings of the International Conference on Very Large Databases (VLDB)*, September 2006, Seoul, Korea.

R. Sion, M. J. Atallah, and Sunil Prabhakar, "Rights Protection for Discrete Numeric Streams", *IEEE Transactions on Knowledge and Data Engineering*, Vol. 18, No. 5, May 2006.

Reynold Cheng Ben Kao, Sunil Prabhakar Alan Kwan, Yicheng Tu, "Adaptive Stream Filters for Entity-based Queries with Non-Value Tolerance", *Proceedings of the International Conference on Very Large Databases* (VLDB), September 2005, Trondheim, Norway. pp. 37–48.

Yuan (Alan) Qi
Assistant Professor of Computer Science (2007)

Education

BS, Huazhong University of Science and Technology (1995)
MS, University of Maryland, College Park (2000)
MS, Chinese Academy of Sciences (1998)
PhD, MIT Media Lab (2005)

Academic biography

Alan Qi has a dual appointment in Computer Science and Statistics. His main research interests include Bayesian machine learning and computational biology. Qi has taught at the ACM International Conference on Multimedia, Campus IT Summer School in Spain, and at MIT. He also performed research at MIT, the University College London, and University of Maryland, College Park, and in industry at Microsoft Research.

Selected publications

Y. Qi and T.S. Jaakkola, "Parameter Expanded Variational Bayesian Methods", *Advances in Neural Information Processing Systems 19*, MIT Press, Cambridge, MA, 2007.

Y. Qi, A. Rolfe, K. D. MacIsaac, G. K. Gerber, D. Pokholok, J. Zeitlinger, T. Danford, R. D. Dowell, E. Fraenkel, T. S. Jaakkola, R. A. Young and D. K. Gifford, "High-resolution Computational Models of Genome Binding Events", *Nature Biotechnology*, vol. 24, 963-970, August, 2006.

Y. Qi, M. Szummer, and T. P. Minka, "Diagram Structure Recognition by Bayesian Conditional Random Fields", in the *Proceedings of International Conference on Computer Vision and Pattern Recognition*, 2005.

Vernon J. Rego
Professor of Computer Science (1985)

Education

MSc, Mathematics, Birla Institute of Technology and Science (1979)
MS, Computer Science, Michigan State University (1982)
PhD, Computer Science, Michigan State University (1985)

Academic biography

Professor Vernon Rego directs research in the Parallel Computation and Simulation Laboratory (PacsLab). His research interests include software systems for high-performance distributed computation, network protocols, threads systems, parallel stochastic simulation, computational probability and performance, and software engineering. His current projects include the ACES software architecture for multi-threaded distributed computing and parallel simulation, including the EcliPSe replicated simulation system (for which he was awarded an IEEE/Gordon Bell Prize), the ParaSol process-oriented distributed simulation system, the Ariadne threads system, and the CLAM protocol suite. He was also awarded a German Research Council Award for Computer Networking Research. He has been an invited researcher at the Oak Ridge National Laboratories and an ACM National Lecturer. He is an editor of the *IEEE Transactions on Computers* and an advisory board member of The DoD Advanced Distributed Simulation Research Consortium.

John R. Rice

W. Brooks Fortune Distinguished Professor Emeritus of Computer Science (1964)
Professor of Mathematics (courtesy)

Education

BS, Mathematics, Oklahoma State University (1954)
MS, Mathematics, Oklahoma State University (1956)
PhD, Mathematics, California Institute of Technology (1959)

Academic biography

Professor Rice is founder of the ACM Transactions on Mathematical Software, he is the past chair of the CRA, a fellow of AAAS and ACM, and a member of the National Academy of Engineering. For the past 25 years, Rice has been analyzing numerical methods and problem solving environments for scientific computing. He has created a general methodology for performance evaluation of mathematical software and developed the ELLPACK system for elliptic problems. It is now being extended to Parallel ELLPACK and PDELab. He has published 21 books. Among recent ones are *Solving Elliptic Problems with ELLPACK* (Springer-Verlag, 1985), *Mathematical Aspects of Scientific Software* (Springer-Verlag, 1988), *Expert Systems for Scientific Computing* (North Holland, 1992), and *Enabling Technologies for Computational Science* (Kluwer, 2000). He also has published about 300 scientific articles. Rice also has extensive funding from Wright Patterson Air Force Base, the SBIR Program, and the State of Indiana.

Elisha Sacks

Professor of Computer Science (1994)

Education

BS, Computer Science, Carnegie-Mellon University (1982)
SM, Computer Science, Massachusetts Institute of Technology (1985)
PhD, Computer Science, Massachusetts Institute of Technology (1988)

Academic biography

Professor Sacks' research area is geometric reasoning in science and engineering. His current projects are robust computational geometry, model acquisition for computer graphics, generalized camera models, and robot path planning. He has also researched mechanical design algorithms using configuration spaces. The research led to practical design software for kinematic analysis, simulation, tolerancing, and parametric design of mechanical systems with higher pairs and changing contact topologies. The software has been used at Ford Motors for transmission design and at Sandia National Laboratory for micro-mechanism design.

Selected publications

Victor Milenkovic and Elisha Sacks, "An Approximate Arrangement Algorithm for Semi-Algebraic Curves", *International Journal of Computational Geometry and Applications*, 2006, In press.

Min-Ho Kyung and Elisha Sacks, "Robust Parameter Synthesis for Planar Higher Pair Mechanical Systems", *Computer-Aided Design* 38(5), 2006.

Chunhui Mei, Voicu Popescu, and Elisha Sacks, "The Occlusion Camera", *Computer Graphics Forum* 24(3), 2005.

Ahmed Sameh
Samuel D. Conte Professor of Computer Science (1997)

Education
PhD, University of Illinois at Urbana-Champaign (1968)

Academic biography

Professor Ahmed Sameh's current research interests include numerical linear algebra and the design and performance analysis of parallel numerical algorithms needed in various science and engineering applications. He has served on the editorial boards of: *IEEE Transactions on Computers*, *Computing*, *SIAM Journal on Scientific and Statistical Computing*, *Parallel Computing*, *Journal of Parallel and Distributed Computing*, *Computer Physics Communications*, *International Journal of High Speed Computing*, *Numerical Linear Algebra with Applications*, *IEEE Computing in Science and Engineering*, and *International Journal of Parallel Programming*.

He joined Purdue in 1997 as head of the Department of Computer Science, after being head of computer science at the University of Minnesota, Minneapolis, and the holder of the William Norris Chair for Large-Scale Computing. He was also a faculty member in the Department of Computer Science at the University of Illinois at Urbana-Champaign. While at Illinois, he served as an associate director and director of the Center for Supercomputing Research and Development (CSRD). He is a Fellow of ACM, IEEE, and AAAS, and a member of SIAM. He received the IEEE 1999 Harry Goode Award for "seminal and influential work in parallel numerical algorithms."

Selected publications

S. Kilic, F. Saied, and A. Sameh, "Efficient iterative solvers for structural dynamics problems", *Computers & Structures*, Volume 82, No. 28, pp. 2363–2375, 2004.

A. Baggag and A. Sameh, "A nested iterative scheme for indefinite linear systems in particulate flows", *Computer Methods in Applied Mechanics and Engineering*, Vol 193, pp. 1923–1957, 2004.

S. Sambavaram, V. Sarin, A. Sameh, and A. Grama, "Multipole-Based Preconditioners for Large Sparse Linear Systems", *Parallel Computing*, Volume 29, No. 9, pp. 1261–1273, September 2003.

Luo Si
Assistant Professor of Computer Science (2006)

Education
BS, Computer Science and Technology, Tsinghua University (1998)
MS, Computer Science and Technology, Tsinghua University (2000)
PhD, Language and Information Technologies, Carnegie Mellon University (2006)

Academic biography
Professor Si's research spans a range of topics in information retrieval, machine learning, text mining, speech and multimedia processing, and data mining. His recent research focuses on federated search (distributed information retrieval), probabilistic models for information filtering, and text/data mining for life science. Professor Si has designed systems with his colleagues and acquired good results in evaluation campaigns such as TREC (Text Retrieval Conference) and CLEF (Cross-Lingual Evaluations Forum). He has published more than 35 conference, journal, and workshop papers.

Selected publications
Luo Si and Jamie Callan, "Modeling Search Engine Effectiveness for Federated Search", In *Proceedings of the Twenty-Seventh Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*, 2005, ACM.

Rong Jin, Luo Si, Cheng Xiang Zhai, "A Study of Mixture Models for Collaborative Filtering", *Journal of Information Retrieval*, 2006.

Luo Si and Jamie Callan, "A Semi-Supervised Learning Method to Merge Search Engine Results", In *ACM Transactions on Information Systems*, 24(4), 2003 ACM.

Robert D. Skeel
Professor of Computer Science (2004)
Professor of Mathematics (courtesy)

Education
BSc, (Honours) Applied Mathematics, University of Alberta (1969)
MS, Mathematics, University of Toronto (1970)
PhD, Computing Science, University of Alberta (1974)

Academic biography
Professor Skeel's research interest is in computational methods for biomolecular simulation, which seeks to aid in the discovery of the structures and mechanisms that are basic to life. Such simulations are very demanding computationally, running for days, weeks, and even months on parallel computers. Current research of Professor Skeel embraces three challenges: (1) the N-body problem for calculating nonbonded interactions as well as dense matrix "inversion" for dipole moments and implicit solvent, (2) the problem of doing dynamics simulations on biological time scales, and (3) the problem of calculating of free energy differences and transition paths in very high dimensional configuration space. Professor Skeel has previously taught full time at the University of Illinois where he initiated the development of the scalable parallel molecular dynamics program NAMD. Professor Skeel has, with Jerry Keiper, co-authored a textbook *Elementary Numerical Computing with Mathematica*.

Selected publications

G. Zou and R.D. Skeel, "Robust biased Brownian dynamics for rate constant calculation", *Biophys. J.* 85, pp. 2147–2157, 2003.

W. Wang and R. D. Skeel, "Fast Evaluation of Polarizable Forces", *J. Chem. Phys.*, 123, 164107 (12 pages), 2005.

J. C. Phillips, R. Braun, W. Wang, J. Gumbart, E.Tajkhorshid, E. Villa, C. Chipot, R.D. Skeel, L. Kale, andK. Schulten, "Scalable molecular dynamics with NAMD", *J. Comput. Chem.* 26, 2005, 1781-1802.

Eugene H. Spafford

Professor of Computer Science (1987)
Professor of Electrical and Computer Engineering (courtesy)
Professor of Communication (courtesy)
Professor of Philosophy (courtesy)
Executive Director, Purdue CERIAS

Education

BA, Mathematics and Computer Science, State University of New York at Brockport (1979)
MS, Information and Computer Science, Georgia Institute of Technology (1981)
PhD, Information and Computer Science, Georgia Institute of Technology (1986)
DSc (honorary), State University of NY (SUNY) (2005)

Academic biography

Professor Spafford's research interests are focused on issues of computer and network security, cybercrime, and ethics, and the social impact of computing. He is the founder and executive director of the Center for Education and Research in Information Assurance and Security (CERIAS). This university-wide institute addresses the broader issues in information security and information assurance, and draws on expertise from all of the academic disciplines at Purdue.

Spafford has received recognition and many honors for his research, including being named as a Fellow of the ACM, of the AAAS, and of the IEEE. He has received almost every major award in the field of information security for his accomplishments as a researcher and technical leader. Additionally, he has been honored for his education efforts, including receiving all three of Purdue's highest honors for teaching. He has also received major awards from organizations including the NCISSE and the IEEE for his leadership in infosec education.

Among many professional activities, Spafford is a member of the Computing Research Association's Board of Directors and chair of ACM's U.S. Public Policy Committee. He is the academic editor of the journal *Computers & Security*.

Selected publications

Brian Carrier and Eugene H. Spafford, "Categories of Digital Investigation Analysis Techniques Based On the Computer History Model", *Digital Investigation*, Elsevier; v. 3(S); pp. 121-130, Aug. 2006.

Paul D. Williams and Eugene H. Spafford, "CuPIDS: An Exploration of Highly Focused,Coprocessor-based Information System Protection", *Computer Networks*, v 51(5); pp. 1284-1298; April 2007.

Eugene H. Spafford, "Voter Assurance", *The Bridge*, v 37(2), summer 2007; pp. 28–34.
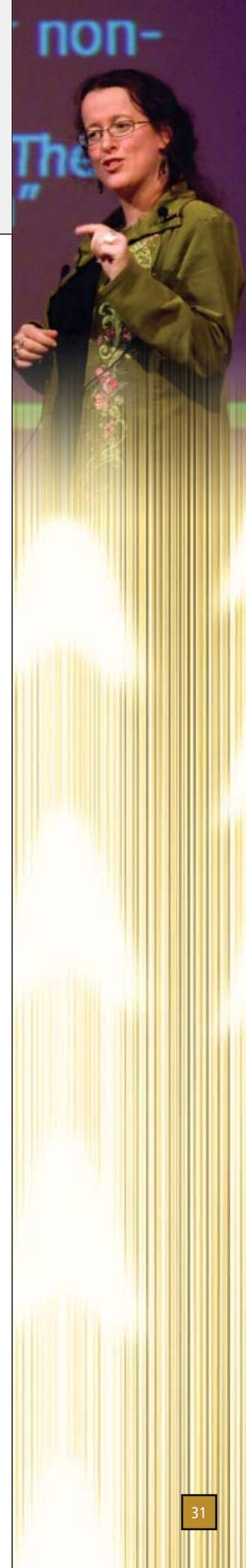
John M. Steele

Associate Professor Emeritus of Computer Science (1963)

Academic biography

John Steele's research interests are in the areas of computer data communications and computer circuits and systems.

Yinlong Sun

Assistant Professor of Computer Science (2001)

Education

BS, Physics, Beijing University (1985)
PhD, Physics, Simon Fraser University (1996)
PhD, Computer Science, Simon Fraser University (2000)

Academic biography

Professor Yinlong Sun's research interests lie in computer graphics, scientific visualization, biomedical imaging, computational neuroscience, and cross-disciplinary topics. The research projects include spectral modeling, simulation of iridescences, physical-based illumination, BRDF representation, vector visualization, cellular visualization, cortical surface analysis, and neuroimaging. A particular focus is on combining analytical, numerical, and experimental techniques to solve complex, cross-disciplinary problems. He has established a Computational Imaging Research Lab (CIRL) with principal missions to bridge computational sciences and physical sciences and engineering and to develop effective imaging and visualization tools to assist scientific research and discoveries. He is also associated with the Computer Graphics and Visualization Lab. He is a member of ACM, IEEE, and IS&T.

Selected publications

Yinlong Sun, Bartek Rajwa, and J. Paul Robinson, "Adaptive Image-Processing Technique and Effective Visualization of Confocal Microscopy Images", *Microscopy Research and Techniques*, Volume 64, pp. 156–163, 2004.

Yinlong Sun, "Self Shadowing and Local Illumination of Randomly Rough Surfaces", *Proceedings of the Computer Vision and Pattern Recognition* (CVPR), pp. 158–165, 2004.

Yinlong Sun, F. David Fracchia, Mark S. Drew, and Thomas W. Calvert, "A Spectrally Based Framework for Realistic Image Synthesis", *The Visual Computer* Volume 17, No. 7, pp. 429–444, 2001.
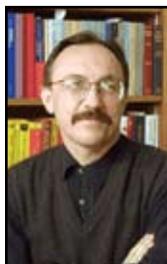
Wojciech Szpankowski

Professor of Computer Science (1985)
Professor of Electrical and Computer Engineering (courtesy)

Education

MS, Electrical Engineering and Computer Science, Technical University of Gdansk (1970)
PhD, Electrical Engineering and Computer Science, Technical University of Gdansk (1980)

Academic biography

Professor Wojciech Szpankowski teaches and conducts research in analysis of algorithms, information theory, bioinformatics, analytic combinatorics, random structures, and stability problems of distributed systems. He was a visiting professor/scholar at McGill University, Canada, INRIA, France, Stanford University, Hewlett-Packard Labs, Universite de Versailles, France, Universite de Marne-la-Vallee, Paris, France, and University of Canterburry, New Zealand. He is a Fellow of IEEE (for "contributions to performance evaluation of information systems"), the Erskine Fellow, and the Humboldt Fellow. He published the book *Average Case Analysis of Algorithms on Sequences*, John Wiley & Sons, 2001.

Szpankowski has been a guest editor and an editor of technical journals, including *Theoretical Computer Science*, the *ACM Transaction on Algorithms*, the *IEEE Transactions on Information Theory*, *Foundation and Trends in Communications and Information Theory*, and *Combinatorics, Probability, and Computing*. He chaired the International Seminar on Analysis of Algorithms, Gdansk and Berkeley, the Information Theory and Networking Workshop, Metsovo, Greece, the NSF Workshop on Information Theory and Computer Science Interface, Chicago, and the workshop Information Beyond Shannon, Orlando. In June 2004 he directed the MSRI Graduate Program on the "Analysis of Algorithms and Information Theory".

Selected publications

M. Drmota and W. Szpankowski, "Precise Minimax Redundancy and Regrets", *IEEE Trans. Information Theory*, 50, 2686-2707, 2004.

P. Flajolet, W. Szpankowski, and B. Vallee, "Hidden Word Statistics", *Journal of the ACM*, 53, 1-37, 2006.

M. Koyuturk, Y. Kim, S. Subramaniam, W. Szpankowski, and A. Grama, "Detecting conserved interaction patterns in biological networks", *J. Computational Biology*, 13, 1299-1322, 2006.

Xavier Tricoche

Assistant Professor of Computer Science (2007)

Education

Engineer's Degree, Computer Science, ENSIMAG (Grenoble, France) (1998)
MSc, Applied Mathematics, Universite Joseph Fourier (Grenoble, France) (1998)
PhD, Computer Science, University of Kaiserslautern, Germany (2002))

Academic biography

Xavier Tricoche joins the Graphics, Visualization, and Geometric Modeling group. His research aims at creating new methods for interactive visualization and effective visual analysis of large datasets. His main topics of interest include flow visualization, structural analysis of vector and tensor fields, post-processing of medical imaging data, computer graphics, and computational steering. Tricoche has taught at the University of Utah and the University of Kaiserslautern. He also gave tutorial presentations at IEEE Visualization 2004 and 2006, and Eurographics 2001.

Selected publications

G. Kindlmann, X. Tricoche, C.-F. Westin, "Delineating White Matter Structure in Diffusion Tensor MRI with Anisotropy Creases", *Medical Image Analysis 11*, 2007, 492–502.

A. Wiebel, X. Tricoche, D. Schneider, HeikeJänicke, Gerik Scheuermann, "Generalized Streak Lines: Analysis and Visualization of Boundary Induced Vortices", *IEEE Transactions on Visualization and Computer Graphics 13(6)*, 2007, 1464–1471.

C. Garth, F. Gerhardt, X. Tricoche, H. Hagen, "Efficient Computation and Visualization of Coherent Structures in Fluid Flow Applications", *IEEE Transactions on Visualization and Computer Graphics 13(6)*, 2007, 1735–1742.

Jan Vitek

Associate Professor of Computer Science (1999)

Education
BS, Computer Science, University of Geneva (1989)
MS, Computer Science, University of Victoria (1995)
PhD, Computer Science, University of Geneva (1999)

Academic biography
Professor Vitek works in foundations and implementation of programming languages and has an interest in program analysis, real time systems, object-oriented software engineering, and information security. He is leading the Open Virtual Machines project to develop a framework for configurable and secure virtual machines for object-oriented languages. This research is being conducted in the Secure Software Systems (S3) Lab founded in early 2000 by Professors Vitek, Hosking, and Palsberg.

Vitek was born in Czechoslovakia and educated in Switzerland. He has authored more than 30 papers and edited books on mobile objects and secure Internet programming. He served on program committees for international conferences such as PLDI, OOPSLA, ECOOP, POPL, ESOP, ICALP, and SACMAT.

Selected publications

T. Zhao, J. Palsberg, J. Vitek, "Type-based Confinement", *Journal of Functional Programming*, 2006.

A. Armbuster, J. Baker, A. Cunei, C. Flack, D.Holmes, F.Pizlo, E. Pla, M. Prochazka, J. Vitek, "A Real-Time Java Virtual Machine with Applications in Avionics", *ACM Transactions on Embedded Systems*, 2006.

C. Andrea, Y. Coady, C. Gibbs, J. Noble, J. Vitek, T. Zhao, "Scoped Types and Aspects for Real-Time Systems", *Proceedings of the European Conference on Object Oriented Programming (ECOOP)*, 2006.

Olga Vitek

Assistant Professor of Computer Science (2006)
Assistant Professor of Statistics

Education

BSc, Econometrics and Statistics, University of Geneva (1995)
MSc, Econometrics and Statistics, University of Geneva (1997)
MSc, Mathematical Statistics. Purdue University (2001)
PhD, Statistics. Purdue University (2005)

Academic biography

Olga Vitek's research interests are in statistical and computational methods for high-dimensional molecular biology, in particular for mass spectrometry-based proteomics. Methodological aspects of her work include Bayesian modeling, statistical computing, and experimental design. Before joining the Purdue faculty, she was a post-doctoral fellow in the Aebersold Lab at the Institute for Systems Biology in Seattle.

Jeffrey S. Vitter

Frederick L. Hovde Dean of the College of Science (2002)
Professor of Computer Science (2002)

Education

BS with highest honors, Mathematics, University of Notre Dame (1977)
PhD, Computer Science, Stanford University (1980)
MBA, Duke University (2002)

Academic biography

Professor Vitter's research investigates how to manage and process very large amounts of data. He helped pioneer the field of external memory algorithms. His work melds theory and practice to span a number of application areas, including geographic information systems (GIS), databases, computational geometry, data mining, and text indexing. Another aspect of Vitter's work involves novel prediction mechanisms based upon principles of data compression and locality; examples include algorithms for caching, prefetching, data streaming, database query optimization, data mining, and resource management in mobile computers. His interest in prediction comes from ongoing work in data compression and machine learning. Vitter is currently working on compressed indexes for long sequences of symbols, such as text. A recent theoretical breakthrough he worked on showed how to fully compress text and make it self-indexing at the same time. His honors and awards include: Fellow, John Simon Guggenheim Foundation, 1986; Fellow, IEEE, 1993; Fellow, ACM, 1996; National Science Foundation Presidential Young Investigator Award 1985; Fulbright Scholar, 1998; Recognition of Service Award, ACM, 1998 and 2001.

Selected publications

J. S. Vitter, "External Memory Algorithms and Data Structures: Dealing with Massive Data", *ACM Computing Surveys*, 33(2), June 2001, 209–271.

D. T. Hoang and J. S. Vitter, *Efficient Algorithms for MPEG Video Compression*, John Wiley & Sons, New York, NY, 2002.

R. Grossi, A. Gupta, and J. S. Vitter, "High-Order Entropy-Compressed Text Indexes", *Proceedings of the 14th Annual SIAM/ACM Symposium on Discrete Algorithms (SODA 2003)*, Baltimore, MD, Jan. 2003.

Samuel S. Wagstaff Jr.

Professor of Computer Science (1983)
Professor of Mathematics (courtesy)

Education
BS, Massachusetts Institute of Technology (1966)
PhD, Cornell University (1970)

Academic biography
Before coming to Purdue, Professor Wagstaff taught at the Universities of Rochester, Illinois, and Georgia. He spent a year at the Institute for Advanced Study in Princeton. His research interests are in the areas of cryptography, parallel computation, and analysis of algorithms, especially number theoretic algorithms. He and J. W. Smith of the University of Georgia have built a special processor with parallel capability for factoring large integers. He is the author of *Factorizations of bn ± 1, b = 2, 3, 5, 6, 7, 10, 11, 12 up to high powers*, Contemporary Mathematics series, v. 22, Third edition, American Mathematical Society, 2002 (with John Brillhart, D. H. Lehmer, J. L. Selfridge and Bryant Tuckerman) (See http://www.ams.org/online_bks/conm22), *Cryptanalysis of Number Theoretic Ciphers*, CRC Press, 2002, and *Sums of Squares of Integers*, CRC Press, 2005 (with Carlos Moreno).

Selected publications
B. Dodson, A. K. Lenstra, P. Leyland, A. Muffett, and Samuel S. Wagstaff, "MPQS with three large primes", *Proceedings of the Algorithmic Number Theory Symposium 2002*, Volume 2369 of *Springer-Verlag Lecture Notes in Computer Science*, pp. 448-462, 2002.

B. Carrier, S. S. Wagstaff, Jr., "Implementing the hypercube quadratic sieve with two large primes", *Proceedings of the International Conference on Number Theory for Secure Communications*, Srinivasta Ramanujan Centre, SASTRA Deemed University, Kumbakonam, India, 20 and 21 Dec, 2003, pages 51-64.

S. S. Wagstaff, Jr., "Is there a shortage of primes for cryptography?", *International Journal of Network Security*, v. 3 (2006), pages 296-299.

Dongyan Xu

Associate Professor of Computer Science (2001)
Associate Professor of Electrical and Computer Engineering (courtesy)

Education
BS, Computer Science, Zhongshan University (1994)
PhD, Computer Science, University of Illinois at Urbana-Champaign (2001)

Academic biography
Professor Xu's current research focuses on the development of virtualization technologies for computer system security and for virtual distributed computing. He has also made early contributions to the area of peer-to-peer media streaming and distribution. He leads the Lab for Research in Emerging Network and Distributed Systems (FRIENDS).

Xu and his students have been developing virtualization-based systems for capturing, investigating, and defending against stealthy computer malware (e.g., worms, rootkits, and bots). He and his students also have been developing virtualization-based middleware that creates

virtual networked environments on top of a shared physical infrastructure. His lab contributes to the development and deployment of the nanoHUB, one of the first production-quality virtualization-enabled cyberinfrastructures in operation.

Xu received the C. L. and Jane W-S. Liu Award from the Department of Computer Science at UIUC (2000), a Seed for Success Award from Purdue University (2004), and a CAREER Award from the National Science Foundation (2006). He is affiliated with the Center for Education and Research in Information Assurance and Security (CERIAS) and the Cyber Center. He is an associate editor of the Cluster Computing Journal (Springer) and has served on program committees of major distributed computing and security conferences (e.g., ICDCS, SC, NDSS, and WWW). Xu's research has been supported by the National Science Foundation (NSF), the Disruptive Technology Office (DTO), Microsoft Research, and Purdue Research Foundation.

Selected publications

X. Jiang and D. Xu, "Collapsar: A VM-Based Architecture for Network Attack Detention Center", *Proceedings of the 13th USENIX Security Symposium* (Security 2004), San Diego, CA, August 2004.

P. Ruth, X. Jiang, D. Xu, and S. Goasguen, "Towards Virtual Distributed Environments in a Shared Infrastructure", *IEEE Computer*, Special Issue on Virtualization Technologies, May 2005.

M. Hefeeda, A. Habib, D. Xu, B. Bhargava, and B. Botev, "CollectCast: A Peer-to-Peer Service for Media Streaming", *ACM/Springer Multimedia Systems Journal*, October 2005.

David K. Y. Yau
Associate Professor of Computer Science (1997)
Associate Professor of Electrical and Computer Engineering (courtesy)

Education
BS, Computer Science, Chinese University of Hong Kong (1989)
MS, Computer Science, University of Texas at Austin (1992)
PhD, Computer Science, University of Texas at Austin (1997)

Academic biography
Professor David Yau's research interests are in network and operating system quality of service, network security, incentive protocols, value-added services routers, and mobile wireless networks. A major goal is to improve the performance and robustness of complex large-scale networks for heterogeneous applications. He has been invited to serve as panelist and reviewer by the National Science Foundation (NSF), the Research Grants Council of Hong Kong, and the Research Council of Norway. His research has been funded by various government and industrial organizations including the NSF. He is a member of the ACM and IEEE. He serves on the editorial board of the journal *IEEE/ACM Transactions on Networking*, and has served on the organizing and technical program committees of many ACM and IEEE conferences.

Yau received a CAREER award from the NSF. He was the recipient of a Hong Kong Government Scholarship, a Swire Scholarship, a Microelectronics and Computer Development Fellowship (UT Austin), and an IBM Fellowship. Before academia, he was employed as Management Associate and then Assistant Manager at Citibank, NA.

Selected publications

David K. Y. Yau, John C. S. Lui, Feng Liang, and Yeung Yam, "Defending Against Distributed Denial-of-Service Attacks with Max-min Fair Server-centric Router Throttles.", *IEEE/ACM Transactions on Networking*, 13(1), February 2005.

Richard T. B. Ma, Sam C. M. Lee, John C. S. Lui, and David K. Y. Yau, "A Game Theoretic Approach to Provide Incentive and Service Differentiation in P2P Networks.", In *Proc. ACM SIGMETRICS*, New York, NY, June 2004.

Simon S. Lam, Simon Chow, and David K. Y. Yau, "A Lossless Smoothing Algorithm for Compressed Video", *IEEE/ACM Transactions on Networking*, 4(5), October 1996.

Xiangyu Zhang
Assistant Professor of Computer Science (2006)

Education
BS, Computer Science, University of Sci. & Tech. of China (1998)
MS, Computer Science, University of Sci. & Tech. of China (2000)
PhD, Computer Science, University of Arizona (2006)

Academic biography

Professor Zhang's research is on automatic debugging, software reliability, computer security, and program profiling. In particular, he has designed efficient and effective dynamic slicing techniques, which have a lot of applications in debugging runtime errors, intrusion detection, and preventing software piracy. He has designed architectural support for protecting sensitive data in symmetric shared memory processors. He has also conducted research on program tracing and profiling, which includes novel representations and creative compression techniques. Zhang is interested in program analysis, both dynamic and static, and their applications in software engineering and security related issues. Zhang is a member of ACM and IEEE.

Selected publications

X. Zhang, N. Gupta, and R. Gupta, "Pruning Dynamic Slices With Confidence", *ACM SIGPLAN Conference on Programming Language Design and Implementation*, 2006.

X. Zhang and R. Gupta, "Whole Execution Traces and their Applications", *ACM Transactions on Architecture and Code Optimization*, 2005.

X. Zhang and R. Gupta, "Matching Execution Histories of Program Versions", *Conference and 13th ACM SIGSOFT Symposium on the Foundations of Software Engineering*, 2005.

Courtesy Faculty in Computer Science

Name	Title	Main Department	Research Area
Shreeram Abhyankar	Professor	Mathematics	Computational and algebraic geometry
David Anderson	Professor	Mechanical Engineering	Computer-aided design
Saurabh Bagchi	Assistant Professor	Electrical and Computer Engineering	Distributed and secure systems
Alok Chaturvedi	Associate Professor	School of Management	Information technology strategies
William Cleveland	Professor	Statistics	Data mining and visualization
Melissa Dark	Associate Professor	College of Technology	Security awareness and education
David Ebert	Associate Professor	Electrical and Computer Engineering	Visualization and computer graphics
Michael Gribskov	Professor	Biological Sciences	Bioinformatics
Y. Charlie Hu	Assistant Professor	Electrical and Computer Engineering	Distributed systems and wireless networking
Sabre Kais	Professor	Chemistry	Quantum computation
Scott Jones	Adjunct Professor		
Guy Lebanon	Assistant Professor	Statistics	Machine learning, statistical analysis of massive data sets
Yung-Hsiang Lu	Assistant Professor	Electrical and Computer Engineering	Energy-efficient computing systems
Rahul Shah	Research Assistant Professor		Databases and algorithms
Ness Shroff	Professor	Electrical and Computer Engineering	Communication networks
T. N. Vijaykumar	Associate Professor	Electrical and Computer Engineering	Computer architecture

RESEARCH FUNDING

Aliaga, Daniel

Daniel Aliaga, Mireille Boutin, and Carl Cowen. *MSPA-MCS: 3D Scene Digitization: A Novel Invariant Approach for Large-Scale Environment Capture*. National Science Foundation. 2004-2008, $500,000.

Daniel Aliaga. *REU-MSPA-MCS: 3D Scene Digitization: A Novel Invariant Approach for Large-Scale Environment Capture*. National Science Foundation. 2006-2008, $12,000.

Aref, Walid

Walid Aref. *Research and Development of Database Technologies for Modern Applications* (Career Award). National Science Foundation. 2001-2006, $300,000.

Barry Wanner, Walid Aref, Daisuke Kihara, Michael Gribskov, and Xiang Zhang. *Development of the www.ecoli-community.org Information Resource*. National Institutes of Health. 2006-2009, $1,500,000.

Walid Aref and Daisuke Kihara. *Development of the www.ecoli-community.org Information Resource*. National Institutes of Health. 2006-2009, $1,500,000.

Atallah, Mikhail J.

Mikhail J. Atallah. *Secure Supply Chain Protocols*. National Science Foundation. 2003-2007, $800,000.

Mikhail J. Atallah. *Industrial Support*. Motorola. 2004, $9,360.

Mikhail J. Atallah and Juline Mills. *CT-ISG: Improving the Privacy and Security of Online Survey Data Collection, Storage, and Processing*. National Science Foundation. 2006-2009, $300,000.

Sunil K. Prabhakar and Mikhail J. Atallah. *Watermarking Relational Databases*. National Science Foundation. 2003-2007, $149,993.

Christopher Clifton and Mikhail J. Atallah. *ITR Collaborative Research: Distributed Data Mining to Protect Information Privacy*. National Science Foundation. 2003-2006, $282,274.

Bertino, Elisa

Elisa Bertino, Ninghui Li, Melissa Dark, Robert W Proctor, and Victor Raskin. *Collaborative Research: A Comprehensive Policy - Drive Framework For Online Privacy Protection: Integrating IT, Human, Legal and Economic Perspectives.* National Science Foundation. 2004-2007, $653,431.

Elisa Bertino, Eugene Spafford, Melissa Dark, Howard Sypher, Marc Rogers, Victor Raskin, and Juline Mills. *ITR:The Design & Use of Digital Identities.* National Science Foundation. 2004-2007, $900,000.

Sonia Fahmy and Elisa Bertino. *CRI Collaborative Research: A Testbed for Research and Development of Secure IP Multimedia Communication Services*. National Science Foundation. 2006-2010, $86,159.

Elisa Bertino. *Systematic Control and Management of Data Integrity, Quality and Provenance for Command and Control Applications*. Air Force Office of Scientific Research. 2006-2009, $299,999.
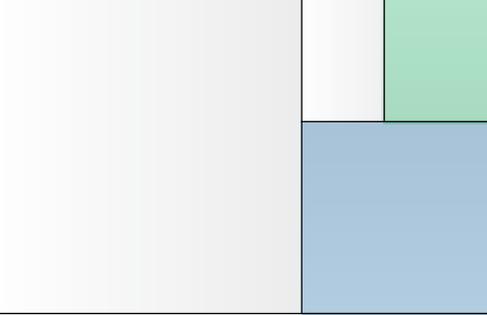
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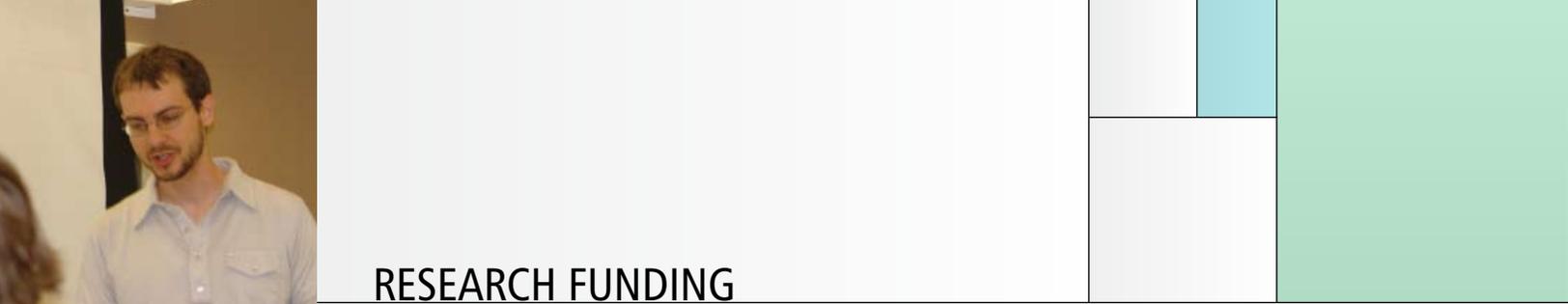
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Hambrusch, Susanne E.

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Hoffmann, Christoph M.

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Christoph M. Hoffmann and Voicu Popescu. *Security of Large-Scale Systems*. P C Krause and Associates. 2006-2008, $55,284.

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Hosking, Tony

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Elisha P. Sacks. Samsung - Mei. Samsung. 2006-2006, $50,000.

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Skeel, Robert

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RESEARCH FUNDING

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Melissa Dark and Eugene Spafford. *A Summer Workshop for Beginning Infosec Educators*. National Science Foundation. 2002-2007, $237,848.

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Eugene Spafford. *DHS-Sponsored Research on Security Issues for Indiana GIS Data*. State of Indiana. 2006-2007, $31,986.

Eugene Spafford. *SEED: Developing Instructional Laboratories for Computer Security Information*. National Science Foundation. 2006-2010, $60,000.

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Szpankowski, Wojciech

Wojciech Szpankowski and Ananth Y. Grama. *Algebraic, Combinatorial and Probabilistic Methods for Biological Sequences*. National Institutes of Health. 2003-2008, $924,865.

Wojciech Szpankowski. *Crossroads of Information Theory and Computer Science: Analytic Algorithmics, Combinatorics, and Information Theory*. National Science Foundation. 2005-2008, $243,862.

Wojciech Szpankowski. *Collaborative Research: Nonlinear Equations Arising in Information Theory & Computer Sciences*. National Science Foundation. 2005-2008, $122,661.

Wojciech Szpankowski. *Information Transfer in Wireless Networks*. Purdue Research Foundation. 2007-2008, $14,627.

Vitek, Jan

Jan Vitek. *CAREER: Foundations and Implementation of Mobile Object Systems*. National Science Foundation. 2001-2007, $325,936.

Y.Charlie Hu and Jan Vitek. *Partage: An Open Peer-to-Peer Infrastructure for Cycle-Sharing*. National Science Foundation. 2003-2007, $498,945.

Jan Vitek. *Assured Software Composition For Real-Time Systems*. National Science Foundation. 2003-2008, $500,000.

Pascal Meunier and Jan Vitek. *Develpoment of a Safe, Virtual Imaging Instrument for Logically Destructive Experiments*. National Science Foundation. 2004-2009, $800,000.

Suresh Jagannathan and Jan Vitek. *CSR/AES: Fault Determination and Recovery in Cycle-Sharing Infrastructures*. National Science Foundation. 2005-2007, $350,000.

Jan Vitek. *CSR/EHS: Aspectual Configuration of Real-time Embedded Middleware*. National Science Foundation. 2005-2008, $240,000.

Suresh Jagannathan, Jan Vitek, Tony Hosking, and Ananth Y. Grama. *CRI: A Computational Infrastructure for Experimentation on Relaxed Concurrency Abstractions and their Applications*. National Science Foundation. 2006-2008, $99,979.

Vitter, Jeffrey

Jeffrey Vitter. *Entropy-Compressed Data Structures*. National Science Foundation. 2004-2007, $255,000.

Mithuna Thottethodi, Vijay Pai, T.N. Vijaykumar, Jeffrey Vitter, and Rahul Shah. *Performance Models & Systems Optimization for Disk Bond Applications*. National Science Foundation. 2006-2009, $889,788.

Xu, Dongyan

Dongyan Xu, Sebastien Goasguen, and Gerhard Klimeck. *NMI Deployment (ENG): nanoHUB*. National Science Foundation. 2004-2007, $2,967,804.

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Yau, David

David Yau. *Collaborative Research: A Component-based Software Environment for Simulation, Emulation, and Synthesis of Network Protocols in Next Generation Networks*. National Science Foundation. 2004-2007, $187,000.

David Yau. *Northwest Indiana Computational Grid: A Joint Project of the University of Notre Dame, Purdue University-West Lafayette, and Purdue University-Calumet*. Department of Energy. 2005-2007, $15,569.

David Yau. *Collaborative Interdomain Networking Research with Tsinghua University*. Asian Initiative Research. 2005-2007, $8,000.

David Yau. *System Support for Detection, Identification, and Tracking Tasks in Sensor-Cyber Networks*. Oak Ridge National Laboratory. 2006-2008, $200,000.

David Yau. *Robust and Deeply Embedded Plume Detection, Identification, & Tracking Sensor-Cyber Networks*. Purdue Research Foundation. 2007-2008, $14,627.

EDUCATION

Graduate Teaching Assistants

Ferit Akova
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Hoda Mohamed Eldardiry
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Justin D. Gaylor
Brian William Hackbarth
Ashish Kamra
Ardalan Kangarlou-Haghighi
HyoJeong Kim
Michael Scott Kirkpatrick
Yunhua Koglin
Yasin Nilton Laura Silva
Alvin Jon-Hang Law
Jing Li
Tiancheng Li
Aaron Richard Lint
Christopher Scott Mayfield
Russell Kenneth Meyers
Ian Michael Molloy
Mihai Mudure
Armand Navabi
Jayesh Pandey
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Jorge R. Ramos
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William Robert Speirs
William Nicholas Sumner
Jacques Daniel Thomas

Mercan Karahan Topkara
Fijoy George Vadakkumpadan
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Marina Valeryevna Blanton
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Ji-Won Byun
Ahmet Burak Can
Hong Chen
Jren-Chit Chin
Youn Sun Cho
Yong Wook Choi
Tomasz Czajka
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Hazem Diaa Eldin Elmeleegy
Ilya Figotin
Hwan Jo Heo
Chun Jia
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48

Ashish Kundu
Yasin Nilton Laura Silva
Alvin Jon-Hang Law
Bin Li
Zhiqiang Lin
Yu Tak Ma
Murat Manguoglu
Ziqing Mao
Ammar Masood
Christopher Scott Mayfield
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Russell Kenneth Meyers
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Rimma Vladimirovna Nehme
Mehmet Ercan Nergiz
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Junghwan Rhee
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Arjmand Micheal Samuel
Jeffrey Cecil Seibert
Sarvjeet Singh
Jacques Daniel Thomas
Mercan Karahan Topkara
Umut Topkara
Yi-Cheng Tu
Qihua Wang
Qiqi Wang
Yang Wang
Dasarath Weeratunge
Bin Xin
Xiaopeng Xiong
Yi Xu
Hiroshi Yamauchi
Jingfeng Yan
Yu Yang
David John Zage

Ji Zhang
Mingwu Zhang
Yu Zhang
Zhen Zhu

Fellows
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Ethan Lee Blanton
Marina Valeryevna Blanton
Suleyman Cetintas
Roman Chertov
Jing Dong
Daniel Morgan Harris
Kevin John Hoffman
Nwokedi Chimezie Idika
Md-Abdul Maleq Khan
Lixia Liu
Christopher Scott Mayfield
Ian Michael Molloy
Larissa Alexis O'Brien
Jose Atilio Santos
Philip Schatz
Richard John Shay
Hao Yuan
Lukasz Ziarek

PhD Graduates

December 2006

Gleb Evgeny Bahmutov
Efficient Large Scale Acquisition of Building Interiors
Advisor: V. S. Popescu
Employer: 3D Digital, Inc.; Danbury, Connecticut

Yu Dong
Energy Efficiency and Surveillance in Mobile Sensor Networks
Advisor: D. K. Y. Yau
Employer: IBM Silicon Valley Laboratory; San Jose, California

Ronaldo Alves Ferreira
Distributed Algorithms for Peer-to-Peer Systems
Advisors: A. Y. Grama and S. Jagannathan
Employer: Federal University of Mato Grosso do Sul (UFMS); Brazil

Yunhua Koglin
Security Mechanisms for Content Distribution Networks
Advisor: E. Bertino
Employer: Cisco; Richardson, Texas

Mehmet Koyuturk
Comparative Analysis of Biological Networks
Advisor: A. Y. Grama
Employer: Purdue University; West Lafayette, Indiana

May 2007

Mohamed Hassan Ali
Phenomenon-aware Data Stream Management Systems
Advisor: W. G. Aref
Employer: Microsoft Corporation; Seattle, Washington

Ji-Won Byun
Toward Privacy-Preserving Database Management Systems — Access Control and Data Anonymization
Advisors: N. Li and E. Bertino
Employer: Oracle; Redwood, California

Jorge R. Ramos
Dynamic Covert Channels in Finance
Advisor: V. J. Rego
Employer: Purdue University, Center for Road Safety; West Lafayette, Indiana

William Robert Speirs
Dynamic Cryptographic Hash Functions
Advisor: S. S. Wagstaff
Employer: Pikewerks; Madison, Alabama

Nikolai Alexeevich Svakhin
Development and Application of Volume Illustration Techniques for Medical Illustration and Flow Visualization
Advisor: D. S. Ebert
Employer: Adobe systems; San Jose, California
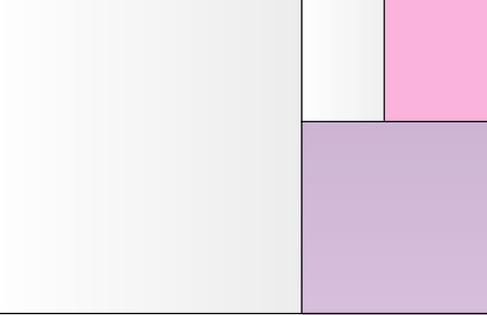
Fijoy George Vadakkumpadan
Computational Methods for Mapping the Human Cerebral Cortex
Advisor: Y. Sun
Employer: Johns Hopkins University; Baltimore, Maryland

Xiaopeng Xiong
Scalability in Spatio-Temporal Data Management Systems
Advisor: A. G. Aref
Employer: IBM; San Jose, California

Huiying Xu
Modeling of Light Reflection, Transmission, and Subsurface Scattering for Realistic Image Synthesis
Advisor: Y. Sun
Employer: Purdue University; West Lafayette, Indiana

August 2007

Marina Valeryevna Blanton
Key Management in Hierarchical Access Control Systems
Advisor: M. J. Atallah
Employer: University of Notre Dame; South Bend, Indiana

Deepak Rao Bobbarjung
Improving the Performance of Highly Reliable Storage Systems
Advisor: S. Jagannathan
Employer: VMware; Palo Alto, California

Ahmet Burak Can
Trust and Anonymity in Peer-to-Peer Systems
Advisor: B. Bhargava
Employer: Hacettepe University; Ankara, Turkey

Paul Michael Ruth
Adaptive Virtual Distributed Environments for Shared Cyberinfrastructures
Advisor: D. Xu
Employer: University of Mississippi; Oxford, Mississippi

Mercan Karahan Topkara
Natural Language Watermarking
Advisors: M. J. Atallah and C. Nita-Rotaru
Employer: IBM, T. J. Watson Research Center; Hawthorne, New York

Umut Topkara
Information Security Applications of Natural Language Processing Techniques
Advisor: M. J. Atallah
Employer: Carnegie Mellon University; Pittsburgh, Pennsylvania

Yi-Cheng Tu
Quality-Aware Adaptation in Database Systems
Advisor: S. K. Prabhakar
Employer: University of South Florida; Tampa, Florida

Yan Wu
Energy Management in Sensor Networks for Continuous Monitoring Applications
Advisors: S. Fahmy,S and N. B. Schoff
Employer: Microsoft Corporation; Redmond, Washington

GUEST SPEAKERS

DATE	SPEAKER/ AFFILIATION	TALK TITLE
8/31/06	Peter Shier, PhD; Microsoft	Windows Drivers and the Quality Challenge
9/5/06	Prof. Romain Boichat; Swiss Federal Institutes of Technology in Lausanne (EPFL)	Consensus in Asynchronous Distributed Systems with Crash-recovery Failures
9/11/06	Prof. James Demmel; University of California, Berkeley	The Future of LAPACK and ScaLAPACK
9/25/06	Prof. Jennifer Rexford; Princeton University	Stable Internet Routing Without Global Coordination
9/26/06	Prof. Lawrence Landweber; University of Wisconsin, Madison	GENI: The Global Environment for Networking Innovations
10/2/06	Prof. Sergio Verdu; Princeton University	Information Theory Today
10/04/06	Tim Bell, PhD; University of Canterbury	CS Unplugged
10/12/06	Nick Weaver, PhD; International Computer Science Institute, Berkeley	Toward HardLANs: Scaling IDS to 1 Gbps and Beyond
10/16/06	Rich LeHoucq, PhD; Sandia Lab	Connections Between Domain Decomposition and Atomistic-to-Continuum (AtC) Coupling
10/19/06	Sandeep Singhal, PhD; Microsoft	P2P and Collaboration Technologies
10/23/06	Prof. Arnold Rosenberg; University of Massachusetts, Amherst	A New Scheduling Paradigm for Internet-Based Computing
10/27/06	Prof. Marc Snir; University of Illinois, Urbana-Champaign	Parallel Programming Models and Languages
10/30/06	Prof. Jehoshua Bruck; California Institute of Technology	The Logic of Biological Networks
11/2/06	Barbara Simons, PhD; ACM US Public Policy Committee	Electronic Voting Machines: Who is Counting Your Vote?
11/13/06	Prof. Ben Schumacher; Kenyon College	What is Information? Insights from Quantum Physics
11/17/06	Sudeb Basu; Applied Resources, Inc	Testing the Remote-Controlled Army Drone
11/20/06	Prof. Jack Dongarra; University of Tennessee	Supercomputers and Clusters and Grids, Oh My!
11/28/06	Prof. Emery Berger; University of Massachusetts	Exploiting Multiple Cores Now: Scalability and Reliability for Off-the-Shelf Software
11/30/06	Victor Bahl, PhD; Microsoft	Wireless Networks Work What's Next?
2/1/07	Douglas Comer, PhD; Cisco Systems	Lessons Learned From The Internet Project
2/8/07	Tapas Kanungo, PhD; IBM Almaden Research Center	Text Analysis Tools for Drug Discovery and Manufacturing
2/12/07	Prof. Ruy de Oliveira; CEFET-MT, Brazil	A Smart TCP Acknowledgment Approach for Multihop Wireless Networks
2/12/07	Prof. Nicholas C. Yannelis; University of Illinois, Urbana Champaign	Contracts Under Asymmetric Information
2/19/07	Matthew Caesar; University of California, Berkeley	Identity-Based Routing
2/20/07	Prof. Ed Reingold; Illinois Institute of Technology	Determining Plurality
2/26/07	Prof. Andrew Barron; Yale University	The Interplay of Information Theory, Probability, and Statistics
2/26/07	Vinod Ganapathy; University of Wisconsin, Madison	Retrofitting Legacy Code for Security
2/28/07	Chad Myers; Princeton University	Inferring Biological Networks from Diverse Genomic Data
3/1/07	Prof. David Padua; University of Illinois, Urbana Champaign	Multicores and Program Optimization

3/7/07	Edmund Nightingale; University of Michigan	Improving the Performance of Highly Reliable Software Systems
3/8/07	Yuan (Alan) Qi, PhD; Massachusetts Institute of Technology	Bayesian Learning for Deciphering Gene Regulation
3/19/07	Prof. Jun Sakuma; Tokyo Institute of Technology	Privacy-Preserving Combinatorial Optimization and Clustering
3/19/07	Martin Isenburg, PhD; University of California, Berkeley	Streaming Geometry Processing
3/27/07	Bianca Schroeder, PhD; Carnegie Mellon University	From Web Servers to Databases to Storage Systems: A Methodological Approach to System Design
3/29/07	Chen-Hsiang Yeang, PhD; University of California, Santa Cruz	Computational Methods for Reconstructing Biomolecular Systems and Studying Their Evolution
4/3/07	Prof. H V Jagadish; University of Michigan	Making Database Systems Usable
4/4/07	Vivek Kwatra, PhD; University of North Carolina, Chapel Hill	Spatio-Temporal Textural Modeling for Data-Driven Synthesis and Visualization
4/5/07	Genevieve Bell, PhD; Intel Corporation	Just like Magic: Anthropological Accounts of Wireless Technology
4/6/07	William Nylin, PhD; Conn's, Incorporated	From Vacuum Tubes to Plasma TV's: Five Decades of Change
4/6/07	Prof. Yongdae Kim; University of Minnesota, Twin Cities	Securing Peer-to-Peer Systems
4/9/07	Rajiv Chakravorty; University of Cambridge	Two Systems to (Fundamentally) Restructure Wide-Area Wireless Services
4/10/07	Joel Goergen; Force10	Network Industry Updates--A Force10 Perspective
4/11/07	Nilesh Dalvi; University of Washington	Managing Uncertainty Using Probabilistic Databases
4/11/07	Shuo Chen, PhD; Microsoft	Browser Security: A New Research Territory
4/12/07	Niklas Elmqvist, PhD; Chalmers University of Technology	3D Occlusion Management — Challenges and Techniques
4/16/07	Prof. Madku Sudan; Massachusetts Institute of Technology, Computer Science and Artificial Intelligence Laboratory	Towards Universal Semantic Communication
4/17/07	Xavier Tricoche, PhD; University of Utah	Extraction of Salient Structures for Analysis and Visualization of Scientific Data
4/19/07	Ramana Kompella; University of California, San Diego	Automated Fault Localization and Measurement in Backbone Networks
4/24/07	Junfeng Yang; Stanford University	A Lightweight, General Approach to Finding Serious Storage System Errors
4/26/07	Caitlin Kelleher, PhD; Carnegie Mellon University	Storytelling Alice: Presenting Programming as a Means to the End of Storytelling
4/27/07	Radu Sion, PhD; Stony Brook University	Conditional E-Cash and a Few Thoughts for Graduate Students on Getting Research Jobs
4/30/07	Danny Z. Chen, PhD; University of Notre Dame	Computer-Assisted Therapeutical Planning for Radiation Cancer Treatment: Problems and Algorithms
5/7/07	Adri van Duin, PhD; California Institute of Technology	ReaxFF: A Fast, Transferable Computational Method for Atomistic-Scales Dynamical Simulations of Chemical Reactions
5/10/07	Mazin Yousif, PhD; Intel Corporation	Scale-Out Virtualization
6/18/07	Prof. John E Savage; Brown University	Addressing of Self-Assembled Nanoarrays
6/25/07	Matthias Hollick, PhD; Technische Universität Darmstadt, Germany	Vaccinating Ad hoc and Mesh Networks against Misbehaving Nodes
8/3/07	Selma Yilmaz, PhD; Cisco Systems	An Adaptive Management Approach to Resolving Policy Conflicts
8/7/07	Yuri Bazilevs, PhD; University of Texas, Austin	Isogeometric Analysis: Using Elements of Computational Geometry to Perform Computational Analysis of Engineering Systems

DEVELOPMENT HIGHLIGHTS

Harris Corporation Classroom Dedicated

On September 10, 2007, Professor and Head, Aditya Mathur recognized Harris Corporation for a significant gift to the CS Corporate Partners Program (CPP), by celebrating the dedication of The Harris Corporation Classroom in the Lawson Computer Science Building. Harris Corporation, an international communications and information technology company, has been a visible and vital member of the CPP for several years. With this major gift, Harris became recognized as a Premier Level Corporate Partner.

Lawson CS Building Naming Opportunities Still Available

September 15, 2007, marked the one year anniversary of the official opening and dedication of the Richard and Patricia Lawson Computer Science Building. Construction of the 100,000 square foot, $20 million building started in October 2004 and was funded through $13 million from the state of Indiana and $7 million raised from 289 private donors. The department raised additional funds from new naming opportunities in the Lawson Building. Key strategic rooms/facilities are still available for naming opportunities ($10-300K range) from individual or corporate donors. Please contact Tony Vidmar, Director of Development, for more information (tvidmar@purdue.edu).

Campaign for Purdue surpasses goal, raises $1.7 billion

On June 30, 2007 Purdue University officials announced that more than $1.7 billion had been raised from nearly 184,000 donors at the conclusion of the seven-year Campaign for Purdue fundraising, surpassing the $1.5 billion goal. More than 105,000 Purdue alumni made gifts to the campaign, which is almost 30 percent of Purdue's total alumni population. Of the gifts, 206 were of $1 million or more, and 111,850 gifts were less than $100.

Computer Science Excellence Fund: An Excellent Gift Opportunity at Any Level

An unrestricted gift to the Computer Science Excellence Fund represents one of the most strategic funding sources for the department. The gift can be allocated to the most pressing needs facing the department, and the percentage of alumni who give to a department is a metric often requested when seeking foundation and/or corporate gifts. The department has seen increased giving to this fund, and is seeking more alumni and friends to invest in the department through this vehicle. To donate to the Computer Science Excellence Fund, please see the reply envelope inserted in this report, or give online at the link: https://awc.alumni.purdue.edu/ud_b1_handoff1.asp.

K–12 Outreach

The main purpose of the Department of Computer Science K–12 Outreach Program is to promote scientific literacy and stimulate interest in computer science among students in the K–12 school systems. Visits to K–12 schools include presentations, workshops, and teacher consultations.

A secondary goal of our program is to inspire educators by equipping them with the confidence they need so they may incorporate the use of technology and computer science concepts into their classrooms on a daily basis. This goal is achieved mainly through professional development seminars as well as statewide conference presentations.

A new outreach initiative is the ROCS- Reaching Out for Computer Science presentation group. This group is composed of undergraduate and graduate students passionate about computer science. Purdue undergraduate students in this service-learning program receive course credit. Students travel to high schools and middle schools to give the interactive presentation.

A mainstay of the Computer Science Outreach Program is the annual Summer Camps for Middle School students. There are Beginner and Advanced Level Camps. Additionally, former campers

are invited to participate in a Junior Counselor program. Another expansion of the K-12 Outreach Program is a summer workshop for Mathematics teachers. The goal of the workshop, called "Linking Mathematics and Computer Science" is to show these teachers how topics in the mathematics curriculum relate naturally to many concepts in computer science. Thus far in 2007, more than 4500 teachers, students, or community members have learned about our outreach programs and over 1600 have participated in departmental K-12 outreach events.

Corporate Partners

The Corporate Partners Program (CPP) was launched to foster close communication between the Department of Computer Science and private industry in the context of a mutually beneficial relationship. The department enjoys the benefit of financial contributions, nurturing experiences for our student, and faculty research collaboration with industry leaders. Members in our CPP reap the benefit of increased visibility, priority access to top students who may become future employees, and priority access to faculty who are experts in relevant technical fields.

Companies participate through strategic, unrestricted donations at tier levels and are involved in many core activities of the department. Company representatives take advantage of opportunities to speak in classes, sponsor student projects, and make significant contact with CS students and faculty. Members of the CPP include giants of the information technology industry, as well as smaller, specialized companies. Partner members represent Indiana-based companies and other outstanding firms nationwide. This diverse and dynamic membership provides CS students with exposure to a myriad of career opportunities across the United States.

The Corporate Partners meet twice each year to provide input and feedback to departmental and college leadership. Recent contributions of the council include assistance in revising the undergraduate and graduate curricula, suggestions regarding recruiting, retention and enrollment issues, collaborative efforts with faculty and student research, as well as alerting the department to industry areas of concern, such as global outsourcing.

Premier Corporate Partners

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DEVELOPMENT HIGHLIGHTS

Development of Private Support

With support from its alumni and friends, Purdue Computer Science competes for the best faculty, recruits top students, provides scholarships, supports research, and funds new program initiatives. The department is deeply grateful to these donors who made contributions and pledges in the 2006–07 academic year.

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The department provides high-quality computing facilities for use by computer science faculty, students, and administrative personnel. The facilities are operated by an outstanding technical staff who handle all aspects of installation, maintenance, and user assistance for a wide variety of hardware and software platforms. The staff includes a director, facilities manager, administrative assistant, network engineer, hardware engineer, six system administrators, and several student assistants.

General Facilities
General computing facilities are available for both administrative activities (such as the preparation of research reports and technical publications) and research needs that are not supported by other dedicated equipment. The main server systems are multiprocessors with large main memories and a total of over 60 TB of disk storage. Personal workstations and laptops from a variety of vendors are used by faculty, staff, and students throughout the department.

Educational Facilities
The department operates nine instructional laboratories in two buildings and include over 220 Intel- and Sun SPARC-based workstations. Supported operating systems include Windows XP, Linux, Solaris x86, and Solaris SPARC. A later section lists equipment owned and maintained by ITaP but used by computer science students.

I/O Equipment
The department operates both special-purpose output devices as well as general output equipment, including more than 75 laser printers, color printers, color scanners, copiers, video projectors, digital video editing capabilities, and phone and video conferencing equipment.

Networking Services
The department is strongly committed to state-of-the-art networking technology to provide access to and communication among its systems, as well as to those elsewhere on campus and throughout the world. Our departmental infrastructure supports gigabit per second data rates to the desktop throughout our two buildings using over 65 Ethernet VLAN-capable switches from Force10 and Cisco Systems. Wiring in the new Lawson Computer Science Building is based on Panduit augmented CAT6 data cable and patch panels, capable of 10 gigabit per second speeds. This network infrastructure is bi-connected to the campus backbone by two 1 gigabit per second redundant fiber links. The campus is connected to multiple high speed Internet backbones, including Abilene/Internet2 and I-Light. DSL, cable, and cellular data services are widely used for remote access.

Information Technology at Purdue (ITaP)
In addition to the facilities described above, students and faculty have access to computing systems owned and operated by ITaP. General instructional facilities operated by ITaP include large Sun SPARC servers and several Sun and Intel workstation laboratories. Departmental research projects make use of other facilities provided by ITaP, including a large IBM SP cluster and the Envision Center for Data Perceptualization.

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