

DEPARTMENT OF COMPUTER SCIENCES

*2002-03
Annual Report*



PURDUE
UNIVERSITY

MESSAGE FROM THE HEAD

SUSANNE E. HAMBRUSCH



For Purdue Computer Science, 2002-03 was a year of celebration of special milestones and of people and their accomplishments!

Many of you know that the first degree-program in computer science was founded at Purdue in 1962-63. On March 28, 2003, the department celebrated its 40th anniversary and its proud tradition of providing outstanding computer science education and fostering groundbreaking research. During a day-long symposium, distinguished guests, including founding dean Dr. Felix (Phil) Haas and alumni from around the world, came to campus to look back at the earliest days in the field and to make predictions on the future of information technology. In the evening, Purdue University President Martin Jischke hosted a gala anniversary dinner at which Indiana Governor Frank O'Bannon was keynote speaker. It was a marvelous day of intellectual inspiration, renewal of friendships, and formation of new bonds.

For the new academic year, we welcomed four outstanding new faculty members: Daniel Aliaga, Cristina Nita-Rotaru, Daisuke Kihara, and Ninghui Li. The research interests of these four assistant professors are described in the faculty section. Their hire brings the size of our department to 40 tenure-track faculty members. I am proud to report that our faculty continue to earn praise and reward for their achievements. Highlights include:

- Professors Chris Bailey-Kellogg and Sonia Fahmy were awarded the prestigious Career Awards by the National Science Foundation.
- Professor Gene Spafford was appointed to serve on President Bush's Information Technology Advisory Committee.
- Professor Chris Bailey-Kellogg received a 2003 Showalter Grant Award.
- Professor Wojciech Szpankowski was named a Fellow of the IEEE.
- Professors Bharat Bhargava and Gene Spafford were inducted into Purdue's Book of Great Teachers.
- Professor Doug Comer was selected as a Fellow of the Purdue Teaching Academy.
- Professor Tony Hosking and Dr. Gustavo Rodriguez-Rivera were selected as two of the Top 10 Outstanding Teachers in the School of Science.

Our enrollment followed the national trend and experienced a slight decrease. We are pleased, though, that our entering students have even higher standardized test scores — and smaller classes improve the quality education we can provide our students. In fall 2003, we had 221 freshmen and 747 total undergraduate majors. Among our 174 graduate students, we currently have a near record high 61 Ph.D. students. The department awarded 167 B.S., 62 M.S., and 8 Ph.D. degrees in 2002-03.

All of Purdue helped celebrate the completion of the campaign to raise \$20 million for a new Computer Science building. Groundbreaking is scheduled for 2004 and we will open doors to students in fall 2006. Several leadership gifts, including an anonymous contribution of \$4.7 million, were instrumental in bringing fundraising for the building to a close this year. At a ceremony on the stage of Elliott Hall of Music, President Jischke recognized the generosity of the State of Indiana and many alumni and friends who made the dream of a new facility come true. He introduced Mrs. Heddy Kurz, whose \$2 million commitment put the campaign over the top, and took the audience on a virtual tour of the department's new home.

Our research expenditures for 2002-03 exceeded \$7 million, with the National Science Foundation providing the largest source of research support. Financial support from individuals and from corporate partners continues to strengthen and grow. You will find a complete list of 2002-03 donors beginning on page 7. The department presented \$265,000 in merit scholarships to new and continuing students at the April 2003 awards banquet.

As you look through this annual report, I think you will agree that Purdue Computer Science had many reasons to celebrate during the past year. I am honored to lead this extraordinary department.

Susanne Hambruch

Professor and Department Head

P.S. To order a boxed DVD set of the 40th anniversary celebration or a DVD of the campaign completion celebration, please send e-mail to annual-report@cs.purdue.edu.

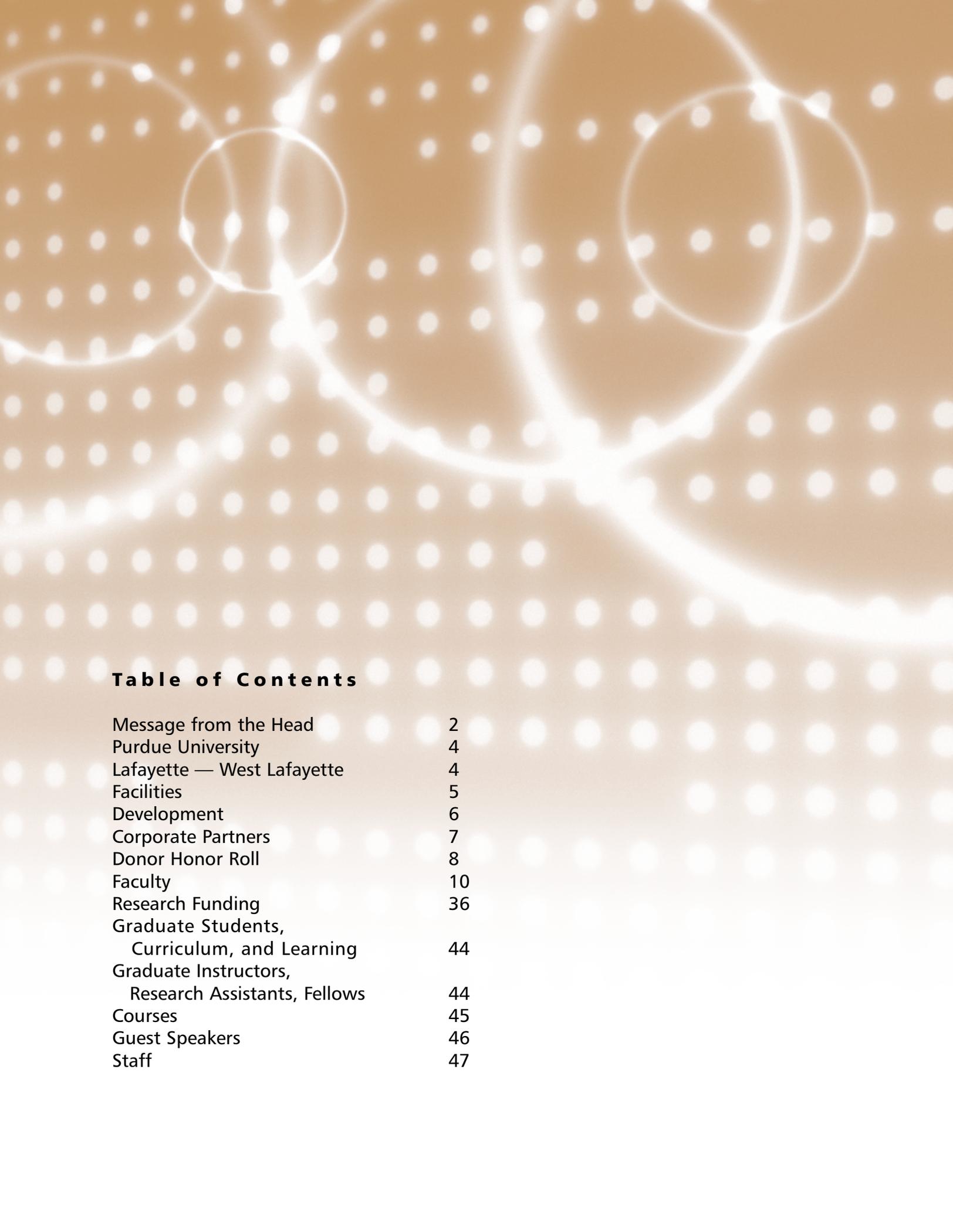


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PURDUE UNIVERSITY

Founded in 1869 as Indiana's land-grant university, Purdue is a public, doctoral-granting research university with just over 38,000 students on its West Lafayette campus, choosing from more than 5,300 courses in more than 350 specializations. Students come from 50 states and 136 countries. Purdue enrolls more international students than any public university in the United States.

Purdue's research and learning environment is a birthplace of great ideas and accomplishments where faculty and students discover together, push the boundaries of knowledge, and make significant contributions to virtually every aspect of contemporary life.

Extensive library, computing, and laboratory resources support the robust research and learning setting and provide multiple opportunities to explore interests and develop skills.

More than 325,000 living alumni are graduates of one of the University's highly regarded 10 schools — Science, Engineering, Management, Pharmacy, Nursing, Consumer and Family Sciences, Liberal Arts, Agriculture, Veterinary Medicine, and Technology — and are making a difference each day in myriad fields.

For more information, visit www.purdue.edu.



LAFAYETTE-WEST LAFAYETTE

The home of Purdue, Greater Lafayette is a friendly, spirited community located on Interstate 65, 150 miles southwest of Chicago and 65 miles northwest of Indianapolis. West Lafayette and Lafayette, situated along the scenic Wabash River in Tippecanoe County, are home to a total population of just over 150,000 people who enjoy a strong economic base; historic architecture; excellent schools; well-maintained parks, biking, and hiking trails; and several fine restaurants. The local arts scene, including performances by international artists presented throughout the year at Purdue, is thriving. Residents enjoy the changes of four seasons with an average mean temperature in January of 23 degrees and 73 degrees in July.

For more information, visit www.lafayette-in.com.

COMPUTER SCIENCES FACILITIES

The department is dedicated to providing high-quality computing facilities for use by computer science faculty, students, and administrative personnel. The facilities are operated by a technical staff who are not only responsible for the installation and maintenance of the systems, but who also assist faculty and students in the development of software systems for research projects. The staff includes a director, facilities manager, administrative assistant, one network engineer, one 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 systems each have 512 MB to 4 GB of main memory and a total of over 500 GB of disk storage. All faculty and many graduate students have a Sun, Intel, or Apple (Mac) workstation on their desk.

Educational Facilities

Computing systems used by students enrolled in both undergraduate and graduate computer science courses include over 100 Intel PCs running either Sun Solaris x86 or Windows XP. CS also offers over 60 Sun workstations for courses running Solaris Sparc OS. Four rooms in the Computer Science Building, two rooms in the Physics Building and a room in the Recitation Building are dedicated to laboratory-based instruction using these facilities. A later section lists equipment owned and maintained by ITaP but used by computer science students.

I/O Equipment

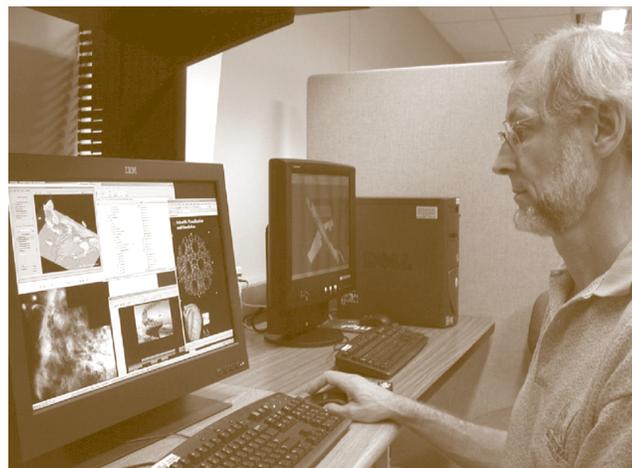
The department operates special-purpose output devices as well as general output equipment, including about 75 laser printers, color printers, color scanners, video projectors, digital video editing capabilities, and video conferencing equipment.

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. Over 60 100 Mbps and 1000 Mbps Ethernet switches installed in the Computer Science Building connect the workstations to the departmental computing facilities. Experimental wireless networks and production wireless networks are also used in the building. A dual gigabit link connects departmental systems to other systems on campus, as well as to the Internet community via both "commodity" and Internet2/Abilene connections. ADSL, 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. In addition, ITaP provides systems for use in courses taught by the department. These systems include UNIX-based Sun SPARC stations for undergraduate computer science courses and Microsoft Windows-based Intel personal computers for use in an introductory course for non-majors (CS 110). Departmental research projects make use of other facilities provided by ITaP, including a large IBM SP cluster.



Chris Hoffmann examines a visualization on an IBM flat panel 9 million pixel display.

DEVELOPMENT

The Building Campaign: A New Home for Computer Science at Purdue

In 2003, Purdue and the Department of Computer Science celebrated the completion of the campaign to raise \$20 million to build a new facility for CS.

With gifts topping \$7 million from alumni and corporate and foundation friends, and an allocation from the State of Indiana of \$13 million, the goal was reached and exceeded. Groundbreaking for this beautiful, state-of-the-art facility will take place in 2004 and doors will open in time for classes in fall 2006. The site of the new building will be on the northwest corner of Third and University streets on the main campus with a beautiful view of the Bell Tower and Engineering Mall to the east. It will be situated diagonally across University Street from the current CS building.

The impact of the new building on Purdue's quest to become a Top 10 program in computer science will be immediate.

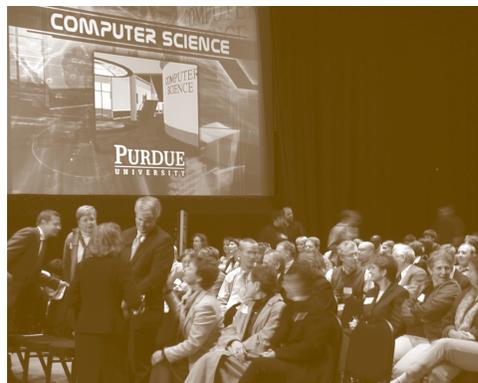
- In its new home, CS will be a magnet for the world's brilliant minds in the field and achieve a competitive advantage in faculty growth.
- Outstanding students will follow great faculty to Purdue. The exterior of the new building will be stunning; and the thoughtful, people-friendly interior design that, among other features, includes break-out rooms, comfortable conversation areas, and upscale food service, will help attract the best and brightest students.
- Working in teams, students in the new building will be taught more often by faculty and less often by teaching assistants. There will be space and equipment for additional research projects for undergraduates as well as graduate students.
- Students will take coursework in smaller classrooms with the most technologically advanced equipment
- The new building will include a well-designed and fully equipped room intended to host university gatherings, corporate meetings, and academic conferences, one of the features that will help Purdue attain the preeminent, multidisciplinary environment it is striving to achieve.



An exterior view of the new Computer Sciences building created by a team of CS faculty and students.



A stop on the virtual tour of the new Computer Sciences building – the Herman and Hedy Kurz lobby.



Purdue celebrates the completion of the new Computer Sciences building campaign.



Purdue President Martin Jischke and Mrs. Hedy Kurz take the virtual tour.

Corporate Partners Program

The Corporate Partners Program (CPP) is a program encouraging corporate involvement in the Department of Computer Sciences.

Companies, which participate at membership tiers by making unrestricted donations, are involved in the everyday activity of the department. Company representatives have opportunities to speak in classes, sponsor student projects, and otherwise make contact with CS students and faculty. Members of the CPP include giants of the IT industry as well as smaller, specialized companies. Partner members represent companies in Indiana as well as across the United States. The diverse membership offers information and guidance about the vast career opportunities available to computer science students.

The Corporate Partners meet twice each year to provide input and feedback to departmental and school leadership. Recent contributions of the council include assistance in revising the undergraduate and graduate curriculums, ideas regarding 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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 State Farm Insurance Companies – Luke Wellman



Corporate partners and CS faculty enjoy the view in the new Ross-Ade Stadium.



Dick Schubert, VP Engineering — Lockheed Martin, visits with CS students Carlie Bower, Sarah Shoup, and Alex Thaman.

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 2002-03 academic year.

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Shreeram S. Abhyankar

Marshall Distinguished Professor of Mathematics
Professor of Computer Science and Industrial Engineering (1988)

B.Sc., Bombay, 1951
A.M., Harvard, 1952
Ph.D., 1955

Professor Abhyankar is a fellow of the Indian Academy of Science and an editorial board member of the *Indian Journal of Pure and Applied Mathematics*. He has won numerous awards and honors. Before coming to Purdue, he was an associate professor of mathematics at Johns Hopkins University and came to Purdue as a full professor. In 1967, he was appointed the Marshall Distinguished Professor of Mathematics.

His research areas of interest have included algebraic geometry, commutative algebra, local algebra, theory of functions of several complex variables, quantum electrodynamics, circuit theory, invariant theory, combinatorics, computer aided design, and robotics. His current research is in the area of computational geometry and algorithmic algebraic geometry.



Daniel G. Aliaga

Assistant Professor of Computer Science (2003)

B.S., Computer Science, Brown University, 1991
M.S., Computer Science, University of North Carolina at Chapel Hill, 1993
Ph.D., Computer Science, University of North Carolina at Chapel Hill, 1999

Dr. 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. Dr. Aliaga's work into this general problem overlaps with several fields, including:

- computer graphics
- computer vision
- robotics
- data compression
- system building

Over the years, Dr. Aliaga has developed and published several new algorithms for interactively rendering massive geometrical models, recreating complex 3D 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.

Dr. Aliaga has been a department coordinator for two Bell Labs scholarship programs, an organizer for a NSF-sponsored Science and Technology Student Collaboration Conference, a Brown University Faculty-Student Liaison, and invited speaker and guest lecturer at several institutions. Furthermore, he is a frequent reviewer of numerous ACM, IEEE, Eurographics, and NSF conferences and panels.

Selected Publications:

- Daniel G. Aliaga, Dimah Yanovsky, Thomas Funkhouser and Ingrid Carlbom, "Interactive Image-Based Rendering Using Feature Globalization", Proceedings of ACM Symposium on Interactive 3D Graphics, April, 2003.
- Daniel G. Aliaga and Ingrid Carlbom, "Plenoptic Stitching: A Scalable Method for Reconstructing 3D Interactive Walkthroughs", Proceedings of ACM SIGGRAPH, pp. 443-450, 2001.
- Daniel G. Aliaga and Anselmo Lastra, "Automatic Image Placement to Provide a Guaranteed Frame Rate", Proceedings of ACM SIGGRAPH, pp. 307-316, 1999.



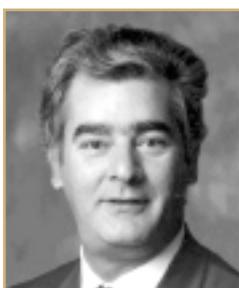
David C. Anderson

Professor of Mechanical Engineering (1975)
Professor of Computer Science

Ph.D., Purdue University, 1974

Professor Anderson conducts research and teaches in the areas of computer-aided design, computer graphics and mechanical engineering design. His research focuses on problems in intelligent manufacturing systems, computer-aided engineering, design environments, high level shape representation, geometric modeling, and geometric reasoning.

He is currently deputy director and co-principal investigator of the National Science Foundation Engineering Research Center (ERC) for Collaborative Manufacturing, and chairman of the Mechanical Engineering Design Area. He is a member of the editorial boards of the *Journal of Research in Engineering Design* and the *Journal of Design and Manufacturing*. Dr. Anderson is a Fellow of the ASME.



Alberto Apostolico

Professor of Computer Science (1984)

Dr. Engineering, Electronic Engineering, University of Naples, 1973

Dipl. Perf., Computer Science, University of Salerno, 1976

Professor Apostolico's research interests are in the areas of algorithmic analysis and design and applications. His recent work deals with algorithms and data structures for combinatorial pattern matching and discovery problems as arising in text editing, data compression, picture processing, biomolecular sequence analysis, etc. He is a co-editor (with Z. Galil) of the books *Combinatorial Algorithms on Words* (Springer-Verlag) and *Pattern Matching Algorithms* (Oxford Univ.Press), serves on the editorial boards of *Parallel Processing Letters*, *Theoretical Computer Science*, *Journal of Computational Biology*, *Chaos Theory and Applications*, *Springer-Verlag Lecture Notes on Bioinformatics*, and was guest editor for a special issue of *Algorithmica* on string algorithms and their applications.

He also serves on the steering committee of the International Symposia on Combinatorial Pattern Matching, the proceedings of which he co-edited in 1993, 1994, 1997, and 2002, and of the International Conferences on Discovery Science, and was on the executive committees of the Fibonacci Institute for the Foundations of Computer Science and of the MSE Program in Software Engineering. He has served on the program committees of many international conferences, most recently, Research in Computational Biology (RECOMB), Workshop on Algorithms in Bioinformatics (WABI), IEEE Data Compression Conference, String Processing and Information Retrieval (SPIRE), Workshop on Algorithms and Data Structures (WADS), Combinatorial Pattern Matching (CPM), among others, and as an invited speaker at numerous international conferences and advanced research schools.

In his career, Professor Apostolico has also held appointments at Italian universities and spent extended stages at several other institutions, including C-MU, UIUC, Rensselaer Poly, U. of London, U. of Paris, IBM T.J. Watson, Renyi Institute, ZiF-Bielefeld. He has been the (co-)recipient of U.S. (Air Force, NIH, NSF, IBM), British, French, Italian, collaborative (Israel, Korea, Japan), and international (Fulbright, NATO, ESPRIT) research grants.

Selected Publications:

- A. Apostolico, M.E. Bock, and S. Lonardi, "Monotony of Surprise and Large Scale Quest for Unusual Words", *Journal of Computational Biology*, Vol. 10, No. 3-4, pages 283-311, 2003.
- A. Apostolico, "Pattern Discovery and the Algorithmics of Surprise (Invited Paper)", *Artificial Intelligence and Heuristic Methods for Bioinformatics*, (P. Frasconi and R. Shamir, eds.) IOS Press, pages 111-127, 2003.
- A. Apostolico and M. Crochemore, "String Pattern Matching for a Deluge Survival Kit (Invited Paper)", *Handbook of Massive Data Sets*, (J. Abello et al, eds.).



Walid G. Aref

Associate Professor of Computer Science (1999)

Ph.D., University of Maryland at College Park, 1993

Professor Aref's research interests are in developing database technologies for emerging applications, e.g., spatial, multimedia, genomics, 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 NSF, Purdue Research Foundation, CERIAS, Panasonic, and Microsoft Corp. In 2001, he received the CAREER Award from the National Science Foundation.

Professor Aref is on the editorial board of the *VLDB Journal* and is a member of the ACM and the IEEE.

Selected Publications:

- M. A. Hammad, M. J. Franklin, W. G. Aref, and A. K. Elmagarmid, "Scheduling For Shared Window Joins Over Data Streams", *VLDB* 2003.
- M. F. Mokbel, T. M. Ghanem, and W. G. Aref, "Spatio-temporal Access Methods", *IEEE Data Engineering Bulletin*, 26(2), 40-49, June 2003.
- W. G. Aref and I. F. Ilyas, "SP-GiST: An Extensible Database Index for Supporting Space Partitioning Trees", *Journal of Intelligent Information Systems, Special Issue on Scientific and Statistical Database Management*. Vol. 17, Num. 2/3, pp. 215 — 240, November 2001.



Mikhail Atallah

Professor of Computer Science (1982)

Ph.D., The Johns Hopkins University, 1982

Professor Atallah's current research interests are in information security (in particular, software security, secure protocols, and watermarking). He received a Presidential Young Investigator Award from the National Science Foundation in 1985. A Fellow of the IEEE, he has served on the editorial boards of *SIAM Journal on Computing*, *IEEE Transactions on Computers*, *Journal of Parallel and Distributed Computing*, *Information Processing Letters*, *Computational Geometry: Theory &*

Applications, *International Journal of Computational Geometry & Applications*, *Parallel Processing Letters*, *Methods of Logic in Computer Science*. He was guest editor for a special issue of *Algorithmica* on computational geometry, has served as editor of the *Handbook of Parallel and Distributed Computing* (McGraw-Hill), as editorial advisor for the *Handbook of Computer Science and Engineering*, (CRC Press), and as editor-in-chief for *Handbook of Algorithms and Theory of Computation* (CRC Press). He was selected to serve on the program committees of various conferences and workshops (including ACM Symposium on Computational Geometry, SIAM Symposium on Discrete Algorithms, Workshop on Algorithms and Data Structures, IEEE Symposium on Parallel and Distributed Processing, IEEE International Parallel Processing Symposium, International Symposium on Algorithms and Computation, and many others). He was keynote and invited speaker at many national and international meetings. In June 2001 he co-founded Arxan Technologies Inc., a startup in the software security products space that in 2002 secured funding from a top-tier venture capital firm.

Selected Publications:

- M.J. Atallah and W. Wu, "Secure Multi-Party Computational Geometry", *Lecture Notes in Computer Science*, 2125, Springer Verlag, Proceedings Workshop on Algorithms and Data Structures, Providence, Rhode Island, pages 165-179, August 2001.
- M.J. Atallah, Victor Raskin, Christoph Hempelmann, Mercan Karahan, Umut Topkara, Katerina Triezenberg, and Radu Sion, "Natural Language Watermarking and Tamperproofing", *Proc. 5th International Information Hiding Workshop*, Noordwijkerhout, The Netherlands, October 2002.
- H. Chang and M.J. Atallah, "Protecting Software Code by Guards", *Proc. ACM Workshop on Security and Privacy in Digital Rights Management*, Philadelphia, Pennsylvania, November 2001.



Chris Bailey-Kellogg

Assistant Professor of Computer Science (2001)

B.S., Electrical Engineering and Computer Science, Massachusetts Institute of Technology, 1993
 M.S., Electrical Engineering and Computer Science, Massachusetts Institute of Technology, 1993
 Ph.D., Computer and Information Science, Ohio State University, 1999

Chris Bailey-Kellogg's research focuses on intelligent systems in computational science and engineering. In the area of computational biology, he is pursuing a mixed computational-experimental approach to the structural and functional understanding of and control over the molecular machinery of the cell. He is developing algorithms and systems to automatically plan experiments, predict outcomes, interpret data, revise models, and so forth. In the area of qualitative reasoning about physical systems, he is focusing on analysis of spatially distributed data, for example, in phase portrait representations and for decentralized control design. He is developing and applying a general framework that navigates a hierarchy from input data to abstract description and back, using a mixture of numeric, symbolic, and geometric reasoning.

Selected Publications:

- C. Bailey-Kellogg and F. Zhao, "Influence-based Model Decomposition", *Artificial Intelligence*, 130(2):125-166, 2001.
- C. Bailey-Kellogg, J.J. Kelley III, C. Stein, and B.R. Donald, "Reducing Mass Degeneracy in SAR by MS (Structure-activity Relation by Mass Spectrometry) by Stable Isotopic Labeling", *Journal of Computational Biology*, 8(1):19-36, 2001.
- F. Zhao, C. Bailey-Kellogg, and M. Fromherz, "Physics-based encapsulation in embedded software for distributed sensing and control applications", *Proceedings of the IEEE*, 91(1):40-63, 2003.



Bharat Bhargava

Professor of Computer Science (1984)

Professor of Electrical and Computer Engineering (Courtesy)

Ph.D., Electrical Engineering, Purdue University, 1984

Professor Bhargava is conducting research in security issues in mobile and ad hoc networks. 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. Applications in e-commerce and transportation security are being tested in a prototype system. He has proposed schemes to identify vulnerabilities in systems and networks, and assess threats to large organizations. He has developed techniques to avoid threats that can lead to operational failures. The research has direct impact on nuclear waste transport, bio-security, disaster management, and homeland security. These ideas and scientific principles are being applied to the building of peer-to-peer systems, cellular assisted mobile ad hoc networks, and to the monitoring of QoS-enabled network domains. He serves on the editorial boards of five international journals.

His research group consists of nine Ph.D. students and two post-docs. He has six NSF funded projects. In addition, DARPA, IBM, Motorola, and CISCO are providing contracts and gift funds.

Professor Bhargava was the chairman of the IEEE Symposium on Reliable and Distributed Systems held at Purdue in October 1998. In the 1988 IEEE Data Engineering Conference, he and John Riedl received the best paper award for their work on "A Model for Adaptable Systems for Transaction Processing."

Professor Bhargava is a Fellow of the Institute of Electrical and Electronics Engineers and of the Institute of Electronics and Telecommunication Engineers. 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. 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. In 2003, he was inducted into Purdue's Book of Great Teachers.

Selected Publications:

- Bharat Bhargava, "Concurrency Control in Database Systems", IEEE Transactions on Knowledge and Data Engineering (TKDE), Vol. 11, No. 1, pages 3-16, January 1999.
- Bharat Bhargava and John Riedl, "A Model for Adaptable Systems for Transaction Processing", IEEE Transactions on Knowledge and Data Engineering (TKDE), Vol. 1, No. 4, pages 433-449, August 1989.
- Bharat Bhargava and Melli Annamalai, "A Communication Framework for Digital Libraries", Multimedia Systems and Applications, Vol. 10, No.2/3, pages 205-236, April 2000.

**Christopher W. Clifton**

Associate Professor of Computer Science (2001)

B.S., Computer Science and Engineering, Massachusetts Institute of Technology, 1986
 M.S., Electrical Engineering and Computer Science, Massachusetts Institute of Technology, 1986
 M.A., Computer Science, Princeton, 1988
 Ph.D., Computer Science, Princeton, 1991

Dr. 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.

Prior to joining Purdue, Dr. Clifton was a principal scientist in the Information Technology Division at the MITRE Corporation. Before joining MITRE in 1995, he was an assistant professor of computer science at Northwestern University.

Selected Publications:

- Chris Clifton, "Change Detection in Overhead Imagery using Neural Networks", International Journal of Applied Intelligence 18(2):215-234, Kluwer Academic Publishers, Dordrecht, The Netherlands, March 2003.
- Chris Clifton, "Using Sample Size to Limit Exposure to Data Mining", Journal of Computer Security, 8(4):281-307, IOS Press, November 2000.
- Jaideep Vaidya and Chris Clifton, "Privacy-Preserving K-Means Clustering over Vertically Partitioned Data", The Ninth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, Washington, D.C., August 24 - 27, 2003. Honorable Mention in Best Paper Competition.

**Douglas E. Comer**

Professor of Computer Science (1976)
 Professor Of Electrical And Computer Engineering

Ph.D., The Pennsylvania State University, 1976

Professor Comer is an internationally recognized expert on computer networking and the TCP/IP protocols. He has been working with TCP/IP and the Internet since the late 1970s. Comer established his reputation as 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 (the group of researchers who built the Internet).

Comer has created courses on TCP/IP and networking technologies for a variety of audiences, including in-depth courses for engineers and less technical courses for others; he continues to teach at various industries and networking conferences around the world. In addition, Comer consults for private industry on the design of corporate networks.

Professor Comer is well known for his series of groundbreaking textbooks on computer networks, the Internet, and computer operating systems. His books have been translated into 16 languages, and are widely used in both industry and academia. Comer's three-volume series *Internetworking With TCP/IP* is often cited as an authoritative reference for the Internet protocols. More significantly, Comer's texts have been used by 15 of the top 16 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. The performance of the resulting prototypes are then measured. The operating system and protocol software that has resulted from Comer's research has been used by industry in a variety of products.

For over 15 years, Professor Comer has served as North American editor of the research journal *Software-Practice and Experience*, which is published by John Wiley & Sons. Comer is a fellow of the ACM and the recipient of numerous teaching awards.



H. E. Dunsmore

Associate Professor of Computer Science (1978)

B.S., Mathematics and Physics, University of Tennessee, 1968

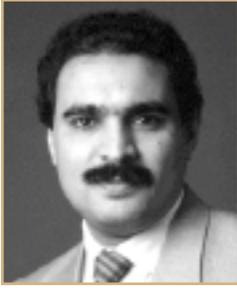
Ph.D., University of Maryland, 1978

Dr. Dunsmore's research areas include the Internet, the World-Wide Web, Web browsers, Web site design and implementation, software engineering, Java, C++, C, JavaScript, and Perl programming, cgi software, object-oriented design and programming, and information systems.

Dr. Dunsmore is the Information Systems convenor for the Global Studies Program in the Office of International Programs. He coordinates research concerning international issues related to the development and the use of Information Systems.

Dr. Dunsmore is a 1996 recipient of the Charles B. Murphy Outstanding Undergraduate Teacher Award for Purdue University. He was selected in 1998 as a member of the Purdue University chapter of Mortar Board (national honor society that recognizes college students and faculty for their achievements in scholarship, leadership, and service). He was nominated in 1998 by Purdue University for the Carnegie Foundation U.S. Professor of the Year program. He was chosen as a Founding Fellow of the Purdue University Teaching Academy in 1997. He was selected Outstanding Teacher in the School of Science at Purdue University in 1980. Dr. Dunsmore was selected one of the Top 10 Teachers in the School of Science in 1994, 1995, and 2000. He is a member of the Phi Beta Kappa and Upsilon Pi Epsilon (honor society for the computing sciences). On May 18, 2001, Dr. Dunsmore was selected as one of three Outstanding Indiana Information Technology Educators by the Indiana Information Technology Association (INITA).

Dr. Dunsmore has extensive legal and industrial consulting experience. He has written over 60 technical articles. 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)

B.S., Computer Science, University of Dayton, 1977

M.S., Computer and Information Science, Ohio State University, 1981

Ph.D., Computer and Information Science, Ohio State University, 1985

Professor Elmagarmid is the director of the Indiana Center for Database Systems and the Indiana Telemedicine Incubator. 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 editor of the book series on *Advances in Database Systems*. He has chaired and served on several program committees and served on several editorial boards.

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 has over 10 active grants from state and federal government agencies as well as several grants from industry.

Professor 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 owner of a recent patent on workflow database technology.

Selected Publications:

- J. Fan, M.-S. Hacid, A.K. Elmagarmid, and W.G. Aref, "Content-based Video Database Systems-Part I: Automatic Content Analysis Towards Compact Video Representation", *IEEE Transactions on Multimedia*, submitted, 2001.
- E. Bertino, J. Fan, E. Ferrari, M.-S. Hacid, and A.K. Elmagarmid, "A Hierarchical Access Control Model for Video Database", *ACM Transactions on Information Systems*, submitted by Professor Ferrari, 2001.
- J. Fan and A.K. Elmagarmid, "A Semi-Automatic Algorithm for Video Object Extraction and Temporal Tracking", *Signal Processing: Image Communication*, 17, 2002.



Sonia Fahmy

Assistant Professor of Computer Science (1999)

Ph.D., Computer and Information Science, The Ohio State University, 1999

Sonia Fahmy's research interests are in the design and evaluation of network architectures and protocols. She is currently investigating Internet tomography, overlay networks, network security, and wireless sensor networks. Her work is published in over 50 papers, including publications in *IEEE/ACM Transactions on Networking, Computer Networks, IEEE INFOCOM, IEEE ICNP*, and *ACM NOSSDAV*. She received the National Science Foundation CAREER award in 2003, the Schlumberger foundation technical merit award in 2000 and 2001, and the OSU presidential fellowship for dissertation research in 1998. She has been very active in the Traffic Management working group of the ATM Forum, and has participated in several IRTF and IETF working groups. Some of the results of her work were incorporated in 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 IEEE INFOCOM, ICNP, ICDCS, ICC, GLOBECOM, ICPP, Hot Interconnects, and IPCCC, and co-chaired the first SPIE conference on scalability and traffic control in IP networks in 2001. She is a member of the ACM, IEEE, Phi Kappa Phi, Sigma Xi, and Upsilon Pi Epsilon.

Selected Publications:

- S. Fahmy and M. Kwon, "Characterizing Overlay Multicast Networks", Proceedings of the IEEE International Conference on Network Protocols (ICNP), pp. 61-70, November 2003.
- S. Kalyanaraman, R. Jain, S. Fahmy, R. Goyal and B. Vandalore, "The ERICA Switch Algorithm for ABR Traffic Management in ATM Networks", IEEE/ACM Transactions on Networking, 8(1):87--98, February 2000.
- S. Fahmy, R. Jain, R. Goyal, B. Vandalore, and S. Kalyanaraman, "Design and Evaluation of Feedback Consolidation for ABR Point-to-Multipoint Connections in ATM Networks", Computer Communications, 25 July 1999, 22(12):1085-1103 (also appeared in IEEE INFOCOM 1998).



Greg N. Frederickson

Professor of Computer Science (1982)

A.B., Economics, Harvard University, 1969

M.S., Computer Science, University of Maryland, 1976

Ph.D., Computer Science, University of Maryland, 1977

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, on designing optimal algorithms for parametric search problems on trees, and on discovering graph decompositions that facilitate fast algorithms for shortest path problems. Professor 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 two books, *Dissections Plane & Fancy*, Cambridge University Press, 1997, and *Hinged Dissections: Swinging & Twisting*, Cambridge University Press, 2002.

Selected Publications:

- Greg N. Frederickson, "Ambivalent data structures for dynamic 2-edge-connectivity and k smallest spanning trees", *SIAM Journal on Computing*, Vol. 26, pp. 484-538, 1997.
- Greg N. Frederickson, "A data structure for dynamically maintaining rooted trees", *Journal of Algorithms*, Vol. 24, pp. 37-65, 1997.
- Greg N. Frederickson and Roberto Solis-Oba, "Increasing the weight of minimum spanning trees", *Journal of Algorithms*, Vol. 33, pp. 244-266, 1999.



Walter Gautschi

Professor Emeritus of Computer Science and Mathematics (1963)

Ph.D., Computer Science, University of Basel, 1953

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, the American University, the 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, has been 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", in *Acta Numerica* 1996, A. Iserles, Editor, Cambridge University Press, Cambridge, 1996, pp. 45-119.
- W. Gautschi, "The Incomplete Gamma Functions Since Tricomi", in *Tricomi's Ideas and Contemporary Applied Mathematics*, *Atti dei Convegni Lincei*, No. 147, Accademia Nazionale dei Lincei, Roma, 1998, pp. 203-237.
- W. Gautschi, "The Interplay Between Classical Analysis and (Numerical) Linear Algebra — a Tribute to Gene. H. Golub", *Electronic Transactions of Numerical Analysis*, 13, pp. 119-147, 2002.

**Ananth Grama**

Associate Professor of Computer Science (1996)

B.E., Computer Science and Technology, University of Roorkee, 1989

M.S., Computer Engineering, Wayne State University, 1990

Ph.D., Computer Science, University of Minnesota, 1996

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, fast algorithms for data compression and analysis.

Professor Grama has authored several papers and co-authored the textbook *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:

- Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar, "Introduction to Parallel Computing", Addison Wesley 2003.
- Sreekanth Sambavaram, Vivek Sarin, Ahmed Sameh, and Ananth Grama, "Multipole-Based Preconditioners for Large Sparse Linear Systems", *Parallel Computing*, Volume 29, Issue 9 (September 2003).
- Mehmet Koyuturk and Ananth Grama, "Proximus: A Framework for Analyzing Very High Dimensional Discrete-Attributed Datasets", *ACM SIGKDD*, 2003.

**Susanne E. Hambrusch**

Department Head

Professor of Computer Science (1982)

M.S., Computer Science, Technical University of Vienna, 1977

Ph.D., Computer Science, The Pennsylvania State University, 1982

Professor Hambrusch's research interests are in the area of parallel and distributed computation, data management and data dissemination in wireless environments, and analysis of algorithms. Her research contributions include parallel algorithms for image processing and graph problems, communication and data dissemination routines for distributed applications, and data management techniques for query processing in wireless, mobile environments. Professor Hambrusch's research has been supported by NSF, ONR, DARPA, DoE, and Microsoft Corp.

Professor Hambrusch is a member of the editorial boards of *Parallel Computing* and *Information Processing Letters* and a member of the IEEE Technical Committee on Parallel Processing (TCPP). She has held visiting positions at the International Computer Science Institute, Berkeley, and at the Technical University of Graz, Austria. Professor Hambrusch is an inaugural member of the Purdue University Book of Great Teachers and was selected in 1999 as one of the 10 Best Teachers of Undergraduates. Since July 2002, she has served as the head of the Department of Computer Sciences.

Selected Publications:

- F. Dehne, T. Eavis, S. Hambrusch, and A. Rau-Chaplin, "Parallelizing the Data Cube", Distributed and Parallel Databases, Special Issue on Parallel and Distributed Data Mining, Vol. 11, Nr. 2, pp. 181-203, 2002.
- S. Prabhakar, Y. Xia, D. Kalashnikov, W. Aref, and S. Hambrusch, "Query Indexing and Velocity Constrained Indexing: Scalable Techniques for Continuous Queries on Moving Objects", IEEE Transactions on Computers, Special Issue on DBMS and Computing, Vol. 51, pp. 1124-1140, 2002.
- S.E. Hambrusch, C.-M. Liu, "Data Replication for Static Tree Structures", Information Processing Letters, vol. 86/4, pp 197-202, 2003.



Christoph M. Hoffmann

Professor of Computer Science (1976)

Co-director, Computing Research Institute

Ph.D., University of Wisconsin, 1974

Before joining the Purdue faculty, Professor Hoffmann taught at the University of Waterloo, Canada. He has also been 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. Professor Hoffmann 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. Professor Hoffmann has received national media attention for his work simulating the 9/11 Pentagon attack.

Selected Publications:

- C. M. Hoffmann and W. Yang, "Compliant Motion Constraints", Asian Symposium on Computer Mathematics, Beijing 2003.
- X.-S. Gao, C. M. Hoffmann and W. Yang, "Solving Spatial Basic Geometric Constraint Configurations with Locus Intersection", Computer-Aided Design 2003.
- Jun Wu, Sherry L Voytik-Harbin, David L. Filmer, Christoph M. Hoffman, Bo Yuan, Ching-Shoei Chiang, Jennis Sturgis and Joseph P. Robinson, "Modeling ECM Fibre Formation: Structure Information Extracted by Analysis of 2D and 3D Image Sets", Proceedings of Society of Photo-Optical Instrumentation Engineers (SPIE), Vol. 4621, pp. 52-56, San Diego, CA, Spring 2002.



Antony Hosking

Associate Professor of Computer Science (1995)

B.Sc., Mathematical Sciences, University of Adelaide, 1985

M.Sc., Computer Science, University of Waikato, 1987

Ph.D., Computer Science, University of Massachusetts, 1995

Dr. 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, distribution and security) in the context of the Smalltalk, Modula-3, and Java programming languages.

Selected Publications:

- M. Hirzel, A. Diwan, and A. Hosking, "On the Usefulness of Liveness for Garbage Collection and Leak Detection", Proceedings of the 15th European Conference on Object Oriented Programming, Budapest, Hungary, pages 181-206, June 2001.
- D. Whitlock and A. Hosking, "A Framework for Persistence-Enabled Optimization of Java Object Stores", Proceedings of the Ninth International Workshop on Persistent Object Systems G.N.C. Kirby (editor), Lillehammer, Norway, pages 4-18, September 2000. Lecture Notes in Computer Science 2135, Springer-Verlag, 2001.
- A. Hosking, N. Nystrom, D. Whitlock, Q. Cutts, and A. Diwan, "Partial Redundancy Elimination for Access Expressions", *Software — Practice and Experience* 31, 6, pages 577-600, May 2001.

**Elias N. Houstis**

Professor of Computer Science (1984)

B.S., Mathematics, University of Athens, 1969

Ph.D., Mathematics, Purdue University, 1974

E.N. Houstis has served as acting and associate head of the Department of Computer Science. He is on the editorial board of *Neural, Parallel and Scientific Computational, Computational Engineering Science*, and *HPC Users Web-Based Journals* and a member of the IFIP WG 2.5 Working Group in Numerical Software. Houstis's current research interests are in the areas of problem-solving environments (PSEs), parallel computation, performance evaluation and modeling, computational intelligence, computational finance, and online 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. He is leading the Parallel ELLPACK group, which is developing infrastructure and implementing methodologies for reusing "legacy" PDE software on a variety of physical and virtual parallel machines and designing a Web Parallel ELLPACK server.

Houstis has been involved in designing 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. This framework has been applied to a simulation system for designing HPC systems (POEMS project), a virtual laboratory environment, and recommender system for mathematical software.

He has published several books and over 120 technical articles. He has supervised 14 Ph.D. students and several M.S. students. 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, National Science Foundation, and the Greek Research Foundation.

**Suresh Jagannathan**

Associate Professor of Computer Science (2002)

Associate Professor of Electrical and Computer Engineering (Courtesy)

B.S., State University of New York at Stony Brook, 1982

Ph.D., Massachusetts Institute of Technology, 1989

Professor Jagannathan is interested in the semantics and implementation of high-level programming languages like SML, Scheme, or Java. More specifically, his interests lie in formal methods for describing and implementing such languages, e.g., type theory, program analysis, abstract interpretation, etc.

He also has an active interest in coordination and distributed languages. One aspect of this research studies the semantics and implementation of lightweight transactions as an alternative to lock-based synchronization for expressing concurrency. The results of this work are used to devise scalable coordination and distributed systems.

His research also explores issues in the design and implementation of next-generation storage infrastructures. This work applies formal methods and software engineering principles to develop highly available scalable storage applications for wide-area deployment.

Selected Publications:

- Suresh Jagannathan, Y. Zhou, A. Bilas, C. Dubnicki, K. Li, and J. Philbin, “Experiences with VI Communication for Database Storage”, International Symposium on Computer Architecture, June 2002.
- Suresh Jagannathan, “Continuation-based Transformations for Coordination Languages”, Theoretical Computer Science, July 2000.
- Suresh Jagannathan, Henry Cejtin and Stephen Weeks, “Flow-Directed Closure Conversion for Typed Languages”, European Symposium on Programming, March 2000.



Daisuke Kihara

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

B.S., Biochemistry, University of Tokyo, 1994
M.S., Bioinformatics, Kyoto University, 1996
Ph.D., Bioinformatics, Kyoto University, 1999

Dr. 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 3D structures, and pathway data have become available. This data now enables us to employ comprehensive analysis of relationship between protein sequence, structure and function, evolution of protein families, pathways, and organisms. He is particularly 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 and comparison, development of prediction method of transmembrane proteins and its application to genome sequences.

Selected Publications:

- Daisuke Kihara and Jeffrey Skolnick, “The PDB is a covering set of small protein structures”, J. Mol. Biol., 334: 793-802, 2003.
- Daisuke Kihara, Yang Zhang, Hui Lu, Andrzej Kolinski and Jeffrey Skolnick, “Ab initio Protein Structure Prediction on a Genomic Scale: Application to the Mycoplasma genitalium Genome”, Proc. Natl. Acad. Sci. USA, 99: 5993-5998, 2002.
- Daisuke Kihara, Hui Lu, Andrzej Kolinski and Jeffrey Skolnick, “TOUCHSTONE: An ab initio Protein Structure Prediction Method that Uses Threading-based Tertiary Restraints”, Proc. Natl. Acad. Sci. USA, 98: 10125-10130, 2001.



Ninghui Li

Assistant Professor of Computer Science (2003)

B.S., Computer Science, University of Science and Technology of China, 1993
M.S., Computer Science, New York University, 1998
Ph.D., Computer Science, New York University, 2000

Professor Li's research interests are in computer security and applied cryptography — e.g., security and privacy in distributed systems, networks, databases, and electronic commerce — with a focus on access control. One focus of Li's work is on trust management, which is an approach to access control in decentralized, open, and distributed systems. He has designed, together with Professors John Mitchell and Will Winsborough, the RT Role-based Trust-management framework, efficient goal-directed algorithms to do distributed credential chain discovery, logic-based semantic foundations for security policy languages, and algorithms and computational complexity characterization for analyzing properties of security policies such as safety and availability.

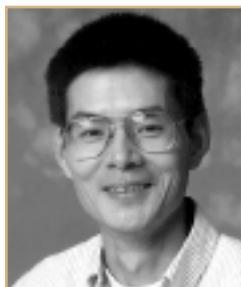
Li is co-principal investigator of a recently-funded mid-size NSF ITR project titled “Automated Trust Negotiation in Open Systems” (2003-2008). Automated Trust Negotiation (ATN) is an approach to regulate the exchange of sensitive credentials by using access-control policies. He has been working with Professors Will Winsborough and Kent Seamons on ATN, using the RT family of trust-management languages.

Together with Professors Dan Boneh and Wenliang Du, Li introduced a cryptographic primitive called Oblivious Signature-Based Envelope (OSBE) and developed an efficient and provably secure OSBE protocol for credentials signed using RSA signatures. OSBE enables the sender to send an encrypted message to the receiver such that the receiver can decrypt if and only if it possesses the signature on a predetermined message, yet the sender does not learn whether the receiver has the signature or not.

Before joining the Purdue faculty, Li was a research associate in the computer science department at Stanford University. He has served on the program committees of the ACM Conference on Computer and Communications Security, IEEE Computer Security Foundations Workshop, and International Conference on Trust Management, and has reviewed papers for a number of international journals and conferences.

Selected Publications:

- Ninghui Li, William H. Winsborough, and John C. Mitchell, “Beyond Proof-of-compliance: Safety and Availability Analysis in Trust Management”, Proceedings of 2003 IEEE Symposium on Security and Privacy.
- Ninghui Li, Wenliang Du, and Dan Boneh, “Oblivious Signature-Based Envelope”, Proceedings of the 22nd ACM Symposium on Principles of Distributed Computing (PODC 2003).
- Ninghui Li, Benjamin N. Grosof, and Joan Feigenbaum, “Delegation Logic: A Logic-based Approach to Distributed Authorization”, ACM Transactions on Information and System Security (TISSEC), volume 6, number 1, February 2003.



Zhiyuan Li

Associate Professor of Computer Science (1997)

Associate Professor of Electrical and Computer Engineering

B.S., Mathematics, Xiamen University, 1982

M.S., Computer Sciences, University of Illinois at Urbana-Champaign, 1985

Ph.D., Computer Sciences, University of Illinois at Urbana-Champaign, 1989

Zhiyuan Li has led a group to design and implement an interprocedural parallelizing Fortran compiler, called Panorama, which performs highly efficient array data flow analysis to enable aggressive loop parallelization and locality-enhancement program transformations. His group also designs and implements compiler-based programming environments and run-time systems for mobile computing on handheld devices.

Li received a National Science Foundation Research Initiation Award and a National Science Foundation Career Award in 1992 and 1995 respectively. In 1998, he co-edited with P.-C. Yew a special issue on Compilers and Languages for Parallel and Distributed Computers for *IEEE Transaction on Parallel and Distributed Systems* and two special issues on Compilers and Languages for Parallel Computing for the *International Journal on Parallel Programming*. Li, with P.-C. Yew, co-chaired the 10th International Workshop on Languages and Compilers for Parallel Computing in 1997. He has served a program committee member for several international conferences, including IEEE International Parallel and Distributed Processing Symposium (IPDPS), ACM International Conference on Supercomputing, International Conference on Parallel Processing, and ACM SIGPLAN Symposium on Languages, Compilers and Tools for Embedded Systems (LCTES).

Selected Publications:

- Junjie Gu and Zhiyuan Li, "Efficient Interprocedural Array Data-flow Analysis for Automatic Program Parallelization", IEEE Trans. On Software Engineering, Special Issue on Architecture-Independent Languages and Software Tools for Parallel Processing, 26(3), March 2000, pp. 244-261.
- Rong Xu, Zhiyuan Li, Cheng Wang and Peifeng Ni, "Impact of Data Compression on Energy Consumption of Wireless-Networked Handheld Devices", Proceedings of the 23rd IEEE International Conference On Distributed Computing Systems (ICDCS), Providence, Rhode Island, May 2003, pp. 302-311. IEEE Computer Society Press.
- Zhiyuan Li, "Optimal Skewed Tiling for Cache Locality Enhancement", Proceedings of 17th IEEE International Parallel and Distributed Processing Symposium (IPDPS), April 2003, Nice, France. IEEE Computer Society Press.



Bradley J. Lucier

Professor of Mathematics and Computer Science (1981)

B.Sc., Mathematics, University of Windsor, 1976

S.M., Applied Mathematics, University of Chicago, 1978

Ph.D., Applied Mathematics, University of Chicago, 1981

Professor Lucier has worked for over 10 years on wavelet and multiresolution 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 indicate some of these interests. The first paper relates variational problems to wavelet shrinkage, as introduced by David Donoho and Iain Johnstone. The second paper gives an interpretation of translation-invariant wavelet shrinkage, introduced by Donoho and Ronald Coifman, as gradient descent along a convex functional; Gaussian smoothing can be interpreted in the same way (with a different functional).

Finally, the third paper introduces several results about wavelet methods for medical tomography, especially for Positron Emission Tomography (PET) imaging. Basically, it again puts into a variational framework the wavelet-vaguelette method of Donoho; it shows that wide classes of computationally efficient wavelet transforms can be used for tomography; and it gives examples that show that wavelet techniques are much more effective than the usual filtered back-projection method for PET imaging.

This work has been supported continuously since 1990 by the Office of Naval Research.

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, 7 (1998), 319-335. Special Issue on Partial Differential Equations and Geometry-Driven Diffusion in Image Processing and Analysis.
- Antonin Chambolle and Bradley J. Lucier, "Interpreting Translation-Invariant Wavelet Shrinkage as a New Image Smoothing Scale Space", Transactions on Image Processing, 10 (2001), 993-1000.
- Namyong Lee and Bradley J. Lucier, "Wavelet Methods for Inverting the Radon Transform with Noisy Data", IEEE Transactions on Image Processing, 10 (2001), 79-94.



Robert E. Lynch

Professor Emeritus of Computer Science and Mathematics (1967)

B.S., Engineering Physics, Cornell University, 1954

M.A., Mathematics, Harvard University, 1961

Ph.D., Applied Mathematics, Harvard University, 1963

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. His areas of 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

Professor of Computer Science (1987)

B.E., Electrical Engineering, Birla Institute of Technology and Science, 1970

M.S., Electrical Engineering, Birla Institute of Technology and Science, 1972

Ph.D., Computer Science, Birla Institute of Technology and Science, 1977

Aditya Mathur conducts research in the areas of software testing, reliability, formal approaches for software process control, and the management of smart spaces.

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.

His research group has developed Home Wabash, a tool for the monitoring and control of Smart Spaces and for ensuring the safety of people within such spaces.

In collaboration with Raymond DeCarlo, Mathur investigates the use of the theory of automatic control for control of software development processes. He is also now researching the long-suspended work on the Listen project to explore the use of sound in a variety of monitoring tasks.

Selected Publications:

- Joao Cangussu, Raymond DeCarlo, and Aditya P. Mathur, “A Formal Model of the Software Test Process”, IEEE Transactions on Software Engineering, Vol. 28, No. 8, pp.782-796, August 2002.
- Aditya P. Mathur, Baskar Sridharan and Steven G. Unger, “Digital Device Manuals for the Management of Connected Spaces”, IEEE Communications Magazine, August 2002, Vol. 40, No. 8, 2002, pp.78-85.
- Joao Cangussu, Raymond DeCarlo, and Aditya P. Mathur, “Effect of Disturbances on the Convergence of Failure Intensity”, Proceedings of the 13th International Symposium on Software Reliability Engineering, IEEE Press, Annapolis, Maryland, November 12-15, 2002.



Cristina Nita-Rotaru

Assistant Professor of Computer Science (2003)

B.S., Computer Science, Politehnica University of Bucharest, 1995

M.S., Computer Science, Politehnica University of Bucharest, 1996

MSE, Computer Science, The Johns Hopkins University, 2000

Ph.D., Computer Science, The Johns Hopkins University, 2003

Cristina Nita-Rotaru worked at Johns Hopkins University under the guidance of her advisor, Dr. Yair Amir. While at Hopkins, she was a member of The Center of Networking and Distributed Systems (CNDS).

Cristina Nita-Rotaru's thesis focused on a high-performance and robust secure architecture for group communication systems. The dissertation outlined two approaches taken when designing a secure group communication system: a layered architecture, where the security services are separated from the distributed systems protocols, and an integrated architecture that provides increased scalability and performance, while requiring a more complex system design. As opposed to previous work, she investigated the use of contributory key agreement protocols as building blocks for group security services. Such protocols have the advantage that they provide strong security services such as key independence and perfect forward secrecy. The security of the resulted system, Secure Spread, relies on a group key management protocol that is efficient, robust to process crashes and network partitions and merges, and protects confidentiality of the data even when long-term keys of the participants are compromised.

In addition to her thesis topic, Cristina investigated secure routing protocols resilient to byzantine failures for ad hoc wireless networks, was involved in the overall design and algorithms for a secure overlay network infrastructure and designed and developed a certified email system based on verifiable encryption of digital signatures, that requires the involvement of a third trusted party only in case of dispute.

Before coming to Johns Hopkins, Cristina Nita-Rotaru obtained both a B.S. and a M.Sc. from Politehnica University of Bucharest, Romania. Thanks to the TEMPUS scholarship program, she developed and finalized her graduation thesis at Politenico di Torino, Turin, Italy.

Selected Publications:

- Y. Amir, C. Nita-Rotaru, J. Stanton and G. Tsudik, "Scaling Secure Group Communication Systems: Beyond Peer-to-Peer", Proceedings of DISCEX, Washington DC, April 22-24, 2003.
- B. Awerbuch, D. Holmer, C. Nita-Rotaru, and H. Rubens, "An On-Demand Secure Routing Protocol Resilient to Byzantine Failures", ACM Workshop on Wireless Security (WiSe), Atlanta, Georgia, September 28, 2002.
- Y. Amir, Y. Kim, C. Nita-Rotaru, J. Schultz, J. Stanton and G. Tsudik, "Exploring Robustness in Group Key Agreement", Proceedings of the 21th IEEE International Conference on Distributed Computing Systems, Phoenix, Arizona, April 16-19, 2001.



Jens Palsberg

Adjunct Professor of Computer Science (1996)

Ph.D., Computer Science, University of Aarhus, 1992

From 1992 to 1996, Professor Palsberg was a visiting scientist at various institutions, including MIT. His research interests span the areas of programming languages, compilers, software engineering, embedded software, and information security. He has authored over 60 technical papers, and co-authored with Michael Schwartzbach the book *Object-Oriented Type Systems* (1994). He is a co-author of the revised version of Appel's textbook on *Modern Compiler Implementation in Java*.

In 1998 Palsberg received a National Science Foundation CAREER award, in 1999 he received a Purdue University Faculty Scholar award, and in 2001 he received a National Science Foundation ITR award.

Dr. Palsberg's research has also been supported by DARPA, IBM, and British Telecom. He is a former member of the editorial board of *IEEE Transactions on Software Engineering*, he has served as a program chair for the Static Analysis Symposium, the Symposium on Requirements Engineering for Information Security, and the ACM Workshop on Program Analysis for Software Tools and Engineering, and he has served as a chair of the Compilers and Operating Systems program subcommittee for the International Conference on Compilers, Architectures and Synthesis for Embedded Systems.

Selected Publications:

- Jens Palsberg and Christina Pavlopoulou, "From Polyvariant Flow Information to Intersection and Union Types", *Journal of Functional Programming*, 11, No. 3, pp. 263-317, May 2001.
- Jens Palsberg and Tian Zhao, "Efficient and Flexible Matching of Recursive Types", *Information and Computation* 171, pp. 364-387, 2001.
- Dennis Brylow, Niels Damgaard, and Jens Palsberg, "Static Checking of Interrupt-driven Software", *Proceedings of ICSE'01, 23rd International Conference on Software Engineering*, Toronto, pp. 47-56, May 2001.



Gopal Pandurangan

Assistant Professor of Computer Science (2002)

B.Tech., Computer Science, Indian Institute of Technology at Madras, 1994

M.S., Computer Science, State University of New York at Albany, 1997

Ph.D., Computer Science, Brown University, 2002

Professor Pandurangan's research interests are generally in design and analysis of algorithms (both theoretical and experimental). He is especially interested in stochastic analysis of dynamic computer phenomena and associated algorithmic problems, randomized algorithms, and probabilistic analysis of algorithms.

Professor Pandurangan is currently working on algorithmic and modeling problems that arise in the following application areas: Peer-to-Peer (P2P) Computing, Communication Networks (especially wireless ad hoc networks), Web Measurement and Modeling, Computational Biology and Bioinformatics.

Selected Publications:

- G. Pandurangan, P. Raghavan, and E. Upfal, "Using PageRank to Characterize Web Structure", 8th Annual International Computing and Combinatorics Conference (COCOON), 2002.
- G. Pandurangan, P. Raghavan, and E. Upfal, "Building Low-Diameter Peer-to-Peer Networks Building Low-Diameter Peer-to-Peer Networks", *IEEE Journal on Selected Areas in Communications (JSAC)*, 21(6), Aug. 2003, 995-1002.
- G. Pandurangan and H. Ramesh, "The Restriction Mapping Problem Revisited", *Journal of Computer and System Sciences* (invited paper for special issue on Computational Biology), 65, 2002, 526-544.



Kihong Park

Associate Professor of Computer Science (1996)

B.A., Management, Seoul National University, 1988
 M.S., Computer Science, University of South Carolina, 1990
 Ph.D., Computer Science, Boston University, 1996

Professor Park's research centers on design and control issues in high-speed multimedia networks including quality of service provisioning architectures, congestion control, distributed scheduling, and the facilitation of adaptive, fault-tolerant computing on large-scale distributed systems.

He has over 40 technical publications, and has edited the book *Self-Similar Network Traffic and Performance Evaluation* (co-editor: Dr. Walter Willinger) published by Wiley-Interscience, 2000. His thesis, entitled "Ergodicity and Mixing Rate of One-Dimensional Cellular Automata" (advisor: Dr. Peter Gacs), was on a problem in theoretical probability going back to von Neumann, with applications to fault-tolerance and reliability in large-scale systems such as the Internet.

Dr. Park was a Presidential University Fellow at Boston University, is a recipient of the NSF CAREER Award, is a Fellow-at-Large of the Santa Fe Institute, has served on several international program committees, NSF panels, and is a member of ACM and IEEE. He serves on the editorial boards of *IEEE Communications Letters* and *Computer Networks* as associate editor.

In 2001, he organized an SFI/NSF Workshop titled "The Internet as a Large-Scale Complex System" (co-chair: Dr. Walter Willinger), March 29-31, held at the Santa Fe Institute. He also co-chaired a SPIE Conference titled "Scalability and Traffic Control in IP Networks" (co-chair: Dr. Sonia Fahmy), August 20-24, 2001, at the Colorado Convention Center in Denver.

Selected Publications:

- K. Park and H. Lee, "On the Effectiveness of Route-based Packet Filtering for Distributed DoS Attack Prevention in Power-law Internets", *Proceeding of the ACM SIGCOMM '01*, pp. 15-26, 2001.
- K. Park and T. Tuan, "Performance Evaluation of Multiple Time Scale TCP Under Self-Similar Traffic Conditions", *ACM Transactions on Modeling and Computer Simulation*, 24, pp. 152-177, 2000.
- K. Park and W. Willinger (eds.), "Self-Similar Network Traffic and Performance Evaluation", Wiley-Interscience, 2000.



Voicu S. Popescu

Assistant Professor of Computer Science (2001)

Ph.D., Computer Science University of North Carolina, 2001

Professor Popescu's research field is computer graphics, focusing on image-based modeling and rendering and on graphics architectures. He and his collaborators have built a low-cost, hand-held device for creating 3D models of complex real-world scenes. The device consists of a video camera and 16 laser pointers that provide reference markings for the scene being scanned. The model is created dynamically during scanning, allowing the operator to control the model creation for greater accuracy and completeness.

Another project uses "reflection morphing" to render 3D reflectors, such as spheres and cylinders, in real-time. The technique uses a pre-processing phase that ray-traces the reflectors from a sparse set of views, then interpolates the datastructure at runtime to generate intermediate views.

Selected Publications:

- Voicu Popescu and Anselmo Lastra, "The Vacuum Buffer", Proceedings of 2001 ACM Symposium on Interactive 3D Graphics (Chapel Hill, NC), 2001.
- Voicu Popescu, John Eyles, Anselmo Lastra, Joshua Steinhurst, Nick England, and Lars Nyland, "The WarpEngine: An Architecture for the Post-Polygonal Age", Proceedings of SIGGRAPH 2000 (New Orleans, La), July 23-28, 2000, pp. 433-442.
- Voicu S. Popescu, Anselmo A. Lastra, Daniel G. Aliaga, and Manuel de Oliveira Neto, "Efficient Warping for Architectural Walkthroughs using Layered Depth Images", Proceedings of IEEE Visualization '98, pp. 211-215, Oct 18-23, 1998.

**Sunil Prabhakar**

Assistant Professor of Computer Science (1998)

B.Tech., Electrical Engineering, Indian Institute of Technology, 1990

M.S., Computer Science, University of California, 1998

Ph.D., Computer Science, University of California, 1998

Dr. Prabhakar's research focuses on performance and security 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.

Dr. Prabhakar's interest also lies in the design and development of digital watermarking techniques for structured (e.g. relational databases) and semi-structured (e.g. XML) data. Prior to joining Purdue, Dr. Prabhakar held a position from 1990 to 1994 with Tata Unisys Ltd.

Selected Publications:

- R. Cheng, D. Kalashnikov, and Sunil Prabhakar, "Evaluating Probabilistic Queries over Imprecise Data", Proceedings of the ACM International Conference on Management of Data (SIGMOD) 2003, 551-562, San Diego, California, June 2003.
- R. Sion, M. J. Atallah, and Sunil Prabhakar, "Rights Protection for Relational Data", Proceedings of the ACM International Conference on Management of Data (SIGMOD) 2003, 98-109, San Diego, California, June 2003.
- Sunil Prabhakar, Y. Xia, D. Kalashnikov, W. Aref, and S. E. Hambrusch, "Query Indexing and Velocity Constrained Indexing: Scalable Techniques for Continuous Queries on Moving Objects", IEEE Transactions on Computers, Vol. 51, No. 10, October 2002, pp. 1124-1140.

**Vernon J. Rego**

Professor of Computer Science (1985)

Ph.D., Computer Science, Michigan State University, 1985

M.Sc., Mathematics, Birla Institute of Technology and Science,

M.S., Computer Science, Michigan State University,

Vernon Rego directs research in the Parallel Computation and Simulation Laboratory (PacsLab) in Purdue's computer sciences department. 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 of Computer Science (1964)

Ph.D., California Institute of Technology, 1959

Professor Rice is founder of the *ACM Transactions on Mathematical Software* and is on several other editorial boards. He is the past chair of the Computing Research Association, a fellow of the AAAS, of the ACM, and a member of the National Academy of Engineering. For the past 15 years, Professor 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.

Professor Rice 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), *Enabling Technologies for Computational Science* (Kluwer, 2000). He has also published about 300 scientific articles. The 25 or so articles of the past two years were in the areas of agent based computing, computational science, computer security, mathematical software, problem solving environments, recommender systems, simulating gas turbines, and Web-based computing.



Elisha Sacks

Professor of Computer Science (1994)

Ph.D., Computer Science, Massachusetts Institute of Technology, 1988

Dr. Sacks's research area is geometric reasoning in science and engineering. He is a problem solver who couples domain knowledge, mathematics, and computer science to solve real-world problems. He worked on qualitative analysis of nonlinear dynamical systems for his Ph.D. and for the next few years. He has worked on mechanical design since then and plans to continue for a while. He is also working with Matt Mason of Carnegie Mellon University on robot path planning with obstacles and steering constraints and with Victor Milenkovic of University of Miami on robust computational geometry. His unique skill is in combining (often esoteric) mathematics with (often inarticulated) domain knowledge with (often idealized) computational methods to solve real-world problems.

The mechanical design research addresses kinematic analysis and the related tasks of simulation, tolerancing, and parametric design. Kinematic analysis means computing the ways that mechanical parts interact: how gears mesh, how linkages transform motion, how robots grasp. Kinematic analysis is central to mechanical design because part contacts largely determine mechanical function and because other forms of analysis (dynamical simulation, stress, tolerance) presuppose it.

Prior to his research, a general, practical kinematic analysis algorithm was deemed impossible. He has developed and implemented such an algorithm based on configuration space computation. He is working with academic and industrial collaborators to develop practical mechanical design software based on his research, notably with Ford Motors on transmission design and with Sandia National laboratory on micro-mechanism design. Dr. Sacks is also the director of the Visualization Center.

Selected Publications:

- Min-Ho Kyung and Elisha Sacks, "Parameter Synthesis of Higher Kinematic Pairs", *Computer-Aided Design*, 35(1), 2003.
- Elisha Sacks, "Path Planning for Planar Articulated Robots using Configuration Spaces and Compliant Motion", *IEEE Transactions on Robotics and Automation*, 19(3), 2003.
- Voicu Popescu, Elisha Sacks, and Gleb Bahmutov, "The ModelCamera: A Hand-Held Device for Interactive Modeling", *Proceedings of the Fourth International Conference on Digital Imaging and Modeling*, Banff, 2003.

**Ahmed Sameh**

Samuel D. Conte Professor of Computer Science (1997)

Ph.D., University of Illinois at Urbana-Champaign, 1968

Ahmed Sameh is the Samuel D. Conte Professor of Computer Science. His 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*

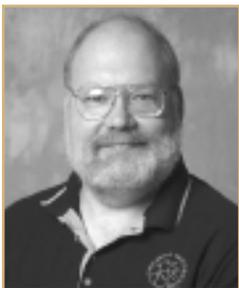
Communications, International Journal of High Speed Computing, Numerical Linear Algebra with Applications, IEEE Computing in Science and Engineering, and *International Journal of Parallel Programming*.

He joined Purdue in 1997 as head of 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 at the Department of Computer Science at the University of Illinois at Urbana-Champaign from 1968 to 1991 and 1992 to 1993. During his tenure at Illinois, he served as an associate director and director of the Center for Supercomputing Research and Development (CSR).

He is a Fellow of ACM, IEEE, and AAAS, and a member of SIAM. He has also received the IEEE's 1999 Harry Goode Award for "seminal and influential work in parallel numerical algorithms."

Selected Publications:

- V. Sarin and A. Sameh, "Hierarchical divergence-free bases and their application to particulate flows", *ASME Journal of Applied Mechanics*, Vol. 70, pp. 1-6, January 2003.
- A. Sameh, and V. Sarin, "Parallel Algorithms for Indefinite Linear Systems", *Parallel Computing*, Vol. 28, pp. 285-299, 2002.
- G. Golub, A. Sameh, and V. Sarin, "A Parallel Balance Scheme for Banded Linear Systems", *Numerical Linear Algebra with Applications*, Vol 8, No. 5, pp. 297-316, 2001.

**Eugene H. Spafford**

Professor of Computer Science (1987)

Professor of Philosophy (Courtesy)

Professor of Communication (Courtesy)

Professor of Electrical and Computer Engineering (Courtesy)

Executive Director, Purdue CERIAS

B.A., Mathematics and Computer Science, State University of New York at Brockport, 1979

M.S., Information and Computer Science, Georgia Institute of Technology, 1981

Ph.D., Information and Computer Science, Georgia Institute of Technology, 1986

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

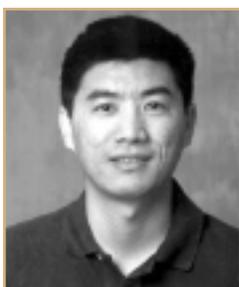
Dr. Spafford has received recognition and many honors for his work, including being a charter recipient of the Computer Society's Golden Core, and being named as a Fellow of the ACM, as a Fellow of the AAAS, and as a Fellow of the IEEE. He has been awarded status as a CISSP (Certified Information Systems Security Professional), *honoris causa*, by the Board of Directors of (ISC)²; named as a member of the ISSA's Hall of Fame; and awarded the 2001 William H. Murray Medal by the NCISSE. In October of 2000, Dr. Spafford received the field's most prestigious award: the NIST/NCSC National Computer Systems Security Award.

In 2001, Professor Spafford received Purdue's two highest honors for teaching: the Outstanding Undergraduate Teaching Award in Memory of Charles B. Murphy, and being named as a Fellow of the Purdue Teaching Academy. In 2003, Spafford was added to Purdue's Book of Great Teachers.

Among many professional activities, Dr. Spafford is a member of the Computing Research Association's board of directors and the President's Information Technology Advisory Committee (PITAC). He is co-chair of ACM's U.S. Public Policy Committee. Dr. Spafford is the academic editor of the journal *Computers & Security*, and on the editorial and advisory board of the *ACM's Transactions on Information and System Security*. Among many other publications, Dr. Spafford is co-author of the award-winning book *Practical Unix & Internet Security* (with S. L. Garfinkel), published by O'Reilly and Associates (3rd edition, 2003), and the book *Web Security, Privacy & Commerce* (also with S. L. Garfinkel; 2nd edition, 2002).

Selected Publications:

- B. D. Joshi, Walid G. Aref, Arif Ghafoor and Eugene H. Spafford, "Security Models of Web-Based Applications", *Communications of the ACM*, vol. 44#2, pp. 38-44, 2001.
- Florian Kirschbaum, Eugene H. Spafford, Diego Zamboni, "Embedded Sensors and Detectors for Intrusion Detection", *Journal of Computer Security*, vol. 10 #1/2, pp. 23-70, 2002.
- Brian Carrier and Eugene H. Spafford, "Getting Physical with the Digital Investigation Process", *International Journal of Digital Evidence*, vol. 2 #2, 2003.



Yinlong Sun

Assistant Professor of Computer Science (2001)

B.S., Physics, Beijing University, 1985

Ph.D., Physics, Simon Fraser University, 1996

Ph.D., Computer Science, Simon Fraser University, 2000

Dr. Sun's research interests lie in computer graphics, scientific visualization, computer vision, color science, computational nanotechnology, and neuroimaging. He is taking on projects on spectral modeling and rendering, statistical local illumination, graphics standard and quality metrics, spectral vision, physical and chemical visualization, nanoscale simulation and visualization, and neural source imaging. He is particularly interested in combining analytical, numerical, and experimental approaches to solve complex, cross-disciplinary problems.

Dr. Sun has recently initiated the Photometric Graphics and Vision Lab, which involves spectral measurement of lights and objects for graphics and vision applications. He is a member of ACM, ACM SIGGRAPH, IEEE, IEEE Computer, and IS&T.

Selected Publications:

- Yinlong Sun, E. David Fracchia, Mark S. Drew, and Thomas W. Calvert, "A Spectrally Based Framework for Realistic Image Synthesis", *The Visual Computer* Vol. 17, No. 7, pp. 429-444, October 2001.
- Yinlong Sun, E. David Fracchia, Mark S. Drew, and Thomas W. Calvert, "Rendering Iridescent Colors of Optical Disks", *The 11th EUROGRAPHICS Workshop on Rendering (EGRW)*, Brno, Czech Republic, pp. 341-352, 2000.
- Yinlong Sun, E. David Fracchia, Thomas W. Calvert, and Mark S. Drew, "Deriving Spectra from Colors and Rendering Light Interference", *IEEE Computer Graphics and Application* Vol. 19, No. 4, pp. 61-67, July 1999.



Wojciech Szpankowski

Professor of Computer Science (1985)

M.S., Electrical Engineering and Computer Science, Technical University of Gdansk, 1970
Ph.D., Electrical Engineering and Computer Science, Technical University of Gdansk, 1980

Before coming to Purdue, W. Szpankowski was assistant professor at the Technical University of Gdansk, and in 1984 was assistant professor at McGill University, Montreal. During 1992-1993, he was professeur invité at INRIA, Rocquencourt, France.

Professor Szpankowski's research interests cover analysis of algorithms, data compression, information theory, analytic combinatorics, random structures, networking, stability problems in distributed systems, modeling of computer systems and computer communication networks, queueing theory, and operations research. His recent work is devoted to the probabilistic analysis of algorithms on words, analytic information theory, and designing efficient multimedia data compression schemes based on approximate pattern matching.

He is a recipient of the Humboldt Fellowship. He has been guest editor for special issues in *IEEE Transactions on Automatic Control*, *Theoretical Computer Science*, *Random Structures & Algorithms*, and *Algorithmica*. Currently, he is editing a special issue on "Analysis of Algorithms" in *Algorithmica*. He serves on the editorial boards of *Theoretical Computer Science*, *Discrete Mathematics and Theoretical Computer Science*, and the book series *Advances in the Theory of Computation and Computational Mathematics*.

Selected Publications:

- P. Jacquet and W. Szpankowski, "A Combinatorial Problem Arising in Information Theory: Precise Minimax Redundancy for Markov Sources", *Colloquium on Mathematics and Computer Science: Algorithms, Trees, Combinatorics and Probabilities*, 311-328, Birkhauser, 2002.
- P. Flajolet and W. Szpankowski, "Analytic Variations on Redundancy Rates of Renewal Processes", *IEEE Trans. Information Theory*, 48, 2911 -2921, 2002.
- C. Knessl and W. Szpankowski, "Height of a Binary Search Tree: The Limiting Distribution Perspective", *Theoretical Computer Science*, 289, 649-703, 2002.



Jan Vitek

Assistant Professor of Computer Science (1999)

B.S., University of Geneva, 1989
M.S., Computer Science, University of Victoria, 1995
Ph.D., University of Geneva, 1999

Professor Vitek is working in foundations and implementation of computer programming languages and has interest in program analysis, real time languages, 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.

Dr. Vitek was born in Czechoslovakia and educated in Switzerland. He has authored over 30 papers and has edited two books on mobile objects and secure Internet programming. He has served on program committees for international conferences such as PLDI, OOPSLA, ECOOP, POPL, ESOP, ICALP, and SACMAT. Dr. Vitek is a member of CERIAS.

Selected Publications:

- P. Sewell and J. Vitek, "Secure Composition of Untrusted Code: Wrappers and Causality Types", Proceedings of the 13th IEEE Computer Security Foundations Workshop (CSFW-13), Cambridge, U.K., July 2000.
- B. Bokowski and J. Vitek, "Confined Types", Proceedings of the 14th Annual ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA'99), Denver, Colorado, November 1999.
- C. Bryce, M. Oriol, and J. Vitek, "A Coordination Model for Agents Based on Secure Spaces", Proceedings 3rd International Conference on Coordination Models and Languages (COORDINATION'99), LNCS 1594, Amsterdam, Netherlands, Springer-Verlag, Berlin, April 1999.



Jeffrey S. Vitter

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

B.S. with highest honors, Mathematics, University of Notre Dame, 1977
Ph.D., Computer Science, Stanford University, 1980
M.B.A., Duke University, 2002

In his research, Professor Jeff Vitter investigates how to manage and process very large amounts of data. He helped pioneer the field of external memory algorithms, where the goal is to develop I/O-efficient algorithms that alleviate the bottleneck between small but fast internal memory and large but slow external storage. 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. For example, Professor Vitter and colleagues designed an I/O-efficient algorithm to help researchers in the Nicholas School of Environment at Duke compute how water flows and accumulates, based on satellite elevation data. The computation time for processing data from the Appalachian Mountain region was reduced from several days to just a few hours.

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 (in which data can be represented succinctly when the patterns in the data are predictable) and machine learning (in which predictions can be made when prior data can be represented succinctly).

Professor 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. Experiments have shown the technique to be quite practical.

Honors and awards: Fellow, John Simon Guggenheim Foundation, 1986; Fellow, Institute of Electrical and Electronics Engineers (IEEE), 1993; Fellow, Association for Computing Machinery (ACM), 1996; National Science Foundation Presidential Young Investigator Award 1985; Fulbright Scholar, 1998; Recognition of Service Award, ACM, 1998 and 2001.

Selected Publications:

- L. Lim, M. Wang, and J. S. Vitter, "SASH: A Self-Adaptive Histogram Set for Dynamically Changing Workloads", Proceedings of the 29th International Conference on Very Large Databases (VLDB 2003), Berlin, Germany, September 2003.
- 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, January 2003.



Samuel S. Wagstaff Jr.

Professor of Computer Science (1983)

B.S., Massachusetts Institute of Technology, 1966

Ph.D., Cornell University, 1970

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 $bn \pm 1$, $b = 2, 3, 5, 6, 7, 10, 11, 12$ 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 www.ams.org/online_bks/conm22), and *Cryptanalysis of Number Theoretic Ciphers*, CRC Press, 2002.

Selected Publications:

- Samuel S. Wagstaff, "Prime numbers with a fixed number of one bits or zero bits in their binary representation", *Experimental Mathematics*, v. 10 (2001), pp. 267-273.
- Samuel S. Wagstaff, "Prime divisors of the Bernoulli and Euler numbers", *Proceedings of the Millennial Conference on Number Theory*, Urbana, Illinois, May 21-26, 2000, M. A. Bennett, B. C. Berndt, N. Boston, H. G. Diamond, A. J. Hildebrand, W. Philipp, eds.
- B. Dodson, A. K. Lenstra, P. Leyland, A. Muffett, and Samuel S. Wagstaff, "MPQS with three large primes", in *Algorithmic Number Theory, Proceedings" ANTS 2002*, volume 2369 of Springer-Verlag Lecture Notes in Computer Science, 2002, pp. 448-462.



Dongyan Xu

Assistant Professor of Computer Science (2001)

Assistant Professor Of Electrical And Computer Engineering (Courtesy)

B.S., Computer Science, Zhongshan University, 1994

Ph.D., Computer Science, University of Illinois at Urbana-Champaign, 2001

Professor Xu's research focuses on protection, management, and quality of service of next generation distributed systems (such as overlay and peer-to-peer networks, autonomic utility computing platforms, and mobile and pervasive applications). He has conducted research in multimedia computing and networking, mobile computing and networking, and distributed OS and middleware, all with a focus on Quality of Service (QoS) provisioning issues. He is the Year 2000 recipient of the C.L. and Jane W-S. Liu Award in the Department of Computer Science at UIUC. He is a member of ACM, IEEE, IEEE Communications Society and e-Enterprise Center at Discovery Park.

Selected Publications:

- X. Jiang and D. Xu, "SODA: a Service-On-Demand Architecture for Application Service Hosting Utility Platforms", *Proceedings of the 12th IEEE International Symposium on High Performance Distributed Computing (HPDC-12)*, Seattle, Washington, June 2003.
- Z. Li, B. Li, D. Xu, and X. Zhou, "iFlow: Middleware-assisted Rendezvous-based Information Access for Mobile Ad Hoc Applications", *Proceedings of the First ACM/USENIX International Conference on Mobile Systems, Applications, and Services (MobiSys 2003)*, San Francisco, California, May 2003.
- M. Hefeeda, A. Habib, B. Botev, D. Xu, and B. Bhargava, "PROMISE: Peer-to-Peer Media Streaming Using CollectCast", *Proceedings of ACM Multimedia 2003 (SIGMM)*, Berkeley, CA, November 2003.



David K. Y. Yau

Associate Professor of Computer Science (1997)

Associate Professor of Electrical and Computer Engineering (Courtesy)

B.S., Computer Science, Chinese University of Hong Kong, 1989

M.S., Computer Science, University of Texas at Austin, 1992

Ph.D., Computer Science, University of Texas at Austin, 1997

Dr. Yau's research interests are in network and operating system quality of service, network security, value-added services routers, and mobile wireless networks. A major goal is to improve the robustness and predictability of complex large-scale networks for heterogeneous applications.

Dr. Yau 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, and has served on the program committee of many leading ACM and IEEE conferences in networking.

Dr. Yau currently holds 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. As a graduating senior, he represented the graduating class to meet with the governor of Hong Kong. Prior to academia, he was employed as management associate and then assistant manager at Citibank, NA.

Selected Publications:

- Siu F. Yeung, John C. S. Lui, and David K. Y. Yau, "A Case for a Multi-key Secure Video Proxy: Theory, Design, and Implementation", Proceedings ACM Multimedia, Juan Les Pins, France, December 2002.
- David K. Y. Yau, John C. S. Lui, and Feng Liang, "Defending Against Distributed Denial-of-service Attacks with Max-min Fair Server-centric Router Throttles", Proceedings IEEE International Workshop on Quality of Service (IWQoS), Miami Beach, FL, May 2002.
- David K. Y. Yau and Xiangjing Chen, "Resource Management in Software Programmable Router Operating Systems", IEEE Journal on Selected Areas in Communications (JSAC), 19(3), March 2001.

RESEARCH FUNDING

Walid G. Aref

Walid Aref, "Research and Development of Database Technologies for Modern Applications (Career Award)", National Science Foundation, 9/15/2001-9/30/2006, \$300,000

Walid Aref and Ahmed K. Elmagarmid, "Integrated Detection of Energetic & Hazardous Materials (IDEHM)", NAVSEA/NSWC CRANE, 7/11/2001-9/30/2003, \$90,000

Susanne E. Hambrusch, Sunil K. Prabhakar, and Walid Aref, "Query Processing in Pervasive Location Aware Computing Environments", National Science Foundation, 9/1/2001-8/31/2004, \$220,000

Walid Aref and Aref Ghafoor, "CERIAS", CERIAS, 9/1/2001-8/14/2002, \$32,731

Walid Aref, "Technical Services for High Performance Knowledge Base, Data Mining and Non-Traditional Data Interfaces", EG&G Services (CRANE), 10/18/2002-9/30/2003, \$700,000

Walid Aref, Ahmed K. Elmagarmid, and Aref Ghafoor, "A Test-bed Facility for Research in Video Database Benchmarking", National Science Foundation, 8/15/2002-7/31/2004, \$134,998

Walid Aref, "Next Generation Software Schedulers", Purdue Research Foundation, 6/11/2001-8/11/2003, \$26,274

Mikhail Atallah

Christopher Clifton and Mikhail J. Atallah, "Collaborative Research: ITR Distributed Data Mining to Protect Information Privacy", National Science Foundation, 8/15/2003-7/31/2006, \$276,274

Mikhail J. Atallah, "General Paradigms for Watermarking and Tamperproofing Multi-Type/Media Documents", Office of Naval Research, 3/1/2002-2/28/2005, \$426,115

Mikhail J. Atallah, "Secure Supply Chain Protocols", National Science Foundation, 8/15/2003-7/31/2004, \$1,088,626

Sunil K. Prabhakar and Mikhail J. Atallah, "Watermaking Relational Databases", National Science Foundation, 6/1/2003-5/31/2006, \$149,992



Bharat Bhargava (center, back) and well-wishers at the Book of Great Teachers induction.

Eugene Spafford and Mikhail J. Atallah, "Audit Trails: Content, Storage, & Processing", National Science Foundation, 9/1/1999-8/31/2002, \$5,000

Eugene Spafford and Mikhail J. Atallah, "Audit Trails: Content, Storage, and Processing", National Science Foundation, 8/1/1999-8/31/2002, \$360,844

Mikhail J. Atallah and Victor Raskin, "Natural Language Watermarking: Watermarking Text-Meaning Representation Trees", CERIAS, 9/1/2001-8/31/2002, \$36,688

Mikhail J. Atallah, "Secure Supply Chain Collaboration: A Proposal for Exploratory Research", CERIAS, 10/1/2002-9/30/2003, \$32,100

Mikhail J. Atallah, "Private Prediction Using Selective Models", National Science Foundation, 8/1/2002-7/31/2005, \$55,423

Mikhail J. Atallah and Sunil K. Prabhakar, "Watermarking Non-media Semi-structured Content: XML & DBMS", CERIAS, 9/1/2001-8/12/2002, \$40,118

Chris Bailey-Kellogg

Chris Bailey-Kellogg and Michael Laskowski, "Distribution Functions of Standard Free Energies of Protein-Protein Assoc.", The Showalter Trust, 7/1/2003-6/30/2004, \$74,800

Chris Bailey-Kellogg, "CAREER: Sparse Spatial Reasoning for High-Throughput Protein Structure Determination", National Science Foundation, 4/1/2003-3/31/2008, \$488,063

Bharat Bhargava

Bharat Bhargava, "Vulnerability Analysis and Threat Assessment/Avoidance", National Science Foundation, 6/1/2003-4/30/2006, \$212,472

Bharat Bhargava, "A Novel Hierarchical Wireless Network: A Cellular Assisted Mobile Ad Hoc Network (CAMA)", Motorola, 3/25/2003, \$30,000

Bharat Bhargava, "A Novel Hierarchical Wireless Network: A Cellular Assisted Mobile Ad Hoc Network (CAMA)", Community Foundation Silicon Valley, 8/9/2002, \$85,000

Bharat Bhargava, "Secure Mobile Systems", National Science Foundation, 9/1/2000-9/30/2003, \$259,172

Bharat Bhargava, "Adaptable Communication Software for Differential QoS", IBM, 7/1/1999-8/15/2003, \$35,000

Bharat Bhargava, "CISE Post Doc: Experiments in Security and Quality of Service in Mobile Systems", National Science Foundation, 8/1/2001-7/31/2003, \$66,000

Bharat Bhargava, "ITR: Scalable Edge Router for Differentiated Services Networks", National Science Foundation, 10/1/2002-7/31/2005, \$363,680

Bharat Bhargava, "Formalizing Evidence & Trust for User Authorization", National Science Foundation, 8/15/2002-6/30/2005, \$332,179

Bharat Bhargava, "REU: ITR-Scalable Edge Router for Differentiated Services Networks", National Science Foundation, 10/1/2002-9/30/2003, \$15,000

Bharat Bhargava, "Experiments in Adaptable Distributed Systems", National Science Foundation, 8/15/1999-7/31/2003, \$251,500

Bharat Bhargava, "CERIAS Voluntary Support", Hewlett Packard Co, 4/15/2002-5/31/2003, \$21,120

Bharat Bhargava, "Time-Based Coordination of Networked Embedded Nodes", Defense Advanced Research Projects Agency, 8/1/2001-5/23/2004, \$155,842

Christopher W. Clifton

Christopher Clifton, "Technical Services for High Performance Knowledge Base, Data Mining and Non-Traditional Data Interfaces", EG&G Services (CRANE), 10/18/2002-9/30/2003, \$187,708

Christopher Clifton, Ananth Iyer, and Reha Uzsoy, "Purdue Discovery Park – Management of Distributed E Enterprises a Prototype Integrated Transaction Data Analysis and Visualization Environment for the Transportation, Distribution and Logistics Sector", CERIAS, 8/19/2002-5/10/2003, \$34,312

Christopher Clifton, "Privacy Preserving Distributed Data Mining", Purdue Research Foundation, 8/12/2002-8/11/2004, \$26,403

Christopher Clifton and Ahmed K. Elmagarmid, "Transportation, Distribution and Logistics: a Strategic Opportunity for Indiana and Purdue", Central Indiana Corporate Partnership, 7/7/2003-8/1/2004, \$285,000

Christopher Clifton, "Secure Programming: Add-on Course Module and Short Course", CERIAS, 8/19/2002-6/30/2003, \$44,457

Christopher Clifton and Mikhail J. Atallah, "Collaborative Research: ITR Distributed Data Mining to Protect Information Privacy", National Science Foundation, 8/15/2003-7/31/2006, \$276,274



Kihong Park and research assistants.

Douglas E. Comer

Douglas E. Comer, "Software Practice & Experience", John Wiley & Sons, 11/1/1987-12/31/2003, \$587,655

Douglas E. Comer, "Proposal to Develop a Network Systems Engineering Course and Instructional Materials", Intel Corporation, 8/1/2001-7/31/2003, \$315,000

Douglas E. Comer, "Research on Network Processors Focused on High-Level Programming", Agere Systems, 7/31/2003, \$50,900

Ahmed K. Elmagarmid

Ahmed K. Elmagarmid, Eugene Spafford, Kihong Park, John T. Korb, and Aref Ghafoor, "MSI: A Research Infrastructure for Integrated Quality of Service Management of Multimedia Computing Environments", National Science Foundation, 9/15/1999-9/30/2004, \$1,394,111

Ahmed K. Elmagarmid, "Digital Government: Database Middleware for Distributed Ontologies in State and Federal Family and Social Services", National Science Foundation, 6/1/2000-5/31/2004, \$499,998

Walid Aref and Ahmed K. Elmagarmid, "Integrated Detection of Energetic & Hazardous Materials (IDEHM)", NAVSEA/NSWC CRANE, 7/11/2001-9/30/2003, \$90,000

Walid Aref, Ahmed K. Elmagarmid, and Aref Ghafoor, "A Test-bed Facility for Research in Video Database Benchmarking", National Science Foundation, 8/15/2002-7/31/2004, \$134,998

Christopher Clifton and Ahmed K. Elmagarmid, "Transportation, Distribution and Logistics: a Strategic Opportunity for Indiana and Purdue", Central Indiana Corporate Partnership, 7/7/2003-8/1/2004, \$285,000



Attendees enjoy CS Middle School Summer Camp.

Sonia Fahmy

Catherine Rosenberg, "Collaborative Research: Testing and Benchmarking Methodologies for Future networking Security Mechanisms", National Science Foundation, 9/1/2003-8/31/2006, \$819,000

Sonia Fahmy, "Design & Evaluation of Coordinated Congestion Control Algorithms for Layered Multicast Traffic in the Internet", Purdue Research Foundation, 8/13/2001-8/12/2003, \$26,274

Sonia Fahmy, "CAREER: Exploiting Tomography in Network-Aware Protocols: Theory and Practice", National Science Foundation, 9/1/2003-8/31/2008, \$437,085

Ananth Grama

Ananth Y. Grama, "Academic Allowance for Paul Ruth", The Krell Institute, 8/1/2000-12/31/2005, \$3,000

Ahmed Sameh, Ananth Y. Grama, and Christoph M. Hoffmann, "ITR/AP: Collaborative Research on Model Reduction of Dynamical Systems for Real-time Control", National Science Foundation, 9/1/2003-8/31/2007, \$958,502

Ananth Y. Grama, "Fast Methods for Particle Dynamics and Their Applications (Career Award)", National Science Foundation, 2/15/1999-1/31/2004, \$234,947

Wojciech Szpankowski and Ananth Y. Grama, "Algebraic, Combinatorial and Probabilistic Methods for Biological Sequences", National Institute of Health, 5/15/2003-4/30/2007, \$924,865

Zhiyuan Li and Ananth Y. Grama, "ITR/SW+ACS: Dynamic Code Enhancement and Scheduling Techniques for Complex Simulations", National Science Foundation, 9/1/2000-2/28/2005, \$294,994

Ahmed Sameh, "Algorithms for Network Routers", Purdue Research Foundation, 8/1/2002-7/31/2004, \$25,792

Christoph M. Hoffmann, Ahmed Sameh, Ananth Y. Grama, Voicu Popescu, J. Bottum, David Ebert, and J. Paul Robinson, "MRI: Acquisition of Equipment for Purdue Envision Center for Data Perceptualization", National Science Foundation, 9/1/2002-8/31/2005, \$862,011

Ananth Y. Grama, "1998 Undergraduate Biological Sciences Education Program", Hughes Medical Institute, 9/1/1998-8/31/2003, \$16,732

Ananth Y. Grama, "Krell Institute/DOE Fellowship for Paul Ruth", The Krell Institute, 1/15/2001-1/14/2004, \$4,966

Bruce Alexander and Ananth Y. Grama, "Calibrating the Two Antimicrobial Susceptibility Tests", National Institute of Health, 7/1/2001-6/30/2004, \$161,197

Ahmed Sameh, Ananth Y. Grama, and Vivek Sarin, "Innovative Algorithms & Techniques for Large Scale Simulations", National Science Foundation, 9/1/1999-8/31/2003, \$308,521

Mark Lundstrom, James Bottum, Joseph Pekny, Supriyo Datta, Ahmed Sameh, Ananth Y. Grama, and Jayathi Murthy, "Network for Computational Nanotechnology", National Science Foundation, 9/15/2002-8/31/2007, \$10,500,000

Susanne E. Hambrusch

Susanne E. Hambrusch, "Data Driven Communication and Synchronization in Non-Uniform Bandwidth Computing Cluster", National Science Foundation, 9/1/2000-8/31/2002, \$123,383

Susanne E. Hambrusch, Sunil K. Prabhakar, and Walid Aref, "Query Processing in Pervasive Location Aware Computing Environments", National Science Foundation, 9/1/2001-8/31/2004, \$220,000

Dwight Lewis and Susanne E. Hambrusch, "Faculty for the Future-Engineering and Science – GE Fund", General Electric, 9/1/1997-12/31/2005, \$18,000

Christoph M. Hoffmann

Christoph M. Hoffmann, "2003 Faculty Award", IBM, 8/22/2003, \$40,000

Christoph M. Hoffmann, "Analysis of Segmented Spatial Distributions", Army Research Office, 4/15/1999-12/31/2002, \$247,187

Christoph M. Hoffmann, Ahmed Sameh, Ananth Y. Grama, Voicu Popescu, J. Bottum, David Ebert, and J. Paul Robinson, "MRI: Acquisition of Equipment for Purdue Envision Center for Data Perceptualization", National Science Foundation, 9/1/2002-8/31/2005, \$862,011

Christoph M. Hoffmann, "Tooling Net: Foundation for Multi-Client Platform for Industrial Tooling Customer-Supplier Resource Management", State of Indiana, 1/1/2002-2/15/2005, \$1,654,197



CS faculty and staff celebrate with Leading Light Award winners Shobha Potluri and Elian Haliman (center).

Ahmed Sameh, Ananth Y. Grama, and Christoph M. Hoffmann, "ITR/AP: Collaborative Research on Model Reduction of Dynamical Systems for Real-time Control", National Science Foundation, 9/1/2003-8/31/2007, \$958,502

Mileta Tomovic, Karthik Ramani, and Christoph M. Hoffmann, "Short Run Tooling Advisor", Ad Tech Inst, 12/14/2001-6/15/2004, \$450,000

Karthik Ramani, Sunil K. Prabhakar, and Christoph M. Hoffmann, "Exploratory Research for Enabling 3D Part Searching in Large CAD Repositories for Distributed Product Management", CERIAS, 9/1/2002-2/28/2003, \$29,662

Christoph M. Hoffmann, "Capturing Multilayered Design Intent Using Efficient Constraint Decomposition", National Science Foundation, 1/14/2000-8/31/2003, \$138,821

Christoph M. Hoffmann, "Topological Accuracy for Boundary Representation Models", National Science Foundation, 5/1/2002-4/30/2005, \$230,600

Christoph M. Hoffmann, "Volume-Filling Image Display Equipment", Army Research Office, 5/3/2002-2/2/2004, \$150,000

Karthik Ramani, Linda Katehi, Christoph M. Hoffmann, and Sunil K. Prabhakar, "Toolingnet: A Partnership for Enhancing the Tooling Industry in Indiana through the use of Information Technology in the Advanced Manufacturing Sector", National Science Foundation, 1/1/2003-12/31/2004, \$600,000

Antony Hosking

Jens Palsberg and Tony Hosking, "IBM Eclipse Innovation", IBM, 1/1/2003, \$28,000

Tony Hosking, "Transactional Threads for Reliable Persistent Application Systems", National Science Foundation, 9/1/2000-8/31/2004, \$215,000

Tony Hosking, "ITR/SW: Dynamic Cooperative Performance Optimization", National Science Foundation, 9/1/2000-8/31/2005, \$423,922

Jan Vitek, Jens Palsberg, and Tony Hosking, "DCMF/NES: Dynamic Compositional Middleware Frameworks for Networked Embedded", Defense Advanced Research Projects Agency, 5/31/2001-5/29/2005, \$3,274,680

Elias N. Houstis

John R. Rice and Elias N. Houstis, "Institute for Gas Turbine Dynamics Simulation (Sandia National Labs)", Department of Energy, 7/1/1998-9/30/2002, \$1,500,000

Elias N. Houstis, "Travel Support for Young Scientists to attend the EUROSCO 2003 Conference on Advanced Environments and Tools for High Performance Computing", National Science Foundation, 6/15/2003-11/30/2004, \$32,000

John R. Rice and Elias N. Houstis, "Collaborative Research: Performance-Driven Adaptive Software Design and Control", National Science Foundation, 9/15/2001-8/31/2004, \$356,239

Elias N. Houstis, "Agent Based Scalable Enterprise System for Enterprise Co-Design", National Science Foundation, 10/1/2001-9/30/2004, \$497,838

Elias N. Houstis, "Agent Oriented Approaches to a Ubiquitous Grid", National Science Foundation, 9/15/2002-8/31/2005, \$117,012

Elias N. Houstis, John R. Rice, and Terrance Weisshaar, "ITR: A Data Driven Environment for Multiphysics Applications", National Science Foundation, 10/1/2002-9/30/2005, \$467,499

Suresh Jagannathan

Suresh Jagannathan, "Investigation of IP Storage Protocols", Community Foundation Silicon Valley, 12/9/2002, \$70,000

Suresh Jagannathan, "Distributed Storage System Research", NEC Laboratories America, 11/7/2002, \$94,000

Zhiyuan Li

Zhiyuan Li and Ananth Y. Grama, "ITR/SW+ACS: Dynamic Code Enhancement and Scheduling Techniques for Complex Simulations", National Science Foundation, 9/1/2000-2/28/2005, \$294,994

Zhiyuan Li, "Compiler Techniques for Improving Data Locality in Complex Program Constructs", National Science Foundation, 9/1/1999-8/31/2003, \$175,000



Voicu Popescu (left) and students in the Graphics Lab.

Zhiyuan Li, "REU Supplement Compiler Schemes for Server-assisted Energy-efficient Mobile Computing on Handheld Devices", National Science Foundation, 5/15/2003-8/14/2004, \$7,500

Zhiyuan Li, "Compiler Schemes for Server-assisted Energy-efficient Mobile Computing on Handheld Devices", National Science Foundation, 7/1/2002-6/30/2005, \$257,078

Zhiyuan Li and David Yau, "Memory Management Software on Palm-Size Computers (21st Century Award)", State of Indiana, 8/4/2000-8/4/2003, \$393,230

Aditya P. Mathur

Aditya P. Mathur, "SERC: Industry/University Cooperative Research Center for Software Engineering", National Science Foundation, 9/1/1999-12/31/2002, \$235,052

Aditya P. Mathur, "Industry/University Collaborative: Monitoring & Control of Next Generation Systems", National Science Foundation, 9/15/2002-8/31/2004, \$25,000

Aditya P. Mathur, "Software Engineering Research Center - (North Grumman for Ball State Subcontract)", Software Engineering Research Center, 8/20/2003-8/19/2004, \$25,000

Aditya P. Mathur, "Industry/University Cooperative Research Center for Software Engineering", National Science Foundation, 9/1/1999-12/31/2002, \$100,052

Aditya P. Mathur and Raymond DeCarlo, "Modeling the Software System Test Phase as a Feedback Control System under an Incremental Development Model", State of Indiana, 7/1/2003-6/30/2004, \$30,000

Jens Palsberg

Jens Palsberg, "IBM Eclipse Innovation", IBM, 1/29/2003, \$28,000

Jens Palsberg, "ITR: Static Timing of Interrupt-Driven Software", National Science Foundation, 9/1/2001-8/31/2004, \$432,900

Jens Palsberg, "Secure Assembly of Software Systems Components", CERIAS, 6/1/2000-8/31/2002, \$106,773

Jan Vitek, Jens Palsberg, and Tony Hosking, "DCMF/NES: Dynamic Compositional Middleware Frameworks for Networked Embedded", Defense Advanced Research Projects Agency, 5/31/2001-5/29/2005, \$3,274,680

Jens Palsberg, "Efficient Crypto Implementations for Low-Power Devices", CERIAS, 9/1/2001-12/31/2002, \$37,500

Jens Palsberg, "Foundations of ILP-based Static Analysis", National Science Foundation, 9/1/2003-8/31/2006, \$270,000

Kihong Park

Kihong Park, "Toward Scalable Solutions for Distributed Denial of Service Attack Prevention", Defense Advanced Research Projects Agency, 7/1/2001-6/30/2003, \$442,284

Kihong Park, "ITR: Multiple Time Scale Traffic Control for Next Generation Internets", National Science Foundation, 9/1/2000-8/31/2004, \$280,962

Kihong Park, "Toward a QoS Provision Architecture in Noncooperative Networks: Theory and Implementation (Career Award)", National Science Foundation, 5/1/1999-4/30/2004, \$348,401

Kihong Park, "Research in the Area of Security", Xerox, 4/23/2001, \$15,000

Kihong Park, "Network Security Management Framework Research", Electronics and Telecommunications Research Institute, 11/1/2002-10/31/2005, \$78,269

Kihong Park, "CERIAS Voluntary Support", CERIAS, 7/1/2001-8/14/2002, \$45,175



Graduate students enjoy a welcome back picnic.

Ahmed K. Elmagarmid, Eugene Spafford, Kihong Park, John T. Korb, and Aref Ghafoor, "MSI: A Research Infrastructure for Integrated Quality of Service Management of Multimedia Computing Environments", National Science Foundation, 9/15/1999-9/30/2004, \$1,394,111

Voicu S. Popescu

Christoph M. Hoffmann, Ahmed Sameh, Ananth Y. Grama, Voicu Popescu, J. Bottum, David Ebert, and J. Paul Robinson, "MRI: Acquisition of Equipment for Purdue Envision Center for Data Perceptualization", National Science Foundation, 9/1/2002-8/31/2005, \$862,011

Sunil Prabhakar

Sunil K. Prabhakar and Mikhail J. Atallah, "Watermaking Relational Databases", National Science Foundation, 6/1/2003-5/31/2006, \$149,992

Sunil K. Prabhakar, "Quality-Based Hierarchical Storage Management for Multimedia Documents", Purdue Research Foundation, 11/21/2000-12/30/2002, \$26,204

Sunil K. Prabhakar, "Technical Services for High Performance Knowledge Base, Data Mining and Non-Traditional Data Interfaces", EG&G Services (CRANE), 10/18/2002-9/30/2003, \$136,633

Karthik Ramani, Sunil K. Prabhakar, and Christoph M. Hoffmann, "Exploratory Research for Enabling 3D Part Searching in Large CAD Repositories for Distributed Product Management", CERIAS, 9/1/2002-2/28/2003, \$29,662

Sunil K. Prabhakar and Aref Ghafoor, "A Transformation Framework for Developing an E-enterprise from a Legacy Enterprise", CERIAS, 9/1/2002-8/31/2003, \$30,000

Susanne E. Hambruch, Sunil K. Prabhakar, and Walid Aref, "Query Processing in Pervasive Location Aware Computing Environments", National Science Foundation, 9/1/2001-8/31/2004, \$220,000

Karthik Ramani, Linda Katehi, Christoph M. Hoffmann, and Sunil K. Prabhakar, "Toolingnet: A Partnership for Enhancing the Tooling Industry in Indiana through the use of Information Technology in the Advanced Manufacturing Sector", National Science Foundation, 1/1/2003-12/31/2004, \$600,000

Mikhail J. Atallah and Sunil K. Prabhakar, "Watermarking Non-media Semi-structured Content: XML & DBMS", CERIAS, 9/1/2001-8/12/2002, \$40,118

Sunil K. Prabhakar, "Efficient I/O for Modern Database Applications (Career Award)", National Science Foundation, 10/1/2000-9/30/2004, \$242,425

Vernon J. Rego

Vernon Rego, "Multithreaded Scalable Distributed Computing for Collaborative Multimedia", Army Research Office, 4/1/1998-3/31/2003, \$206,471

Vernon Rego, "User-Space Protocols for Distributed Applications", Purdue Research Foundation, 10/6/1999-8/16/2002, \$26,273

Vernon Rego, "Recovery Issues in Wireless Group Transport Protocols", Purdue Research Foundation, 6/16/2003-6/15/2004, \$13,263

John R. Rice

Elias N. Houstis, John R. Rice, and Terrance Weisshaar, "ITR: A Data Driven Environment for Multiphysics Applications", National Science Foundation, 10/1/2002-9/30/2005, \$467,499

John R. Rice and Elias N. Houstis, "Collaborative Research: Performance-Driven Adaptive Software Design and Control", National Science Foundation, 9/15/2001-8/31/2004, \$356,239

John R. Rice and Elias N. Houstis, "Institute for Gas Turbine Dynamics Simulation (Sandia National Labs)", Department of Energy, 7/1/1998-9/30/2002, \$1,500,000

Elisha Sacks

Elisha P. Sacks, "Collaborative Research: A Formal Theory of Robust Numerical Computational Geometry and Its Validation on Configuration Space Construction", National Science Foundation, 8/15/2003-7/31/2006, \$240,000

Elisha P. Sacks, "ITR/HCI: Practical Robot Path Planning with Contact and Velocity Constraints", National Science Foundation, 10/1/2000-9/30/2003, \$185,173

Ahmed Sameh

Ahmed Sameh, Ananth Y. Grama, and Christoph M. Hoffmann, "ITR/AP: Collaborative Research on Model Reduction of Dynamical Systems for Real-time Control", National Science Foundation, 9/1/2003-8/31/2007, \$958,502

Mark Lundstrom, James Bottum, Joseph Pekny, Supriyo Datta, Ahmed Sameh, Ananth Y. Grama, and Jayathi Murthy, "Network for Computational Nanotechnology", National Science Foundation, 9/15/2002-8/31/2007, \$10,500,000

Ahmed Sameh, "Efficient Algorithms for Large-Scale Dynamical Systems", National Science Foundation, 9/1/2000-8/31/2003, \$156,443

Ahmed Sameh, Ananth Y. Grama, and Vivek Sarin, "Innovative Algorithms & Techniques for Large Scale Simulations", National Science Foundation, 9/1/1999-8/31/2003, \$308,521

Christoph M. Hoffmann, Ahmed Sameh, Ananth Y. Grama, Voicu Popescu, J. Bottum, David Ebert, and J. Paul Robinson, "MRI: Acquisition of Equipment for Purdue Envision Center for Data Perceptualization", National Science Foundation, 9/1/2002-8/31/2005, \$862,011

Eugene H. Spafford

Melissa Dark and Eugene Spafford, "A Summer Workshop for Beginning Infosec Educators", National Science Foundation, 1/1/2002-12/31/2003, \$237,848

Eugene Spafford, "Audit Trails: Content, Storage, & Processing", National Science Foundation, 9/1/1999-8/31/2002, \$365,844

Eugene Spafford, "Forensic Evidence Capture and Analysis", MITRE Corp, 1/1/2001-12/31/2003, \$30,308

Eugene Spafford, "Access Control Management and Security in a Heterogeneous Multidomain Environment", National Science Foundation, 8/15/2002-7/31/2004, \$225,000

Eugene Spafford, "Content-Based, Context-Aware Role Based Access Control for Secure Distributed XML Applications", National Science Foundation, 1/1/2003-12/31/2005, \$299,990

Eugene Spafford, "Center for the Development of Faculty in Information Assurance", National Security Agency, 3/1/2002-2/28/2005, \$2,767,253

Eugene Spafford, "A Dual-Track Masters Degree Program for Infosec Specialists", National Science Foundation, 6/1/2001-7/31/2005, \$2,360,722

Ahmed K. Elmagarmid, Eugene Spafford, Kihong Park, John T. Korb, and Aref Ghafoor, "MSI: A Research Infrastructure for Integrated Quality of Service Management of Multimedia

Computing Environments", National Science Foundation, 9/15/1999-9/30/2004, \$1,394,111

Eugene Spafford, "Lilly Endowment", CERIAS, 1/6/1999-12/31/2002, \$4,900,000

Wojciech Szpankowski

Wojciech Szpankowski, "Information Theory and Computer Science Interface", National Science Foundation, 6/15/2003-8/31/2004, \$40,000

Wojciech Szpankowski, "Analytic Information Theory, Combinatorics, and Algorithmics: The Precise Redundancy & Related Problems", National Science Foundation, 8/1/2002-7/31/2005, \$215,000

Wojciech Szpankowski and Ananth Y. Grama, "Algebraic, Combinatorial and Probabilistic Methods for Biological Sequences", National Institute of Health, 5/15/2003-4/30/2007, \$924,865

Jan Vitek

Jan Vitek, "Resilient Mobile Agent Architecture", Motorola, 9/1/2000-8/31/2003, \$49,866

Yu Hu and Jan Vitek, "Partage: An Open Peer-to-Peer Infrastructure for Cycle-Sharing", National Science Foundation, 8/15/2003-7/31/2006, \$498,945

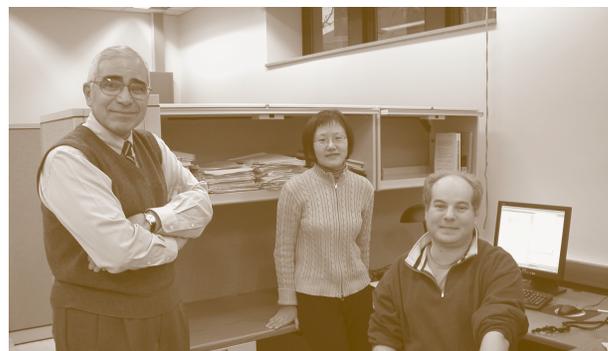
Jan Vitek, "Collaborative Research: Secure Distributed Programming", National Science Foundation, 9/1/2002-8/31/2006, \$240,000

Jan Vitek, Jens Palsberg, and Tony Hosking, "DCMF/NES: Dynamic Compositional Middleware Frameworks for Networked Embedded", Defense Advanced Research Projects Agency, 5/31/2001-5/29/2005, \$3,274,680

Jan Vitek, "Software Engineering", Microsoft Corporation, 1/15/2002, \$75,000

Jan Vitek, "CERIAS Voluntary Support", CERIAS, 1/1/1999-12/31/2002, \$62,500

Jan Vitek, "CAREER: Foundations and Implementation of Mobile Object Systems", National Science Foundation, 6/1/2001-5/31/2006, \$325,936



Ahmed Sameh with his research assistants.

Jeffrey S. Vitter

Jeffrey Vitter, "Dynamic Optimization in Databases and Information Systems, 2002 Faculty Award", IBM, 9/30/2002, \$40,000

Jeffrey S. Vitter, "External Memory Algorithms: Dealing with MASSIVE Data", Army Research Office, 9/15/2003-6/14/2005, \$107,529

Jeffrey S. Vitter, "External Memory Algorithms: Dealing with MASSIVE Data", National Science Foundation, 9/1/1999-9/30/2003, \$290,000

Dongyan Xu

Catherine Rosenberg and Dongyan Xu, "e-Courier: A Service for Enterprise Data Delivery", CERIAS, 10/1/2002-7/15/2003, \$30,000

Dongyan Xu, "Purdue Discovery Park-E-Courier: An Enhanced Service for Enterprise Data Distribution", CERIAS, 8/1/2001-8/31/2004, \$30,000

Dongyan Xu, "MARIA: A Middleware Architecture for Reliable Information Access in Mobile Ad Hoc Applications", Purdue Research Foundation, 8/18/2003-8/17/2004, \$13,263

David K. Y. Yau

David Yau, "QoS Architecture for General Purpose Network Computing (Career Award)", National Science Foundation, 3/15/1999-2/29/2004, \$255,332

David Yau, "Ensemble: Cooperative Resource Management for Cluster Web Servers", Purdue Research Foundation, 1/1/2001-4/15/2004, \$26,210

Zhiyuan Li and David Yau, "Memory Management Software on Palm-Size Computers (21st Century Award)", State of Indiana, 8/4/2000-8/4/2003, \$393,230

GRADUATE STUDENTS, CURRICULUM, AND LEARNING



Graduate Instructors, Graduate Research Assistants, and Fellows

Graduate Teaching Assistants

Saumya Agarwal
Dan I. Ardelean
Mehmet Derya Arikkan
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Ethan Lee Blanton
Marina Valeryevna Bykova
Ji-Won Byun
Sarah Ann Caruthers
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Frank Mueller
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Sambamurthy

Rupak Sanjel
Amit Jayant Shirsat
Manish Singh
Andrew Brian Smith
David John Spigarelli
Baskar Sridharan
Sriram Srinivasan
Tiberiu Vasile Stef-Praun
Benjamin Lawrence Titzer
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Pranathi Venkatayogi
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Chin-Ying Wang
Qiqi Wang
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Yan Wu
Youchan Yao
Xiaoduan Ye
Puneet Zaroo
Haiya Zou

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Mohamed Hassan Ali
Dan I. Ardelean
Mahendra Babu Arugundram
Hrikrishna
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Jayesh Pandey
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Shobha Chowdary Potluri
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Prathima Rama Rao
Huan Ren
Wenhui Ren
Vidyut Samanta
Piyush Shukla
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Huiying Xu
Rong Xu
Hiroshi Yamauchi
Weiqiang Yang
Yu Yang
Ossama Mohamed Younis
Yuhui Zhong

Fellows

Jason Baker
Megan Carney
Brian Joseph Denny
Joseph-Patrick Roger Dib
Hicham Galal Elmongui
Lucas Jon Fisher
Jason Mark Fox
Keith Byron Frikken
Roger Patrick Gorman
Craig Michael Grube
Dmitri V. Kalashnikov
Darren Joseph King
Yungbin Benjamin Lee
Robert Preston Light
Bernard Kevin McShea
Tamara Lonette Morris
Anna Saputera
April Wilhelmina Savoy
Andrew Brian Smith
David Thomas Vos
Jeffrey David Wassil
Scott Yost



COURSES

110 Introduction to Computers
 149 Web Programming
 152 FORTRAN Programming for Engineers
 154 FORTRAN Programming
 156 C Programming for Engineers
 158 C Programming
 178 Introduction to Computer Science
 180 Programming I
 182 Foundations of Computer Science
 190V Web Programming
 192 Freshman Resources Seminar
 197 Freshman Honors Seminar
 235 Introduction to Organizational Computing
 240 Programming Laboratory (C)
 250 Computer Architecture
 251 Data Structures
 290B Web Database Programming
 314 Numerical Methods
 334 Fundamentals of Computer Graphics
 348 Information Systems
 352 Compilers: Principles and Practice
 354 Operating Systems
 381 Introduction to the Analysis of Algorithms
 390S Secure Programming
 397 Honors Seminar
 406 Software Engineering I
 422 Computer Networks
 426 Computer Security
 434 Advanced Computer Graphics
 448 Introduction to Relational Database Systems
 483 Introduction to the Theory of Computation
 490B Introduction to Bioinformatics
 490N Network System Design
 490S Secure Network Programming
 491 Senior Resources Seminar
 497 Honors Research Project
 501 Introduction to Computational Science
 502 Compiling and Programming Systems
 503 Operating Systems
 514 Numerical Analysis
 515 Numerical Linear Algebra
 525 Parallel Computing
 526 Information Security
 530 Introduction to Scientific Visualization
 531 Computational Geometry
 535 Interactive Computer Graphics
 536 Data Communication and Computer Networks
 541 Database Systems
 542 Distributed Database Systems
 543 Introduction to Simulation and Modeling of Computer Systems
 555 Cryptography
 580 Algorithm Design, Analysis, and Implementation
 584 Theory of Computation and Computational Complexity
 590A Advanced Database Systems
 590B Topics in Computational Molecular Biology
 590C Network Processor Seminar
 590E Topical Lectures in Information Security
 590G Image-Based 3D Computer Graphics
 590N Topics in Peer-to-Peer Networks and Systems
 590N Network System Design
 590R Algorithms for Communication Networks
 590S Programming Languages and Compilers Seminar
 590V Programming Languages and Compilers Seminar: Resource-Aware Computing 2003
 615 Numerical Solution of Partial Differential Equations
 626 Advanced Information Assurance
 636 Internetworking
 641 Multimedia Database Systems

Ph.D. Graduates

August 2003

Dennis William Brylow

Static Checking of Interrupt-Driven
 Software

Advisor: J. Palsberg

Hoi Chang

Building Self-Protecting Software with
 Active and Passive Defenses

Advisor: M. J. Atallah

Md Ahsan Habib

Monitoring and Controlling QoS Network
 Domains: An Edge-to-Edge Approach

Advisor: B. Bhargava

Baskar Sridharan

Enforcing Safety in Pervasive
 Computing Environments

Advisor: A. P. Mathur

May 2003

Dmitri V. Kalashnikov

Efficient Querying of Constantly
 Evolving Data

Advisor: S. K. Prabhakar

Christopher Adam Telfer

Abstractions and Efficient Implementation
 of Automatically Reconfigurable
 Network Testbeds

Advisor: D. E. Comer

December 2002

Thomas Earl Daniels

Reference Models for the Concealment
 and Observation of Origin Identity in
 Store-and-Forward Networks

Advisor: E. H. Spafford

Huan Ren

Aggregate-Flow Scheduling: Theory and
 Practice

Advisor: K. Park

GUEST SPEAKERS

Date	Name	Association	Talk Title
FALL 2002			
Sep. 11	Prof. Thorsten Braun	University of Bern	Mobile Information and Communication Systems – A Swiss National Center of Competence in Research
Sep. 23	Prof. Peter Scheuermann	Northwestern University	FAST: A New Sampling-Based Algorithm for Discovering Association Rules
Sep. 30	Prof. Alan Frieze	Carnegie-Mellon	Approximate Sampling and Counting
Oct. 3	Prof. Kai-Yuan Cai	Beijing University	Software Testing in the Context of Software Cybernetics
Oct. 7	Prof. Azer Bestavros	Boston University	Practical and Efficient Construction of Network Caricatures
Oct. 14	Dr. C.W. Gear	NEC Research Institute	Macro Scale Numerical Analysis from Microscopic Simulators
Oct. 15	Prof. Robin Kravets	University of Illinois, Urbana	Security in Ad Hoc Networks
Oct. 18	Prof. S. Muthukrishnan	Rutgers University	Data Stream Processing: Algorithms and Applications
Oct. 21	Prof. Bruno Codenotti	University of Chicago	Generating Realistic Data Sets for Combinatorial Auctions
Oct. 24	Dr. Doug Busch	Intel	Lessons Learned from an Evolving e-Enterprise
Oct. 31	Prof. James Noble	Victoria University	Aliasing and Ownership in Object-Oriented Systems
Nov. 4	Dr. Gadiel Seroussi	Hewlett-Packard Laboratories	On Hats and Other Covers
Nov. 8	Dr. David Spellmeyer	Signature BioScience	“Cells First” Drug Discovery
Nov. 11	Prof. Jiawei Han	University of Illinois, Urbana	Mining Unusual Patterns in Data Streams: Methodologies and Research Problems
Nov. 15	Prof. Amin Vahdat	Duke University	Dynamically Provisioning Distributed Services for Target Levels of Performance, Availability, and Data Quality
Nov. 18	Dr. Peter Neumann	SRI International	The Artful Practice of Developing Trustworthy Systems
Nov. 25	Prof. Dan Rubenstein	Columbia University	Using Overlays to Increase Network Robustness
SPRING 2003			
Jan. 13	Prof. Steve Blackburn	Australian National University	Garbage Collection: The Next Generation
Jan. 27	Prof. Ramgopal Mettu	Dartmouth	The Online Median Problem
Jan. 30	Dr. Vijay Srinivasan	IBM & Columbia University	Theory of Dimensioning
Feb. 6	Prof. Li-San Wang	The University of Texas, Austin	Distance-Based Genome Rearrangement Phylogeny
Feb. 10	Dr. Mukesh Mohania	IBM – India Research Lab	Maximizing Realized Revenue in a Web-Based Dutch Auction
Feb. 20	Prof. John Regehr	University of Utah	Principles and Pragmatics for Embedded Systems
Feb.17	Dr. Ninghui Li	Stanford University	A Role-Based Trust-Management Framework
Feb. 27	Dr. Christina Nita-Rotaru	Johns Hopkins University	Secure Group Communication
Mar. 3	Prof. Uri Keich	University of California, San Diego	On Designing Seeds for Similarity Search in Genome DNA
Mar. 5	Dr. Vivek Sarkar	IBM	The Jikes RVM and its Dynamic and Adaptive Optimizing Compiler
Mar. 6	Prof. Kevin Compton	University of Michigan	On the Synthesis of Cryptographic Protocols
Mar. 7	Prof. Rajmohan Rajaraman	Northeastern University	Meet and Merge: Approximation Algorithm for Confluent Flows
Mar. 10	Mr. Ting Yu	University of Illinois, Urbana-Champaign	Trust Establishment and Access Control over the Internet
Mar. 13	Ms. Michelle Strout	University of California, San Diego	Performance Transformations for Irregular Applications
Mar. 24	Dr. Banu Ozden	Bell Laboratories	QoS Support in Operating Systems
Mar. 26	Dr. Daisuke Kihara	Buffalo Center of Excellence in Bioinformatics	Genome-Scale Protein Structure Prediction
Mar. 27	Prof. Michael Goodrich	Johns Hopkin	Distributing Authentication and Integrity Services
Mar. 31	Prof. Jiong Yang	University of Illinois, Urbana-Champaign	Mining Biological Data
Apr. 2	Mr. Todd Millstein	University of Washington	Reconciling Software Extensibility with Modular Program Reasoning
Apr. 3	Dr. Prasun Sinha	Bell Laboratories	Transport Layer Fairness on Wireless LANs
Apr. 7	Prof. Daniel Aliaga	Princeton University	Capturing and Rendering Real-World Environments
Apr. 7	Prof. Lavy Libman	Technion, Israel	Pricing and its Impact on Failure Recovery Strategies in Large-Scale Networks
Apr. 10	Prof. Mema Roussopoulos	Stanford University	Controlled Update Propagation in Peer-to-Peer Networks
Apr. 14	Prof. Alberto Medina	Boston University	Practical Estimation of Internet Traffic Demands
Apr. 16	Prof. Robert Skeel	University of Illinois, Urbana-Champaign	Computational Methods for Biomolecular Simulation
Apr. 21	Mr. Mung Chiang	Stanford University	Balancing Supply and Demand of Bandwidth in Communication Networks
Apr. 22	Prof. Thomas Henzinger	University of California, Berkeley	From Models to Code: The Missing Link in Embedded Software
Apr. 23	Dr. William Cleveland	Bell Laboratories	Statistical Multiplexing: Math and Stat Take Over the Internet
May 5	Prof. Elisa Bertino	University of Milano, Italy	Secure and Selective Dissemination of XML Data in the Author –X System
May 19	Dr. Neal Glew	Intel Corporation	Open Runtime Platform: Flexibility with Performance Using Interfaces
June 2	Prof. Peter Dinda	Northwestern University	Virtuoso: Distributed Computing Using Virtual Machines

STAFF

Department

Susanne Hambrusch, Department Head
 Jens Palsberg, Associate Head
 John T. (Tim) Korb, Assistant Head
 Paula Perkins, Administrative Assistant

Business Office

Mary Bell, Business Manager
 Linda Byfield, Account Clerk
 Margaret Floyd, Account Clerk
 Tammy Muthig, Account Clerk
 Amber Vibbert, Account Clerk

Office of Development

Mary Jo Bartolacci, Director of Development
 Jean Jackson, Corporate Relations
 Pat Morgan, Secretary

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Brian Board, Hardware
 Ron Castongia, Facilities Manager
 Charles Fultz, UNIX Software
 Kip Granson, Windows Software
 Nathan Heck, Windows Software
 Nick Hirschberg, Webmaster and DBA
 Mike Motuliak, Hardware
 Steve Plite, UNIX Software
 Dan Trinkle, Tech. System Administrator
 Candace Walters, Administrative Assistant

Graduate Office

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 Amy Ingram, Graduate Secretary
 Renate Mallus, Graduate Office Coordinator

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 Mirette Marzouk, Systems Programmer
 Sherri Neibert, Administrative Assistant

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 Mindy Hart, Outreach Coordinator
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The top half of the page features a blue background with a grid of white dots. On the right side, there are several overlapping circles of varying sizes, some of which are highlighted with a bright blue glow. The Purdue University logo is positioned in the upper left corner of this section.

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DEPARTMENT OF COMPUTER SCIENCES

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