<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message from the Head</td>
<td>3</td>
</tr>
<tr>
<td>About Purdue University</td>
<td>4</td>
</tr>
<tr>
<td>Computing Facilities</td>
<td>5</td>
</tr>
<tr>
<td>Faculty</td>
<td>6</td>
</tr>
<tr>
<td>Research Laboratories</td>
<td>20</td>
</tr>
<tr>
<td>Research Funding</td>
<td>22</td>
</tr>
<tr>
<td>Corporate Partners</td>
<td>27</td>
</tr>
<tr>
<td>Education</td>
<td>28</td>
</tr>
<tr>
<td>Guest Lectures</td>
<td>30</td>
</tr>
</tbody>
</table>
I am pleased to update you on important developments that took place in our department during the 1999–2000 academic year and the beginning of this current academic year, 2000–01. Enrollment in our undergraduate and graduate courses continues to increase and our graduates are in great demand by all sectors of industry. Perhaps the most significant news item is that five new faculty members have joined us during this period. Walid Aref, Sonia Fahmy, Clay Shields and Jan Vitek joined us in August 1999, and Yinlong Sun joined the ranks of our faculty in August 2000. Brief biographies and the research interests of these talented individuals appear in this report. During the same period, Sunil Prabhakar received an NSF-Career award, thus bringing the number of our junior faculty members who have received NSF-Career awards to a total of six. On the whole, our faculty has national and international recognition in their respective fields. One member of our faculty is a member of the National Academy of Engineering, four are IEEE Fellows, and four are ACM Fellows.

The second most significant development has been the pending request by the University to the State of Indiana for a new building for our department. If the first stage of this building materializes with help from private funds, a part of the department would move into new quarters as early as 2004 with the remaining following in 2006. This new building would provide the department with adequate research and instructional space to accommodate our anticipated growth in the number of faculty and graduate students.

Our faculty has continued to be successful in securing an increasingly large sum of research funds from federal agencies, the State of Indiana, and private industry. Two grants totaling approximately $4 million stand out as examples of cooperation among our faculty. These two grants are an NSF Research Infrastructure grant, and a grant from the State of Indiana 21st Century Fund.

I would like to report that a great colleague and one of the giants of Numerical Analysis and Computational Mathematics, Professor Walter Gautschi, has decided to retire from CS & Mathematics at Purdue effective the Fall semester of the 2000–01 academic year. However, Professor Gautschi will continue his research activities as usual. We will cherish his great contributions as a teacher and miss him as a wonderful and talented colleague.

The future of this department looks promising with its renowned senior faculty providing the much-needed stability and its junior faculty offering the fresh intellectual vibrancy needed to survive in this fast changing world of technology.
Purdue University

Founded in 1869, Purdue University is a public, state-assisted, doctoral-granting research university. The West Lafayette campus enrollment for the Fall of 1999 was 37,762 students from 50 states and 127 countries.

Purdue is a birthplace of ideas. It is a place of great accomplishments, where faculty and students explore knowledge and make significant contributions to virtually every aspect of contemporary life. With a keen vision of the future the University actively regenerates itself to meet the needs of each new generation.

Purdue maintains a tradition of providing students with a superior, yet affordable education. Faculty members are leaders in their fields. Extensive library, computer, and laboratory resources give students the opportunity to explore interests and develop research skills.

For more information, see <http://www.purdue.edu>.

GREATER LAFAYETTE

The home of Purdue University, Greater Lafayette is friendly and spirited. Steeped in history, yet moving steadily towards the future, it is a community with a delightful mixture of Midwestern charm and metropolitan attractions.

The Native Americans were the first to discover the beauty of the Wabash Valley. Then the French arrived in the early 1700’s establishing a trading post at Quiatenon, and changes began in the valley. Indiana’s newest state park and the Museums at Prophetstown will be opening in phases during the years 2000 and 2001 to celebrate our history.

Separated by the Wabash River, Lafayette and West Lafayette have populations of 49,104 and 30,406 respectively. Residents are able to enjoy all the changes of the four seasons. The average mean temperature in January is 23 degrees F and 73.3 degrees F in July. The average mean rainfall is 36.1 inches and 22.4 inches average snowfall. Greater Lafayette is just off Indiana’s Interstate 65, and only 120 miles from Chicago and 60 miles from Indianapolis.

For more information, see <http://www.lafayette-in.com>.
The Department of Computer Sciences

The Department of Computer Sciences at Purdue University, West Lafayette, one of the oldest such departments in the United States, offers challenging B.S., M.S., and Ph.D. programs for about 900 undergraduate and 150 graduate students.

The graduate faculty consists of 38 persons (about 32 full-time equivalents) whose interests span most of computer science: analysis of algorithms and theory of computation, compilers and programming languages, databases, geometric modeling and scientific visualization, information security, networking and operating systems, scientific computing, and software engineering.

Computer Science Department 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, two hardware engineers, seven 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. These facilities include six Sun multiprocessor systems, a 32 CPU SGI Origin 2000, two Intel 32 CPU clusters and one 48 CPU cluster, and several Sun and Intel servers. 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 Silicon Graphics workstation on their desks.

Educational Facilities

Computing systems used by students enrolled in both graduate and undergraduate computer science courses include over 100 Intel PCs running either Sun Solaris x86 or Windows 2000. Four rooms in the Computer Science Building and nearby Recitation Building are dedicated to laboratory-based instruction using these facilities. A later section (Purdue University Computing Center Facilities) lists equipment owned and maintained by the Computing Center but used by computer science students.

I/O Equipment

The department operates both special-purpose output devices as well as general output equipment, including about 60 laser printers, color printers, color scanners, video projectors, a digital video editing suite, 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 forty 10 Mbps and 100 Mbps Ethernet hubs and switches included in the Computer Science Building connect the workstations to the departmental computing facilities. Experimental wireless networks are also used in the building. A fiber-optic ATM link connects departmental systems to other systems on campus, as well as to the Internet community via both "commodity" and Internet2/Abilene connections. ISDN and ADSL services are in use for remote access from a number of nearby sites.

Purdue University Computing Center Facilities

In addition to the facilities described above, students and faculty have access to computing systems owned and operated by the Purdue University Computing Center (PUCC). General instructional facilities operated by PUCC include large Sun SPARC servers and several Sun and Intel workstation laboratories. In addition, PUCC provides systems for use in courses taught by the CS 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 PUCC, including a large IBM SP cluster.

CS Department Computers

![Diagram of CS Department Computers]

- Solaris x86 33%
- Win 2000 28%
- Other Win 7%
- Solaris SPARC 17%
- Linux 3%
- XINU 5%
- IRIX 7%
- Other Win 7%
Shreeram S. Abhyankar

Marshall Distinguished Professor of Mathematics, Professor of Computer Sciences and Industrial Engineering (1988)
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 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.

David C. Anderson

Professor of Mechanical Engineering and Computer Sciences (1975)
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 Sciences (1984)
Dr. Engineering, Electronic Engineering, University of Naples (Italy), 1973; Dipl. Perf., Computer Science, University of Salerno (Italy), 1976

Professor Apostolico's research interests are in the areas of algorithmic analysis and design and parallel computation. His recent work deals with algorithms and data structures for combinatorial pattern matching problem 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, 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 and 1997 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, the International Colloquium on Automata, Languages, and Programming, the IEEE Data Compression Conference, the IFIP Conference on Parallel Algorithms for Irregularly Structured Problems, the Workshop on Algorithms and Data Structures, Research in Computational Biology (RECOMB), and as an invited speaker at various international conferences and advanced schools.

Walid G. Aref

Associate Professor of Computer Sciences
Ph.D., University of Maryland, College Park, 1993

Walid G. Aref is an associate professor of computer science at Purdue. His research interests are in database systems, spatial and multimedia data indexing, video servers, network-attached storage devices, data mining, algorithms and data structures, and geographic information systems (GIS).

Selected Publications:


Mikhail Atallah
Professor of Computer Sciences (1982)

Professor Atallah’s current research interests are information security and algorithms (in particular, for geometric and parallel computation). 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, 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.

Selected Publications:


Bharat Bhargava
Professor of Computer Sciences (1988)
Ph.D., Electrical Engineering,
Purdue University, 1974

Professor Bhargava’s research involves both theoretical and experimental studies in distributed systems. His research group has implemented a robust and adaptable distributed database system called RAID, an adaptable video conferencing system and is involved in networking research using ideas of active routers, diffserv, and mobileIP. Prof. Bhargava has conducted experiments in large scale distributed systems, communications, authentication, key management, fault-tolerance and Quality of Service. He is conducting experiments with large scale communication networks to support emerging applications such as digital library and multimedia databases. His current interests are in secure mobile systems, multimedia security and QoS as a security parameter.

Professor Bhargava was the chairman of the IEEE Symposium on Reliable and Distributed Systems held at Purdue in October 1998. Professor Bhargava is on the editorial board of three international journals. 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. Bhargava is a fellow of Institute of Electrical and Electronics Engineers and 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. He has received an IEEE Technical Achievement award for the major impact of his decade long contributions to foundations of adaptability in communication and distributed systems in 1999. Prof. Bhargava’s students have received best paper awards in International conferences and have started a Nasdaq listed company.

Selected Publications:


Douglas E. Comer
Professor of Computer Sciences (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. Comer’s research is experimental. He and his students design and implement working prototypes of large, complex systems. The operating system and protocol software that has resulted from Comer’s research has been used by industry in a variety of products.

Professor 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. 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 eleven 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 fifteen of the top sixteen Computer Science departments listed in the *U.S. News and World Report* ranking. Comer is a fellow of the ACM and the recipient of numerous teaching awards.

Professor Comer is the editor of the research journal *Software-Practice and Experience*, published by John Wiley & Sons. He is the former chairman of the CSNET technical committee, the DARPA Distributed Systems Architecture Board, and was a member of the Internet Activities Board.

Samuel D. Conte
Professor Emeritus of Computer Sciences and Mathematics (1962)
B.S., University of Buffalo, 1943;
M.A., Mathematics, University of Buffalo, 1946;
Ph.D., University of Michigan, 1950
Professor Conte was head of the Department of Computer Sciences from 1962 to 1979 and director of the University Computing Center from 1962 to 1968. Before coming to Purdue, he was manager of the Programming and Analysis Department at TRW Systems from 1956 to 1962 and a professor of mathematics at Wayne State University from 1948 to 1956.

Professor Conte’s early research was primarily in the area of numerical analysis and mathematical software. He is co-author of *Elementary Numerical Analysis* (McGraw-Hill), currently in its third edition. In recent years, his research has centered around software engineering in general and software metrics in particular. He has been deriving and experimentally testing models for software effort estimation and programmer productivity as well as metrics for software complexity.

Professor Conte is a senior scientist in the NSF-sponsored Software Engineering Research Center (SERC), a joint center at Purdue University and at the University of Florida. He is co-author (with H. E. Dunsmore and V. Y. Shen) of *Software Engineering Metrics and Models*, Benjamin/Cummings Publishing Company, 1986.

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, Website 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 was selected Outstanding Teacher in the School of Science at Purdue University in 1980. He was selected one of the Top Ten Teachers in the School of Science in both 1994 and 1995. He is a 1996 recipient of the Charles B. Murphy Outstanding Undergraduate Teaching Award at Purdue University. He was a Founding Fellow of the Purdue University Teaching Academy in 1997. He was also nominated in 1997 by Purdue University for the Carnegie Foundation U.S. Professor of the Year program. 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). In April, 1999, he was selected for the Book of Great Teachers honoring outstanding teaching by Purdue faculty and displayed in the west foyer of the Purdue Memorial Union. He is a member of the Phi Beta Kappa and Upsilon Pi Epsilon (honor society for the computing sciences).

Dr. Dunsmore has extensive legal and industrial consulting experience. He has written over 60 technical articles. He is co-author (with William Theobald) of *Internet Resources for Tourism and Leisure*, Butterworth-Heinemann Publishing Co., 2000.
Wayne R. Dyksen
Associate Professor of Computer Sciences (1984)
B.A., Mathematics, Calvin College, 1977
M.S., Applied Mathematics, Purdue University, 1979
Ph.D., Applied Mathematics, Purdue University, 1982

Professor Dyksen’s current research interests are in numerical analysis, especially the solution of partial differential equations. Most recently, Dyksen has derived explicit closed-form expressions for the Hermite cubic approximations to both the eigenvalues and the eigenfunctions of the Laplace operator for both the Dirichlet and the Neumann problems. Moreover, for the Dirichlet case, he shows that optimal approximations are obtained using the Gauss points for collocation points.

Dyksen and Robert Lynch have recently developed a new decoupling technique for solving the linear systems arising from Hermite cubic collocation solutions to boundary value problems with both Dirichlet and Neumann boundary conditions. While the traditional approach yields a linear system of order $2N \times 2N$ with bandwidth 2, this new technique decouples this system into two systems, one with a tridiagonal system of order $N-1 \times N-1$ and the other with the identity matrix of order $N \times N$.

Dyksen is now at the University of Nebraska at Omaha.

Ahmed K. Elmagarmid
Professor of Computer Sciences (1988)
B.S., Computer Science, University of Dayton, 1977;
M.S., Computer and Information Science, Ohio State University, 1981;
Ph.D., 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 multibase 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:

Sonia Fahmy
Assistant Professor of Computer Sciences (1999)
Ph.D., The Ohio State University, 1999

Sonia Fahmy’s current research interests are in the design and evaluation of network architectures and protocols. She is currently investigating quality of service and traffic engineering in computer networks, multipoint communication, transport of voice and video over the Internet, and wireless networks. She has been very active in the Traffic Management working group of the ATM Forum, and has participated in several IETF working groups. She has designed, implemented, simulated and analyzed several traffic management schemes and options, for unicast and multicast communication. The work is published in over 40 ATM Forum contributions, and over 30 journal and conference papers. Some of the results of her work were incorporated in the ATM Forum traffic management specifications 4.0 and 4.1. A patent has also been awarded for one of her algorithms. Sonia is a member of the ACM, IEEE, Phi Kappa Phi, Sigma Xi, and Upsilon Pi Epsilon, and is listed in International Who’s Who in Information Technology 1999. She has served on the program committees and organized sessions in a number of networking conferences.

Selected Publications:


Greg N. Frederickson
Professor of Computer Sciences (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.


Selected Publications:


Walter Gautschi
Professor of Computer Sciences and Mathematics (1963)
Ph.D., Basel (Switzerland), 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 Washington, Argonne National Laboratory, the Wright-Patterson Air Force Base, ETH Zurich, and the University of Padova. 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 has been the managing editor of Mathematics of Computation and, since 1991, an honorary editor of Numerische Mathematik.

Selected Publications:


Ananth Grama
Assistant Professor of Computer Science
B.E., Computer Science and Technology, University of Roorkee, India, 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 multiclered environments. Models for platform abstractions and performance modeling are also being developed. His research on applications has focused on particle dynamics methods, their applications to dense linear system solvers, and preconditioning sparse systems. More recently, he has also been working on fast algorithms for data compression and analysis.

Professor Grama has authored several papers and co-authored a text book Introduction to Parallel Computing: Design and Analysis of Algorithms with Vipin Kumar, Anshul Gupta, and George Karypis. Another book is forthcoming entitled Principles of Parallel Programming co-authored with Vipin Kumar and George Karypis.

Selected Publications:


Concettina Guerra
Associate Professor of Computer Sciences (1984)
Dr. Sc. Math., University of Naples, (Italy), 1972

Professor Guerra’s research interests are in the area of computer vision, image processing and computational biology. She is currently working on the design and implementation of efficient algorithms for object representation and recognition. She is also interested in the application of techniques developed for vision tasks to problems arising in computational biology.

Susan E. Hambrusch
Professor of Computer Sciences (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, scalable systems and algorithms, query processing, and analysis of algorithms. Her research contributions include parallel algorithms for image processing and graph problems, communication and synchronization for data-driven high performance applications, and algorithms for VLSI layout and routing problems. 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 in the Purdue University Book of Great Teachers and was selected in 1999 as one of the Ten Best Teachers of Undergraduates.

Selected Publications:


Christoph M. Hoffmann
Professor of Computer Sciences (1976)
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.


Selected Publications:


http://www.cs.purdue.edu
Antony Hosking
Assistant 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, resilience, distribution and security) in the context of the Smalltalk, Modula-3, and Java programming languages.

Selected Publications:

Elias N. Houstis
Professor of Computer Sciences (1984)
B.S., Mathematics, University of Athens, Greece, 1969;
Ph.D., Mathematics, Purdue University, 1974

E.N. Houstis is a Professor of Computer Science and Director of the Computational Science & Engineering Program. He has served as acting and associate Head of the Department of Computer Sciences for several years. Houstis is on the editorial board of Neural, Parallel and Scientific Computations, Computational Engineering Science, and HPC Users Web-Based Journals and a member of the IFIPWG 2.5 WorkingGroupin 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 on-line learning. He is one 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 WebParallel ELLPACK server. Houstis has been involved in the design of a knowledge-based framework (known as PYTHON) to support the use of algorithms and machine pairs for a given class of PDEs 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 MS students.

Houstis’s 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, Greek Research Foundation.

Zhiyuan Li
Associate Professor of Computer Science (1997)
B.S., Mathematics, Xiamen University, China, 1982
M.S., Computer Sciences, University of Illinois, Urbana, 1985
Ph.D., Computer Sciences, University of Illinois, Urbana, 1989

Zhiyuan Li has led a group to design and implement an inter-procedural parallelizing Fortran compiler, called Panorama, which performs highly efficient array data flow analysis to enable aggressive loop parallelization and locality-enhancement program transformations. Li collaborates with a group at the University of Minnesota to build the Agassiz C compiler to perform similar tasks on C programs.

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 Transactions 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 as program committee member for several international conferences, including IEEE/ACM International Parallel Processing Symposium (IIPSPDP), ACM International Conference on Supercomputing and International Conference on Parallel Processing.

Selected Publications:
Bradley J. Lucier
Professor of Mathematics and Computer Sciences (1981)
B.S.(Hon.), 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 ten years on wavelet and multiresolution methods for image processing and other applications. His early work on image and surface compression was with Ronald DeVore and Bjorn Jawerth of the University of South Carolina. Later, he and DeVore collaborated with researchers at the Moffit Cancer Center at the University of South Florida to apply these techniques and theories to compressing images in telemammography.

Lucier's recent research on the relationship between variational problems and wavelet techniques for image processing has been joint with DeVore, Antonin Chambolle of the University of Paris-Dauphine, and Lucier's ex-student, Namyong Lee. They showed that the wavelet shrinkage method introduced by David Donoho and Iain Johnstone could be formulated as the solution of a variational inequality, and they provided sharper bounds on the error incurred by the method. Lucier also worked with Chambolle on a new mathematical formulation of translation-invariant wavelet shrinkage, a technique introduced by Donoho and Ronald Coifman for smoothing images, as a new, nonlinear, wavelet-based, image smoothing scale space.

Most recently, Lucier has worked with Namyong Lee to obtain improved techniques for tomographic reconstruction from noisy data with specific application to Positron Emission Tomography, an important method of brain imaging. He hopes to continue and expand his research into various methods of medical imaging.

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

Selected Publications:


Robert E. Lynch
Professor Emeritus of Computer Sciences 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. Areas of his research include differential equations, linear algebra, software for solving elliptic partial differential equations, and computational biology. He and G. Birkhoff have written the monograph *Numerical Solutions of Elliptic Problems*, SIAM Publications, 1985.

Dan Cristian Marinescu
Professor of Computer Sciences (1984); M.S., Electrical Engineering, Polytechnic Institute, Bucharest, 1965
M.S., Electrical Engineering and Computer Science, University of California at Berkeley, 1969;
Ph.D., EECS, Polytechnic Institute, Bucharest, 1975

Dan Marinescu is Professor of Computer Sciences and (by courtesy) of Electrical and Computer Engineering. Before coming to Purdue, Dr. Marinescu was an associate professor of EECS at the Polytechnic Institute in Bucharest and then a senior researcher at GSI Darmstadt. During the Summer of 1985, he was a visiting professor at the IBM T.J. Watson Research Center, Yorktown Heights, New York, and in the Summer of 1993 he was a visiting scientist at the Scalable Systems Division of Intel. His research interests cover real-time systems, computer networks, performance evaluation of computer and communication systems, parallel and distributed systems, and scientific computing.

Dr. Marinescu was the chief architect of a real-time data acquisition and analysis system used in experiments leading to the discovery of the superheavy elements: meitnerium, hessium, and nielsbohrium. He is currently leading a project in computational biology, which is focused on the development of parallel algorithms and methods for the 3-D atomic structure determination of large macromolecules like viruses. He is also involved in the Scalable I/O Initiative.

Selected Publications:


Aditya P. Mathur
Professor of Computer Sciences (1987)
B.E., Electrical Engineering, BITS, Pilani, India, 1970;
M.S., Electrical Engineering, BITS, Pilani, India, 1972;
Ph.D., Computer Science, BITS, Pilani, India, 1977

Aditya Mathur conducts research in the areas of software testing and reliability. Research questions of interest to Mathur relate to the effectiveness, scalability, and cost of various test adequacy criteria. 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 the use of a sequence of testing techniques. This device is often used by vendors to enhance marketing of their test tools. Mathur’s current work deals with test and management of Internet services. His research group has developed Wabash, a tool for the test and management of CORBA services. Mathur is Director of the Software Engineering Research Center (SERC), an NSF IUCRC, and an Associate Head of the Department of Computer Sciences.

Selected Publications:

Jens Palsberg
Associate Professor of Computer Science (1996)
Ph.D., Computer Science, University of Aarhus, 1992

Professor Palsberg’s main research interests are programming languages, compilers, software engineering, and software security. He has authored over 50 technical papers in these areas. Before coming to Purdue Palsberg was a visiting scientist at various institutions, including MIT. His 1994 book with Michael Schwartzbach is entitled Object-oriented Type Systems. In 1998 he received the National Science Foundation Faculty Early Career Development Award, and in 1999 he received the Purdue University Faculty Scholar award. Dr. Palsberg’s research has been supported by NSF, DARPA, IBM, and British Telecom. Dr. Palsberg is a member of the editorial board of IEEE Transactions on Software Engineering.

Selected Publications:


Kihong Park
Assistant Professor of Computer Sciences (1996)
B.A., School of 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 a 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. In 2001, he is organizing an SPIE Workshop titled The Internet as a Large-Scale Complex System (co-chair: Dr. Walter Willinger), March 29-31, to be held at the Santa Fe Institute, and a SPIE Conference titled Scalability and Traffic Control in IP Networks (co-chair: Dr. Sonia Fahmy), August 20-24, at the Colorado Convention Center in Denver.

Selected Publications:


Purdue News Service photo by David Umbarger
Sunil Prabhakar

Assistant Professor of Computer Sciences (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 issues in large-scale, distributed applications such as multimedia databases, data warehouses, and digital libraries. The efficient execution of I/O is a critical problem for these applications. He is currently developing techniques that improve I/O performance for traditional and multimedia databases. He has developed declustering algorithms for multidimensional data that result in increased parallel I/O scheduling algorithms for robotic removable media libraries. Dr. Prabhakar’s interest also lies in the design and development of digital libraries for the management and study of scientific research data. Prior to joining Purdue, Dr. Prabhakar held a position with TataUnisys Ltd. from 1990 to 1994.

Selected Publications:


Vernon J. Rego

Professor of Computer Sciences (1985)
M.Sc., Mathematics, BITS, Pilani, India;
M.S., Computer Science, Michigan State University;
Ph.D., Computer Science, Michigan State University, 1985

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. Professor Rego was also awarded a German Research 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 Sciences (1964)
Ph.D., California Institute of Technology, 1959

Professor Rice is founder of 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 problemsolving 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 twenty or so articles of 2000 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.
Ahmed Sameh
Department Head; Samuel D. Conte Professor of Computer Science
Ph.D., University of Illinois at Urbana-Champaign, 1968
Ahmed Sameh is the Samuel D. Conte Professor and Head of Computer Science at Purdue University, West Lafayette. He joined Purdue in January, 1997, after being the Head of Computer Science at the University of Minnesota, Minneapolis, and the holder of the William Norris Chair in Large-Scale Computing, for four and half years. His current research interests include numerical linear algebra, the design and performance analysis of parallel numerical algorithms, as well as the design of application-specific problem solving environments.
Sameh received his B.Sc. from the University of Alexandria, Egypt in 1961, M.S. from Georgia Institute of Technology in 1964, and Ph.D. from the University of Illinois (U-C) in 1968, all in Civil Engineering (Structural Mechanics). He was a faculty member of the Department of Computer Science at the University of Illinois (U-C) from 1968 to 1991. He is a Fellow of ACM, IEEE, the American Association for the Advancement of Science (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:


Elisha Sacks
Associate Professor of Computer Sciences (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. The next area that he studies may involve machine learning, scientific visualization, physical simulation, or robotics. His unique skill is in combining (often esoteric) mathematics with (often inarticulated) domain knowledge with (often idealized) computational methods to solve real-world problems.

Clay Shields
Assistant Professor of Computer Sciences (1999)
B.S., Electrical Engineering, University of Virginia, 1989;
M.S., Computer Engineering, University of California Santa Cruz, 1996; Ph.D., Computer Engineering, University of California Santa Cruz, 1999
Clay Shields' research interests lie in the area of network security. He is currently studying the construction, properties and analysis of anonymous communication protocols. Conversely, he is also examining how to trace packets and streams through a network, with the goal of being able to track network intruders. His other interests include secure unicast and multicast routing protocols, network denial of service, and provisioning for network audit data.

Clay was born in Washington, D.C., and spent much of his childhood living overseas as required by the career of his stepfather, who was a covert agent for the CIA. Clay got an undergraduate degree in electrical engineering from the University of Virginia, and then as a computer programmer on Capitol Hill, joined the U.S. Army as an infantry officer with the 101st Airborne Division, he served overseas with the peace-keeping force in the Sinai Peninsula, earning a commendation for liaison work with the Egyptian and Israeli military. Clay left the Army to return to graduate school. After a year at the University of Maryland, making up background requirements, he attended the University of California at Santa Cruz. For his dissertation he studied computer networking, particularly multicast routing and network security issues.
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. In May of 1998 Purdue University established the Center for Education and Research in Information Assurance and Security (CERIAS) with Spaf as its Director. This university-wide center is intended to address the broader issues of information security and information assurance, and draw on expertise and research across all of the academic disciplines at Purdue. Because of its structure, and the incorporation of the previously-existing COAST Laboratory group in its activities, the CERIAS is the largest and most broadly-structured academic research center in the world in its field.

Among many professional activities, Dr. Spafford is a member of the Computing Research Association’s Board of Directors, the Board of Directors of (ISC)². In October of 2000, Gene received one of the field’s most prestigious awards: the NIST/NCSC National Computer Systems Security Award. He is a charter recipient of the Computer Society’s Golden Core, and he has been named as a Fellow of the ACM, as a Fellow of the AAAS, and as a Fellow of the IEEE.


Selected Publications:


FACULTY

Wojciech Szpankowski

Professor of Computer Sciences (1985)
M.S., Electrical Engineering and Computer Science, Technical University of Gdansk, 1976;
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 he was Assistant Professor at the McGill University, Montreal. During 1992/1993 he was Professeur Invité at INRIA, Rocquencourt, France. His 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, queuing 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 editors 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 book series Advances in the Theory of Computation and Computational Mathematics.

Selected Publications:


Jan Vitek

Assistant Professor of Computer Sciences (1999)
B.S., SES, University of Geneva, 1989;
M.S., Computer Science, University of Victoria, 1995;
Ph.D., SES, University of Geneva, 1999

Professor Vitek is interested in efficient implementation of object-oriented programming languages, information security and mobile code. His long-term research is to develop secure languages for mobile computations over the Internet. Currently Dr. Vitek is focusing on implementation techniques for customizable Java Virtual Machines. This research is being conducted in the Secure Software Systems Lab which was founded in January 2000 by Profs Vitek, Hosking and Palsberg.

Dr. Vitek was born in Czechoslovakia and left that country for Switzerland well before it became the Czech Republic. He earned his MSc in Computer Science from the University of Victoria in beautiful British Columbia and a PhD from the University of Geneva, Switzerland in 1999. Dr. Vitek’s research interests revolve around object-oriented programming languages, compilers and software engineering. He has authored over 30 papers in these areas. He has edited books on mobile objects and secure Internet programming. He has served on program committees for international conferences including OOPSLA, ECOOP, POPL, ESOP, ICALP, ASA/MA, SACMAT. Dr. Vitek is a member of CERIAS.

Selected Publications:


Computer Sciences Annual Report
FACULTY

Samuel S. Wagstaff, Jr.
Professor of Computer Sciences (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. SmithoftheUniversity of Georgia have built a special processor with parallel capability for factoring large integers. He is the author of Factorizations of $b^n \pm 1, b = 2, 3, 5, 6, 7, 10, 11, 12$ up to high powers, Contemporary Mathematics, 22, American Mathematical Society, Providence (1983) (second edition 1988), (with John Brillhart, D. H. Lehmer, J. L. Selfridge and Bryant Tuckerman).

Selected Publications:


David K. Y. Yau
Assistant Professor of Computer Sciences (1997)
B.S., Computer Sciences, Chinese University of Hong Kong, Hong Kong, 1989
M.S., Computer Sciences, University of Texas, 1992
Ph.D., Computer Sciences, University of Texas, 1997

David Yau was born in Hong Kong. After getting his Bachelor's degree in computer science from the Chinese University, he spent one year in the local computing industry, with the Systems and Technology group of Citibank, NA. He then entered graduate school at the University of Texas at Austin, where he completed his Ph.D. as a member of the Networking Research Lab.

David is interested in network and operating system architectures and algorithms for quality of service (QoS) provisioning. He is also interested in multimedia coding over IP. He and his students prototype OS and router services on experimental network platforms, and measure their performance impact on benchmark applications. He was the recipient of an IBM graduate fellowship at Texas. In 1999, he received an NSF CAREER award, for OS and network research on QoS.

David is a member of ACM and IEEE. He has been a reviewer for many IEEE and ACM journals and conferences. He has also served on the program committees of IEEE International Conference on network Protocols and IEEE Real-time Systems Symposium.

Selected Publications:


The Bond Laboratory is dedicated to interdisciplinary research in computer science and computational structural biology. Our research is focused on the application of parallel and distributed computing for solving these and other problems. Bond is a Java-based distributed object system and agent framework. It implements message-based middleware and associated services like directory, persistence, monitoring, and security. Bond allows easy construction of multi-agent, distributed applications. Another application of Bond will be a Virtual Laboratory supporting data annotation and metacomputing.

Key technical ideas of the Bond Agent framework include a multi-plane state machine agent model with multiple semantic engines, a component-based architecture (strategies and planes), an agent description language (Blueprint and XML), dynamic agent behavior (agent assembly, mobility, surgery, trimming, and lazy loading of strategies), and multi-lingual, inter-agent communication (KQML and XML).

The laboratory is equipped with several high performance graphics systems and several other workstations. For more information about the research projects conducted in the lab, contact Prof. Marinescu (dcm@cs.purdue.edu) or visit <http://bond.cs.purdue.edu>.

ELLPACK-PDELab is a very high-level language developed at Purdue for the numerical solution of elliptic partial differential equations. The laboratory supports the development of extensions of ELLPACK as well as research in scientific computing in general. The principal extension is PDELab which provides a problem solving environment for general partial differential equations and solutions on parallel computers. High performance graphics workstations are used in developing and implementing innovative approaches to interactive scientific computing. All of the laboratory equipment is networked to the SoftLab facilities as well as to the general departmental facilities. For more information about ELLPACK, visit <http://www.cs.purdue.edu/ellpack>.

The Internetworking Systems Lab houses equipment used for continuing research in the Internetworking, Xinu, and Crosspoint projects. This equipment includes several Sun workstations (including multiprocessor machines), Intel workstations, and several Hewlett-Packard servers and workstations. In addition, the lab contains both processor and communication equipment for the Crosspoint project. This includes a set of Intel workstations that serve as routers to the wireless net, a FORE ATM switch used as a backbone net for the Intel workstations, and several PCs with wireless Ethernet.

The Network Systems Lab (NSL) houses people and research equipment related to the study of networks and distributed systems. Specific research areas include self-similar traffic control, real-time multimedia traffic control, scalable Internet quality of service provision architectures, distributed operating systems, fault-tolerance in distributed systems, and ATM network security. The research projects are supported by grants from NSF, the Purdue Research Foundation, Santa Fe Institute, and Sprint. Additional equipment and software support is provided by Cisco, FORE Systems, and Intel.

Equipment housed in the NSL include 30+ single- and dual-processor UltraSPARC, Intel, and SGI workstations running Solaris, Linux, and Windows NT, several private subnets with ATM, IP, and FastEthernet switches, studio quality video/audio capture devices, real-time MPEG 1 & 2 compression engines, four Cisco 7206VXR routers, and a laser printer. For more information about the Network Systems Lab, visit <http://www.cs.purdue.edu/nsl>.

The Indiana Center for Database Systems (ICDS) takes an interdisciplinary approach to solving practical problems in a wide variety of database applications. Research activities of the Center include multimedia databases, data and system integration, data quality, data mining, and data warehousing. Outreach and educational activities include a summer institute for minority students and associations with the Indiana University Medical Center. Technology transfer to state agencies and industries is a major component of ICDS activities. Support from the Indiana 21st Century Research and Technology Fund has created the Indiana Telemedicine Incubator to develop database technologies for the health care industry. The National Science Foundation (NSF) Digital Government program is sponsoring a study of ontologies in state and federal family and social services databases. For more information about ICDS, visit <http://www.cs.purdue.edu/icds>. 
The RAID Laboratory at Purdue has a software environment for conducting scientific research in a variety of subjects: communication experiments for distributed applications, network communication measurement experiments, experimental analysis of communication infrastructure, adaptability experiments for distributed systems, replication and recovery experiments for distributed database systems, concurrent check-pointing and rollback-recovery algorithms, concurrency control for distributed database systems, efficient implementation techniques for distributed systems, digital library, and mobile computing. The laboratory has a network of Sun workstations running the RAID distributed system and Unix operating system. In addition, several systems such as RAID, mini-RAID, and a variety of communication libraries are available. For more information about the RAID project, visit <http://www.cs.purdue.edu/people/bb>.

The Parallel Computation and Simulation Laboratory (PacsLab) supports research that is experimental and multidisciplinary. The emphasis is on methodologies and tools for seamless, secure, scalable, and fault-tolerant concurrent computing on heterogeneous networked platforms. Central to this effort is the notion of domain-oriented software support. Current projects include research on threads systems, network protocols, active messaging communications environments, integrated network services, parallel simulation systems, and a threads-based message passing interface (MPR). The lab maintains a 100 Mbit subnet of 10 Intel workstations, five Sun SPARC 5 systems, a quad-processor SPARC 20, a Silicon Graphics Indigo, and access to a 140-node Intel Paragon via an ATM network. The machines communicate over a 100 Mbps switched Ethernet. The lab was equipped with funding from the Department of Computer Sciences, Intel, NSF, ARD, and ONR. For more information on PacsLab, please see <http://www.cs.purdue.edu/research/PaCS/PaCS.html>.

The Secure Software Systems Lab designs and implements systems for secure execution of untrusted code, tools for high-assurance computing, and infrastructure for programming language research. We have developed open-source software in the areas of mobile computation, embedded systems, and persistent programming. Our approach is to apply programming language techniques such as type systems, static analysis, and compiler optimizations to a variety of problems including Java security, bytecode compression, software watermarking, real-time system verification, and high-performance persistent storage. Our research is currently supported by NSF, CERIAS, Sun Microsystems, Motorola, Lockheed-Martin, IBM, and Intel. For more information about The Secure Software Systems Lab, visit <http://www.cs.purdue.edu/s3>.

The Software Engineering Research Center Laboratory was established in 1986 with funding from the Software Engineering Research Center and Purdue University. Additional equipment and material have been added through subsequent NSF grants, contributions from the Department of Computer Sciences, and enhancement grants from SERC affiliates. The lab provides a multi-system base of resources to support the research activities of the faculty and students working in the SERC. Resources in the lab and SERC offices include a Sun server, several Sun SPARC workstations, Intel-based PCs, and laser printers. For more information about the Software Engineering Research Center, visit <http://www.serc.net>.

SoftLab. The NSF-sponsored SoftLab laboratory maintains state-of-the-art parallel processing and graphics facilities. In addition to over 30 Sun and Intel-based workstations, the lab includes access to three high-performance 32-processor Intel-based compute servers using dual, quad, and 8-way architectures. The lab uses a wireless infrastructure for experiments in mobile computing. For more information about the SoftLab project, visit <http://www.cs.purdue.edu/research/cse/softlab/softlab.html>.
Researchers in the department are using the 32-processor SGI Origin 2000 computer to produce high-speed simulations of physical phenomena. In the example, fluid is forced up from a grate through a stack of particles. The computer model calculates the complex fluid flow and collision results, then generates a movie to provide a visual display of particle movement. The SGI Origin 2000 was funded by a grant from the National Science Foundation.

This list includes research grants active between September 1999 and December 2000. Research grants are sorted by the name of the (local) principal investigator and co-investigator(s).

**Alberto Apostolico**

**Walid Aref**

**Mikhail J. Atallah**

**Bharat Bhargava**

**Douglas E. Comer**
Ahmed K. Elmagarmid

Sonia Fahmy

Greg N. Frederickson

Ananth Y. Grama


Susanne E. Hambrusch

Christoph M. Hoffmann

Tony Hosking
Elias N. Houstis


Bradley J. Lucier


Robert E. Lynch

RESEARCH FUNDING


Kihong Park. The Internet as a Complex System, Santa Fe Institute, Fellow-at-Large, 8/00–7/01, $5,000.

Kihong Park, QoS-Aware, Secure and Reliable Distributed Scheduling, Xerox, 11/00–10/01, $15,000.


Vernon Rego


John R. Rice


### Research Funding

<table>
<thead>
<tr>
<th>Agency</th>
<th>Funding Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Science Foundation</td>
<td>43.0%</td>
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<tr>
<td>Private Industries/Foundations</td>
<td>21.8%</td>
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<tr>
<td>Advanced Research Projects Agency (DARPA/ARPA)</td>
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<tr>
<td>National Security Agency / Department of Defense</td>
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<tr>
<td>Army Research Office</td>
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<tr>
<td>Office of Naval Research</td>
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<td>Purdue Research Foundation</td>
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<tr>
<td>NASA National Aeronautics and Space Administration</td>
<td>1.9%</td>
</tr>
<tr>
<td>Other</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

**Elisha P. Sacks**


**Ahmed Sameh**


**Clay Shields**


**Eugene Spafford**


**Wojciech Szpankowski**


Wojciech Szpankowski and I. Kontoyiannis. Towards Analytic Information Theory. Purdue Global Initiative Faculty Grant. 3/01/99, $10,000.


**Jan Vitek**

Jan Vitek and Antony Hosking. CERIAS Project. CERIAS. 6/1/99–6/30/01, $41,558

Jan Vitek. Lockheed Martin. 6/1/00–6/30/01, $50,000.

**Samuel Wagstaff**


**David Yau**


David Yau. CERIAS Project. CERIAS. 6/00–6/01, $50,000.

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. They 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.

A subset of the Corporate Partners Program is the Corporate Partners Council. Members are executives or senior managers with select CPP companies participating at the “partner” level. They 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, insight in drafting the departmental strategic plan, ideas regarding retention and enrollment issues, collaborative efforts with faculty and student research, as well as alerting the department to industry areas of concern.

Aprimo Steve Ehrlich
The Boeing Company Bob Byrne
Centillion Data Systems Bill Miller
Centrics Don Shaffer
Eli Lilly Mike Rudicle
Guidant Jim Mapel
Hewlett Packard Janice Zdankus
IBM Sanjiva Weerawarana
Intel Kevin Kahn
Lockheed Martin Rich Kahler
Lucent Technologies Helen Bauer
Made2Manage Gary Rush
Microsoft John Spencer
Motorola Jack Leifel
Raytheon Systems Jerry Slater
RealMed Larry Giggerich
Schlumberger Meyer Bengio
Tektronix Steve Sutton
Tivoli Systems Bryan Everly
TRW Dave Capka

http://www.cs.purdue.edu
Computer Science Courses

These regular courses were offered by Computer Science faculty during the academic year 1999–2000.

110 Introduction to Computers
152 FORTRAN Programming for Engineers
154 FORTRAN Programming
156 C Programming for Engineers
158 C Programming
178 Introduction to Computer Science
180 Programming I
181 Programming II
192 Computer Science Resources Seminar
235 Introduction to Organizational Computing
250 Computer Architecture
251 Data Structures
348 Information Systems
352 Compilers: Principles and Practice
354 Operating Systems
381 Introduction to the Analysis of Algorithms
406 Software Engineering I
407 Software Engineering II
414 Numerical Methods
422 Computer Networks
426 Computer Security
435 Computer Graphics and Visualization
448 Introduction to Relational Database Systems
483 Introduction to the Theory of Computation
491 Senior Resources Seminar
502 Compiling and Programming Systems
503 Operating Systems
510 Software Engineering
514 Numerical Analysis
520 Computational Methods in Analysis
525 Parallel Computing
535 Interactive Computer Graphics
536 Data Communication and Computer Networks
541 Database Systems
542 Distributed Database Systems
543 Introduction to Simulation & Modeling of Computer Systems
555 Cryptography and Data Security
565 Programming Languages
580 Algorithm Design, Analysis, and Implementation
584 Theory of Computation and Computational Complexity
603 Advanced Topics in Distributed Systems
615 Numerical Solution of Partial Differential Equations
636 Internetworking

Graduate Assistants

Sanjay Agrawal
Srinivas Avasarala
Matthew Baarmen
Biana Babinsky
Anna Berdichevskaya
Binita Binita
Ladislau-Lehel Bölöni
Dennis Brylow
Florian Buchholz
Jason Byars
Bogdan Carbanar
Brian Carrier
Hoi Chang
Rahul Chari
Jiawan Chen
Xiangjing Chen
Gong Cheng
Yung-Pin Cheng
Yui Chow
Jared Crane
John Cruz
Jiangtai Dai
Thomas Daniels
Nitesh Dhanjani
Yonghua Ding
Wenliang Du
James Early
Guotong Feng
Chapman Flack
Ravi Gadde
Ravi Ganesh Ithal
Sudipto Ghosh
Rajeev Gopalakrishna
Priya Govindarajan
Vinay Gupta
Robert Gwadera
Md Ahsan Habib
Moustafa Hammad
Kaichuan He
Daniel Hintz
Feng Hong
Jianying Huang
Georgios Iakoulov
Mohamed Ali Ibrahim
Ihab Ilyas
Ioannis Ioannidis
Karthik Jaganathan
Sandeep Jain
Jing Jia
Akshay Johar
Kyung Koo Jun
Dmitri Kalashnikov
Sarat Kamisetty
Jaganathan Karthik
Tapan Prem Karwa
Ambarish Kenghe
Florian Kerschaibn
Young Jun Kim
Matthew Knepley
Yulianto Ko
Atul Kumar
Benjamin Kuperman
Minseok Kwon
Min-Ho Kyung
Usman Latif
Kaiyu Li
Long Li
Zhongwei Liang
Ph.D. Recipients

August 2000

Yung-Pin Cheng
Refactoring Design Models for Composition Verification, Conformance Testing, and Inductive Verification
Advisor: M. Young

Steven M Cutchin
Flexible User Interface Coupling with Operation Transformation
Advisor: C. Bajaj

Young Jun Kim
Visualization and Animation for Situation Awareness in the Battlefield
Advisor: C. M. Hoffmann

Sudipto Ghosh
Testing Component-Based Distributed Applications
Advisor: A. P. Mathur

May 2000

Ladislau-Lehel Bölöni
Contributions to Distributed Object and Agent Systems
Advisor: D. C. Marinescu

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