THE OHIO STATE UNIVERSITY

2007-2008 Annual Report

Dept. of Computer Science and Engineering

It is CSE's intention every year to make the Annual Report representative of the whole Department. With this ideal in mind, a design contest is held every year open to Graduate and Undergraduate students.

This year's winner was James Dickson, a junior CSE major who hails from Granville, Ohio.

THE OHIO STATE UNIVERSITY

DEPARTMENT OF
COMPUTER SCIENCE
AND ENGINEERING

Contents

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Mission Statement

- *The Department of Computer Science and Engineering will impact the information age as a national leader in computing research and education.*
- *We will prepare computing graduates who are highly sought after, productive, and well-respected for their work, and who contribute to new developments in computing.*
- *We will give students in other disciplines an appropriate foundation in computing for their education, research, and experiences after graduation, consistent with computing's increasingly fundamental role in society.*
- *In our areas of research focus, we will contribute key ideas to the development of the computing basis of the information age, advancing the state of the art for the benefit of society, the State of Ohio, and The Ohio State University.*
- *We will work with key academic partners within and outside of OSU, and with key industrial partners, in pursuit of our research and educational endeavors.*

Greetings from the Chair's Office

Dear Colleges, Alumni, Friends, and Parents,

As we reach the end of the 2007-2008 academic year, I am glad to introduce you a new annual report of the department. As you will read in this report, CSE continues to make progress in many aspects. In the past year, the department experienced different evaluations: the Ph.D. program was assessed by the graduate school at Ohio State, the department was comprehensively reviewed by an external team; and our national ranking was updated by the US News and World Report's Special Issue on Best Graduate Schools. All the evaluation results are very encouraging, which also prepare us for a current strategic planning activity of the department in short and long terms. I would like to highlight several accomplishments to be presented in the report.

- *Assistant Professor Yusu Wang received an NSF Career Award. The total number of NSF Career Awardees in the department is accumulated to 20, which is more than one third of the total awardees in the University. Several former CSE graduates also received NSF Career awards this year, and the total number of Career winners of CSE alums also reaches 20. (see page 1)*
- *Professor DK Panda was elected as an IEEE Fellow for his contributions high performance and scalable communication in parallel and high-end computing systems. (see page 1)*
- *We welcome Radu Teodorescu as a new CSE assistant professor. Radu has just received his Ph.D. in Computer Science from University of Illinois, and his research interests are in the area of computer architecture. (see page 45)*
- *We have extended the Industrial Advisory Board by adding two new members. The annual board meeting was held in the Spring this year. (see page 12)*
- *The Ph.D. production this year reached to a record high: a total of 32 students received Ph.D.s from the department (see page 29)*
- *Finally, I would like to give my congratulations to Atanas (Nasko) Rountev for being promoted to the rank of associate professor with tenure.*

The department published two issues of Buckeye Blog, the CSE News letter, last year, which is another regular publication to connect the department to her alums, friends, and the research/academic community. To our alumni, I ask you to please provide your professional and personal achievements for us to share in CSE newsletters and annual reports. Your successes are always inspiring.

Xiaodong Zhang
Robert M. Critchfield Professor and Chair
Department of Computer Science and Engineering
The Ohio State University

2008 ACHIEVEMENT & HIGHLIGHTS

Faculty

❖ Wang Wins the Helmholtz Award

The International Neural Network Society (INNS) has awarded **Dr. DeLiang (Leon) Wang** the 2008 Helmholtz Award for his contributions in sensation and perception. The INNS awards program annually recognizes up to three individuals in the field of neural networks who have made outstanding contributions in biological learning, sensation/perception, or engineering/application. Wang received his award at the 2008 World Congress on Computational Intelligence.

Prof. Wang leads the Perception and Neurodynamics Laboratory part of CSE's Artificial Intelligence group. This is not Professor Wang's first IEEE research honor. In 2007, he received the IEEE Computational Intelligence Society Outstanding Paper Award and IEEE named him a Fellow in 2004. He received the OSU-College of Engineering Lumley Research Award in 1996, 2000 and 2005.

❖ Yusu Wang Receives NSF CAREER Award

The National Science Foundation (NSF) has awarded **Dr. Yusu Wang** the prestigious NSF CAREER Award for her research entitled "Geometric and Topological Methods in Shape Analysis, with Applications in Molecular Biology."

Her project will focus on shape characterization and matching in molecular biology. It is generally believed that the functionalities of proteins are largely determined by their three dimensional structures. Hence understanding molecular functionality, a task essential to fundamental biological problems such as protein folding and drug design, depends on precise analysis of molecular structures. However, while much success has been achieved in molecular sequence analysis, success on the structural side is more limited, to a large degree due to a lack of accurate and efficient characterization and matching algorithms. To address these challenges, this project focuses on shape characterization and matching using geometric and topological methods, with driving applications coming from molecular shape analysis. In particular, it will investigate the fundamental issues in molecular shape matching and characterization, study the mathematical structure behind these problems, and develop practical algorithms that are also theoretically sound.

By developing effective computational frameworks for manipulating and processing various geometric shapes, this project provides an important step towards large-scale molecular structural analysis, which is essential to understanding life at the molecular level. At the same time, this multi-disciplinary project helps to broaden the scope of theoretically sound computational methods for real-life problems, as well as to further bridge computer science, mathematics, and structural biology.

Dr. Wang received her M.S. and Ph.D. degrees from Duke University in 2000 and 2004, respectively, and a B.S. degree from Tsinghua University in 1998. Before joining OSU, she was a post-doctoral researcher at the Geometric Computing lab at Stanford University from 2004-2005. She received the Department of Energy Early Career Award in 2006.

The NSF CAREER program recognizes and supports junior faculty who show the attributes necessary to become the academic leaders of the 21st century. This is the 20th NSF CAREER award for a CSE faculty member.

❖ New IEEE Fellow

The Institute of Electrical and Electronics Engineers (IEEE) has bestowed the honor of IEEE Fellow to **Dr. Dhabaleswar (DK) Panda** for contributions to high performance and scalable communication in parallel and high-end computing systems.

Professor Panda has received numerous acknowledgments of his research expertise including multiple best paper

awards, a thrice winner of the OSU College of Engineering Lumley Research Award and many Keynote Speaker invitations. DK joined CSE in 1991 after receiving his PhD from the University of Southern California.

According to their website, IEEE "honors accomplishments that have contributed importantly to the advancement or application of engineering, science, and technology, bringing the realization of significant value to society. The IEEE Fellows are an elite group from around the globe, they are looked to for guidance, and leadership as the world of electrical and electronic technology continues to evolve." Every year only 0.1% of the IEEE members are elected Fellows, the highest rank within the IEEE. Currently, about 2% of the membership holds the Fellow rank.

❖ Parthasarathy Receives IBM Award

Dr. Srinivasan Parthasarathy received the highly competitive IBM Faculty Award for 2007 in recognition of his work on Architecture Conscious Data Analysis and Management. The challenge of efficient use of hardware has long been a major concern in the fields of database management and data mining. It is only recently that significant efforts in the community have been spent on this problem. Careful algorithmic restructuring coupled with sound methods to explicitly leverage architectural features are essential to enable one to realize performance that is commensurate with emerging hardware technology.

Parthasarathy and his students have been exploring this problem domain and have successfully deployed architecture conscious solutions for key data mining algorithms such as association rule mining, tree-mining and graph mining as well as in the context of indexing XML data. Details on this work can be found at the Data Mining Research Lab's website.

The IBM Faculty awards program is a competitive international program intended to foster collaboration between researchers at leading universities worldwide and those at IBM research. To qualify for this program, candidates must have an outstanding reputation for contributions in their field and show unusual promise.

❖ Network-Based Computing Laboratory Software Runs Some of the Fastest Supercomputers

In November 2007 and again in the June 2008, TOP500.org listed the fastest supercomputers in the world. In each list, the MVAPICH software created by **Dr. DK Panda** and his team ran one of the top five. In the June list Texas Advanced Computing Center (TACC), running a 62,976-core Sun Blade System (Ranger) with Opteron Quad Core 2.0 GHz and MVAPICH software, was ranked fourth (4th). Dr. Panda's creation has impacted the list at this height since November 2003.

Since its inception in 2002, more than 700 organizations world-wide have started using MVAPICH to extract the potential of emerging networking technologies for modern systems such as InfiniBand, iWARP and other RDMA-enabled interconnect networking technologies. MVAPICH, pronounced "em-vah-pich," delivers high performance, scalable and fault-tolerant MPI (Message Passing Interface) for clusters using InfiniBand or 10Gigabit Ethernet/iWARP networking technologies.

This project is supported by funding from U.S. National Science Foundation, U.S. DOE Office of Science, Cisco Systems, Intel, Linux Networx, Mellanox, QLogic, and Sun Microsystems; and equipment donations from Advanced Clustering, AMD, Apple, Appro, Chelsio, Dell, Fulcrum Microsystems, Fujitsu, IBM, Intel, Mellanox, Microway, NetEffect, Obsidian, QLogic and Sun Microsystems. Another technology partner is TotalView Technologies.

According to their web site, the Top500 project "was started in 1993 to provide a reliable basis for tracking and detecting trends in high-performance computing. Twice a year, a list of the sites operating the 500 most powerful computer systems is assembled and released. The best performance on the Linpack benchmark is used as performance measure for ranking the computer systems. The list contains a variety of information including the system specifications and its major application areas."

❖ Rountev - Faculty Promotion

The Ohio State University Board of Trustees has approved the promotion of **Dr. Atanas (Nasko) Rountev** to Associate Professor with tenure.

Dr. Rountev joined OSU-CSE in 2002 and recently earned an NSF CAREER

Award (2007). Atanas's research interests are in software engineering and programming languages. In particular, he is working in static and dynamic program analysis, software understanding and evolution, software testing, component-based software, distributed software, aspect-oriented software, and high-performance computing. Prior to his arrival in Columbus, he received his PhD and Masters degrees from Rutgers University.

❖ CSE Welcomes New Faculty Member

The Department of Computer Science and Engineering is very excited about a new addition to our faculty.

Long time collaborator, **Dr. Christopher Brew** decided his research is becoming more computer science centered and has transferred to CSE as a full time faculty member. He will maintain a joint position in the Department of Linquistics, but his home shall now be with us. Dr. Brew's arrival deepens and strengthens our Artificial Intelligence Area.

Dr. Sadayappan with his wife, Valli and daughter, Shambavi.

❖ Sadayappan Receives College of Engineering Lumley Award

The College of Engineering presented **Dr. P. Sadayappan** with a College Lumley Award.

Ponnuswamy Sadayappan is a member of CSE's Systems Group, one of the most productive research areas. He has received the Lumley award twice before as well as several conference Best Paper Awards. As his research excellence is well known, he is also recognized as an excellent teacher and CSE has twice given him the Outstanding Teaching Award.

The Lumley Research Award, established to promote and enhance research within CoE, is given to a select group of outstanding researchers who have shown exceptional activity and success pursuing knowledge within their fields. This is the 23rd Lumley earned by a CSE faculty member.

❖ CSE Group, IBM & Georgia Tech Collaboration

IBM has initiated a broad-scale collaborative project focusing on self-managing features for virtualized data centers in a cloud computing environment. Chosen as their partners are The Ohio State University Department of Computer Science and Engineering and The Georgia Institute of Technology. Working through each school's Center for Experimental Research in Computer Systems (CERCS), this project includes the creation of a prototype computing cloud linking data centers from the two institutions. It is called the Critical Enterprise Cloud Computing Services (CECCS) facility.

At OSU, **Drs. Rajiv Ramnath** and **Jay Ramanathan** will handle the project through CSE's CERCS for Enterprise Transformation and Innovation (CETI).

❖ Select ARO, NSF and NGA Awards

- The Army Research Office (ARO) has awarded a Multidisciplinary University Research Initiative (MURI) grant to **Ness Shroff** and collaborators from Pennsylvania State, the leader on the project, Harvard, Duke and the University of British Columbia. This project, entitled "Design of Urban Sensor Networks," aims at understanding how data centric organization of sensor networks can enable efficient data fusion of spatial-temporal events in urban environments. This has become a critically important problem given the monitoring and sensing needs in the military's fight against global terrorism and the Department of Defense's use of network centric warfare.
- National Science Foundation (NSF) is supporting **Bruce Weide** and Harvey Friedman (OSU Mathematics) on a new project, "Logical Support for Verification." This collaboration among logicians and software engineering researchers also involves Jeremy Avigad from Carnegie Mellon University and Murali Sitaraman from Clemson University. The team will undertake a number of specific projects in mathematical and software verification that are considered key to the Reusable Software Research Group's vision of addressing the 'verifying compiler' grand challenge.

- **Xiaodong Zhang** leads a collaborative Network Technology and Systems-Networking of Sensor Systems (NeTS-NOSS) grant entitled "Leapnet: Self-Adaptable All Terrain Sensor Networks." He and his collaborators, Li Xiao, Matt Mutka, and Ning Xi from Michigan State University, will address algorithmic and system issues for sensors to be deployed in the areas of difficult terrain and natural obstacles, where radio signals can be partially or fully blocked.
- OSU leads an NSF Human and Social Dynamics award entitled "Using Machine Learning to Model The Interplay of Production Dynamics and Perception Dynamics in Phonological Acquisition." Mary Beckman (OSU-Linguistics) and **Eric Fosler-Lussier** are the co-primary investigators on this collaborative award along with researchers at the Universities of Wisconsin and Minnesota. The research will adapt acoustic modeling techniques for robust Automatic Speech Recognition (ASR) to a large, multi-language database of adult and child speech recordings, in order to explore how cognitive representations relevant to speech production and perception in any given speech community come to be internalized by normally developing children.
- Ron Li (OSU-Mapping and GIS Laboratory) and **DeLiang (Leon) Wang** have been awarded a National Geospatial Agency University Research Initiatives (NURI) grant to support a project that uses both biologically and geometrically inspired methods for automatic target recognition from multispectral/hyperspectral, multi-scale and multiplatform images. This project, titled "Biologically-Inspired Target Recognition Methods for Multispectral/Hyperspectral and Multiplatform Image Analysis," intends to develop a system that quickly analyzes and extracts information from remote sensing images covering large areas.
- **Ness Shroff** and researchers from the University of Illinois, Urbana Champaign, Purdue, Princeton, and UT Austin have recently received a 1.2 million dollar grant from NSF to develop a scientific foundation for designing network architectures. The project aims to develop a rigorous analytic framework for designing such architectures by building on the PI's recent successes in understanding protocols as optimizers and layering as mathematical decompositions.
- **Ness Shroff** and **Prasun Sinha** have received a NSF NeTS-NOSS grant to investigate energy efficiency in sensor networks titled "Energy-Efficient Distributed Sensor Network Control: Theory To Implementation." Energy is a critical component in the emerging area of sensor networks, and its efficient use could lead to significant improvements in the lifetime, quality of service, security, and cost of these networks. The aim of this project is to develop high-performance, cross-layer control mechanisms for sensor networks that are simple, distributed, and robust. This is a joint project with Prof. Lin of Purdue University.
- **Prasun Sinha** has received a NSF NeTS-NOSS award entitled "Doing More with Less: Tracking Movements Using a Sparse Sensor Network." This collaborative project with Santosh Kumar ('06 CSE) of the University of Memphis, proposes to establish a strong foundation for all large scale movement tracking applications and address the key systems issues faced in such applications. The goal is a novel model of coverage called Trap Coverage that can be used for systematic deployment of sparse sensor networks, while ensuring frequent tracking of movements of interest. The advantage of Trap Coverage is that it would allow for holes of bounded size in the deployment, leading to substantial savings in total number of sensors required to provide coverage.
- NSF has awarded **Srinivasan Parthasarathy** a Small Grant for Exploratory Research (SGER) entitled "An Event Based Framework for Analyzing Dynamic Interaction Data." The main scientific outcome or intellectual merit of this research will include the ability to extract, analyze, and understand key features of such dynamic interaction networks in the context of end applications drawn from clinical and social settings.

Student Awards & Accomplishments

❖ SMART Fellowship

Brian Shannahan, a Ph.D. candidate, has been awarded a two year Department of Defense (DOD) Science, Mathematics, and Research for Transformation (SMART) award to fun his work with the US Air Force Research Laboratory investigating Computational Fluid Dynamics, or CFD.

Accuracy in CFD simulations currently is limited because approximations must be used to simulate small discrete regions of flow; today's technology cannot recreate every fluid molecule. Brian's focus is on identifying vortices in a given CFD solution and devising robust statistical methods that resist the problems the noise and outliers cause. He will then apply these methods for better analysis of the CFD simulations.

Brian, is most recently from the Columbus, Ohio, area, however he also lived in Oklahoma, Texas and Connecticut. He is a mentee of Dr. Raghu Machiraju. After attaining his Ph.D., the SMART award gives Brian the opportunity to work for the Department of Defense which works well with his goal - joining the Air Force as a civilian researcher. He is well on his way as the Fellowship includes summer internships at the Air Force Research Laboratory at Kirtland AFB, New Mexico."

The SMART Defense Scholarship for Service Program, according to the DOD publications, "is part of a concentrated effort to improve the flow of new, highly skilled technical labor into DoD laboratories and agencies and to enhance the technical skills of the workforce already in place."

❖ Grad Student "Honorably Mentioned" for NSF Fellowship

In the annual National Science Foundation Graduate Research Fellowship competition **Adam Champion** received the Honorable Mention designation. This is a highly popular and selective award annually giving out just under 500 awards from approximately 10,000 applicants. Mr. Champion's application, "Proposed Plan of Research: Malware Detection," offered "to research improving the automated detection ability of data mining computer programs in distinguishing benign from malicious programs." As a reward for his efforts, he will, courtesy of the NSF, have access to the TeraGrid supercomputer and other resources on the nation's cyberinfrastructure.

Adam has just completed his first year of the graduate program working with Dr. Dong Xuan. His research interests are in computer and network security, particularly wired Internet security. Adam received his Bachelors of Science degree from OSU in 2007 and is from Columbus, Ohio.

The National Science Foundation gives the Graduate Research Fellowships in an effort to ensure the "to ensure the vitality of the human resource base of science, technology, engineering, and mathematics in the United States and to reinforce its diversity."

❖ 2nd Place in Games 4 Girls Competition

The Snogard 2 team, consisting of **Tiffany Lee**, **Elizabeth Leggett**, **Lauren Sapharas**, and **Sijia Wang** took second place in the Games 4 Girls Competition at the Fifth Annual ChicTech Retreat. The competition sets teams of college women who have created a computer game specifically designed to be fun for middle or high school age young women. This is part of the ChicTech (pronounced "sheek-tek") outreach mission. ChicTech is a grass-roots initiative striving to generate interest in computer science among high school girls.

Showing off second place trophy is the Snogard's Tale 2 team (l-r): Saijia Wang, Elizabeth Leggett, and Lauren Sapharas.

The OSU team's game, "Snogard's Tale II" is a story about the dreams of a hot-tempered girl named Kaliope (Kali for short) and is sequel to Snogards Tale. Because it is in the Role Playing/Puzzle Game (RPG) genre, it has appeal to girls who prefer using problem solving skills.

Best Papers & Poster Awards

❖ Best Paper Achieved at Infocom

At the 2008 IEEE Conference on Computer Communications (INFOCOM), the best paper award was given to **Drs. Changhee Joo** (OSU-CSE Post-Doctoral Researcher), Xiaojun Lin (Purdue University) and **Ness Shroff** (OSU - CSE/ECE) for their work, "Understanding the Capacity Region of the Greedy Maximal Scheduling Algorithm in Multi-hop Wireless Networks." This work analyzes the performance of Greedy Maximal Scheduling (GMS), an important class of scheduling scheme.

From the abstract: "While a lower bound on the throughput performance of GMS is relatively well-known in the simple node-exclusive interference model it has not been thoroughly explored in the more realistic interference models. Moreover, empirical observations suggest that the known bounds on GMS are quite loose, and that the performance of GMS is often close to optimal. In this paper, a number of new analytic results based on characterizing the performance of GMS via a topological property are provided. It is shown that GMS achieves the full capacity region for certain networks under the general K-hop interference model, and new sharper bounds on its performance are provided for general network configurations."

The INFOCOM annual meeting, sponsored by IEEE Communications Society, focuses on traffic management and protocols, and also addresses key topics and issues across computer communications. Attendees participate in technical sessions, tutorials, panel discussions, workshops and have many networking opportunities.

❖ NowLab Awarded Best of Technical Papers at IEEE Cluster 2007

The paper, "High Performance Virtual Machine Migration with RDMA over Modern Interconnect" by **Wei Huang**, **Qi Gao**, Jiuxing Liu ('04 CSE) and **DK Panda** explores increasing the efficiency of virtual machine (VM) migration. As a basis for many administration tools in modern clusters and data-centers, VM migration is desired to be extremely efficient to reduce migration time and performance impact on hosted applications.

The group proposes a high performance virtual machine migration design by using RDMA (Remote Direct Memory Access). By taking advantage of the low software overhead and the one-sided nature of RDMA, their design significantly improves the efficiency of VM migration.

The Network-Based Computing Laboratory (NowLab), led by Professor Panda, had a very strong showing at this year's conference. In addition to the best paper award, the program included three other papers by current and former members of NowLab. Jiuxing Liu a coauthor of the best paper, is currently at IBM TJ Watson. He is a PhD graduate of Professor Panda's research group. Professor Panda and former PhD student, Pavan Balaji ('06 CSE), currently a post-doctoral researcher at Argonne National Lab, will co-present an invited tutorial on InfiniBand and GigE entitled Designing High-End Computing Systems with InfiniBand and 10-Gigabit Ethernet.

❖ Best Paper Awarded from SIGKDD Conference

Data Mining Research Lab DMRL graduate students **Sitaram Asur** and **Duygu Ucar** along with their advisor **Professor Srinivasan Parthasarathy** received a Best Paper (in the applications category) award for their work on "An Event-based Framework for Characterizing the Evolutionary Behavior of Interaction Graphs" at the annual ACM Knowledge Discovery and Data Mining (SIGKDD) conference in 2007. The best paper selections were revealed by the awards committee at the opening ceremony of the conference in San Jose.

The work presented in this paper presents a novel approach for modeling and mining evolving interaction networks that are becoming increasingly ubiquitous in social, behavioral, biological, and scientific settings. The key ideas brought forth by this work is a structured way to reason about how communities and individual elements within such networks evolve over time and what are the critical events that characterize their behavior. The authors demonstrate how behavioral indices such as stability and influence as well as a diffusion model can be efficiently composed from the events detected by their framework and can be used to effectively analyze real-life evolving networks in an incremental fashion.

This represents the seventh award nomination and fourth best paper award for the DMRL group over the last 5 years -- a truly remarkable streak. Previous best paper awards received by the group include ones at the IEEE International Conference on Data Mining (ICDM) in 2002, the SIAM International Conference on Data Mining (SDM) in 2003 and at the Very Large Databases Conference (VLDB) in 2005. Previous nominations for an award, including "best-of conference" selections, were received at SDM in 2005, at SIGKDD in 2006, and at ICDM in 2006. SIGKDD, ICDM and SDM are the top conferences in the field of knowledge

discovery and data mining and VLDB is one of the top conferences in the field of database systems.

❖ SIGSOFT Recognition

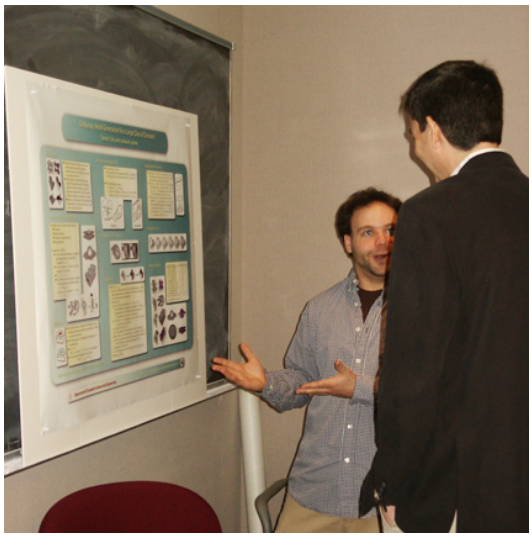
Guoqing Xu (CSE PhD candidate) and **Atanas Rountev** (CSE Faculty and Xu's advisor) were awarded an ACM SIGSOFT Distinguished Paper Award (ICSE Best Paper Award) for their work "Precise Memory Leak Detection for Java Software using Container Profiling" at the 30th International Conference on Software Engineering (ICSE 2008). Guoqing, known as Harry, started with OSU-CSE in 2005. His primary research interests are static and dynamic program analyses for compiler optimizations and software engineering tasks; more generally, he is interested in approaches to help programmers write and maintain reliable and reusable software. This summer, Harry is an intern with the Dynamic Optimization Group at the IBM T. J. Watson Research Center. He received both MS and BS with distinction degrees in Computer Science from East China Normal University, Shanghai, P. R. China.

The International Conference on Software Engineering (http://www.icse-conferences.org) is the flagship software engineering conference cosponsored by ACM SIGSOFT and IEEE, providing a forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends, experiences and concerns in the field of software engineering. The acceptance rate for this year's ICSE was 15%.

❖ Best Poster

Graduate student **Joshua A. Levine** received the Best Student Technical Poster award for joint work with his advisor **Professor Tamal K. Dey** at the 16th International Meshing Roundtable (IMR-07) in Seattle, WA. The poster was presented concurrently with the paper A Practical Delaunay Meshing Algorithm for a Large Class of Domains. Joshua is the third Jyamiti group member to win the best a poster award at IMR.

This work continues the group's research on meshing of piecewise smooth complexes using Delaunay refinement. This class of shapes includes most every 3D object commonly manipulated on computers: smooth surfaces, CAD models, non-manifolds, shapes with small angles, and the volumes contained within. The novelties of the approach include a practical algorithm with provable guarantees on capturing the topology and geometry of the shape. This algorithm has been implemented and the software DelPSC is freely available for non-commercial use.



Joshua Levine discusses his research and winning poster with Doug Roble, alum and Industrial Advisory Board member.

❖ Oscar Recognition for Alum

For a second time, **Dr. Doug Roble** has heard his name spoken by a representative of the Academy of Motion Picture Arts and Sciences. On Feb. 9th, 2008, Dr. Roble received a Scientific and Engineering Award (Academy Plaque) for his development of the fluid simulation system at Digital Domain. This work, done in collaboration with Nafees Bin Zafar and Ryo Sakaguchi, is an "influential and flexible production-proven system (which) incorporates innovative algorithms and refined adaptations of published methods to achieve large-scale water effects." You can see examples of Doug's work can be seen in the "Pirates of Caribbean Series."

Doug first received recognition from the Academy in 1998 (presented in 1999), when he received a Technical Achievement Award (Academy Certificates) for his contribution to tracking technology and for the design and implementation of the TRACK system for camera position calculation and scene reconstruction. As stated on the Academy's website, "the TRACK system is an integrated software tool that uses computer-vision techniques to extract critical 2D and 3D information about a scene and the camera used to film it." OSU-CSE was particularly proud of this award to Roble; this work was derived from research he had started in his doctoral dissertation.

At Digital Domain, Dr. Roble is the Creative Director of Software. In service to the greater graphics technology community, he is Chief Editor of the Journal of Graphics Tools and is on several panels and committees of SIGRAPH (the most prestigious computer graphics conference), including its Advisory Board. He has given invited lectures and keynote addresses at many major conferences, most recently at the Annual Meeting of the American Association for the Advancement of Science in 2007. In 2002, he received the Distinguished Alumnus Award from OSU's College of Engineering. Dr. Roble was a student of Dr. Rick Parent and received his Ph.D. in 1992 after receiving his Masters in 1987. Doug resides in California with his wife and fellow alum, Dr. Deborah Shands.

❖ CAREER Awards

Two Ph.D. graduates of 2004 have made CSE very proud by receiving National Science Foundation (NSF) CAREER awards.

Dr. Nigamanth Sridhar, PhD '04, earned his CAREER for his work titled "Improving the Productivity of the Sensor Network Programmer." Dr. Sridhar, an advisee of Dr. Bruce Weide's, is an Assistant Professor in the Department of Electrical and Computer Engineering at Cleveland State University. His primary areas of research interests lie at the intersection of Software Engineering and Distributed Systems, with a special emphasis on small embedded systems such as wireless sensor networks. Sridhar directs the Dependable Systems and Networks Research Group, which is focused on making programming of sensor systems more accessible to scientists and researchers outside the field of Computer Science. In addition to his Ph.D. Nigamanth received his Master of Science from OSU in 2000 and an MSc (Tech.) (1997) degree in Information Systems from Birla Institute of Technology and Science, Pilani, India. He and his wife, Divya, live in Cleveland, Ohio.

Dr. Murat Demirbas (PhD '04) addresses the topic "An In-network Collaboration and Coordination Framework for Wireless Sensor Actor Networks" for his CAREER award. Murat is an Assistant Professor in the Computer Science and Engineering Department of SUNY Buffalo. He directs the UBiComp Lab, University of Buffalo Ubiqutious Computing Lab. His main research

interests are in the areas of wireless sensor networks and distributed algorithms, focusing on developing robust and resilient distributed wireless sensor network services and applications. After receiving his PhD from OSU, Dr. Demirbas was a post-doctoral researcher at MIT. Dr. Demirbas worked with Dr. Anish Arora while at OSU-CSE where he also earned an Masters degree(2000). His Bachelors of Science degree was achieved granted from the Middle East Technical University, Ankara, Turkey.

❖ Wayne Clark Named College of Engineering Distinguished Alumni

In recognition of his significant contributions the computer industry and long time service to U.S. higher Education, the Ohio State College of Engineering accorded **Wayne Clark** a 2007 Distinguished Alumni Award.

Mr. Clark's expertise has been useful to many of the major corporate 'movers and shakers' of the past twenty years. His contributions made a difference to 3Com Corporation, Novell, Ungermann-Bass, and Memorex. Clark's name and his technical contributions have become an important part of the internet revolution history. He was one of the original employees of Cisco Systems, building that corporation into the giant it has become as the founding architect and technical leader of Cisco's IBM Networking Group. Under his leadership, this group successfully transformed the IBM Corporate enterprise networks Systems Network Architecture (SNA) into multi-protocol inter-networks. Clark and his team created the first commercially successful multi-protocol router for enterprise networks to allow previously incompatible computers to communicate using different network protocols.

After a brief stint as the Chief Technical Officer for the start-up Technauts, Wayne returned to Cisco. Currently, he is the architect for Intelligent Networking Services at Cisco Systems Inc., where he has made significant contributions in networking areas. He also provides technical and organizational leadership by defining grid computing standards in the internet.

Clark has provided advice to U.S. higher education, particularly in engineering colleges, with his technical expertise and successful industrial experiences. He serves on the industrial advisory boards for the Computer Science Department at North Carolina State University and the Department of Computer Science and Engineering at Ohio State.

Wayne Clark received his Bachelor of Science degree in computer and information science at Ohio State in 1973. A member of the Tau Beta Pi Society, he won the Ohio State Engineering Honors Scholar award in 1972. Clark holds several patents and has been the keynote speaker at international conferences in communications and networking applications.

❖ Alum Named Intel Fellow

Intel has recognized one of its own as a leader; **Dr. Shivnandan (Shiv) Kaushik** has been named an Intel Fellow. Dr. Kaushik excels as the Director of the Systems Software and a member of the Solutions Group where he directs work on the definition and optimization of platform and firmware interfaces to operating systems and core virtualization software.

Kaushik joined Intel in 1995 as a senior software engineer and has served in a number of software engineering and management roles. He is an expert in the design of platform hardware and firmware interfaces to operating systems and virtualization software. In this role, he has made optimizations for features introduced on Intel processors since the Pentium Pro and contributions to industry standard firmware specifications. Kaushik holds 12 patents with 29 patents pending in the areas of system software and platform architecture. He has received three Intel Achievement Awards.

Dr. Kaushik, working under the tutelage of Dr. P. Sadayappan, earned his doctorate in 1995, having received his master's degree in 1991. His undergraduate education was done at the Indian Institute of Technology, Bombay ending with a bachelor's degree in computer science and engineering in 1990.

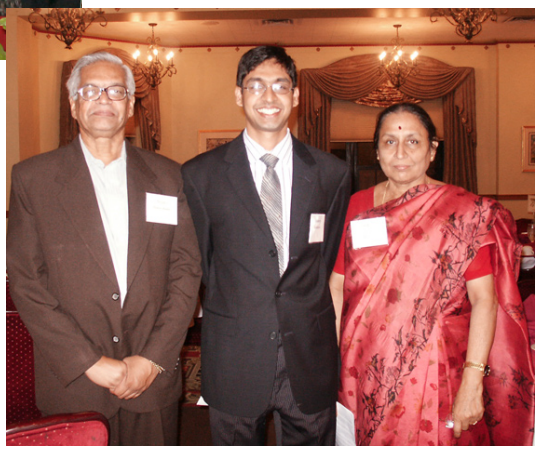
❖ CSE Friend and Patron Receives Honor

Dr. Dennis Frailey has been given a SIGCSE Award for Lifetime Service. Dr. Frailey is a Principal Fellow at Raytheon Company in Plano, Texas and an Adjunct Professor of Computer Science and Computer Engineering at Southern Methodist University (SMU). Frailey has provided considerable, personal and hands-on help to the OSU CSE program, despite the long distance between Columbus, Ohio and Dallas, Texas, where he lives. He has supported scholarships for our students, served as a guest lecturer on an annual basis for several years, and worked with our faculty to help guide curriculum and project efforts. This highly positive relationship has helped CSE to improve our program and resulted in our faculty and students voting him a special Chair's Award for excellent service to CSE. This award has only been given four times in the eleven year history of the department's award program.

At Raytheon, Frailey is a leader in software engineering improvement, currently focusing on software measurement and cycle time reduction. He is also an instructor in several internal courses for project managers and software managers. Prior assignments include software project manager, computer architect, operating system designer, compiler designer, and speechwriter for company executives. Dennis previously worked at Texas Instruments, the Ford Motor Company, and as a tenured, Associate Professor at SMU. He helped start the software engineering program at SMU, and was vice-chair of the ACM/IEEE Software Engineering Coordinating Committee. Frailey is an ABET accreditation evaluator in computer science, computer engineering and software engineering; a former member of the Computer Science Accreditation board of directors; and former ACM vice president. He is currently a member of the IEEE Computer Society's Professional Practices Committee and was recently elected vice-chair of the Industry Advisory Committee to the Texas Board of Professional Engineers. He holds M.S. and Ph.D. degrees in computer science (Purdue) and a B.S. in mathematics (Notre Dame). It was at Purdue University that his future association with OSU-CSE began after he met Stuart Zweben, who would become CSE's longest retained Chair.

At the Department Awards banquet, Service Awardee, Kat Wenger and her very proud parents, Ann and Kim Wenger happily pose.

Janiece Francis joined her husband, Wlliam, at this year's banquet and was very proud of his scholarship win.



On their first visit to the USA, Vijay Mohan and Rama included the CSE banquet in their itinerary. Their son, Kishore is all smiles at having them in attendance as he accepted his Outstanding Research Award.

ANNUAL CSE DEPARTMENT AWARDS

Scholarships

❖ Central Ohio Chapter of Association of Computing Machinery {ACM}
Stacey Laugel

❖ Ernest William Leggett, Jr. Scholarship
The Leggett Family Award

Jamall Brown

Prabhjyotsingh Chawla

Shinta Salim

❖ The O'Connell Family Award
Christopher Suran

❖ Northrop Grumnun
Jamall Brown

Brittany Zwiebel

(these awards were presented in Autumn 2007)

❖ Raytheon Corporation
Isaac Chan

Warren Francis

Katherine Watson

❖ The Department of Computer Science & Engineering
Zachery Howard

Karl Salva

Jason Stenftenagel

Weston Wieser

Faculty & Staff Awards

❖ Eleanor Quinlan Memorial Award
Derek Bronish

❖ Outstanding Research Awards
Greg Buehrer

Xiaoning Ding

Wei Huang

Sriram Krishnamoorthy

Kishor Rao

❖ Outstanding Teaching Awards
Professor P. Sadayappan

❖ Outstanding Service Awards
Kat Wenger

Scholarship recipient Karl Salva (3rd from left) with his parents Jeff and Erin Salva and his fiance, Dayna Cherryholmes (far right).

❖ Explanation of Awards

Ernest William Leggett, Jr. Scholarship // The Leggett Family Award

The Leggett Family established this endowment in memory of Ernest William Leggett, Jr., who received his Ph.D. from the Department in 1977. Dr. Leggett passed away in 1994.

Eleanor Quinlan Memorial Award

This fund is an endowment established to honor the memory of Eleanor "Elley" Quinlan, who was both a staff member and graduate of the Department. From 1990 until her passing in January 2001, she was the Academic Program Assistant. The proceeds from this fund are used for the development and recognition of graduate teaching associates in the CSE Department.

The O'Connell Family Award

Alumni Conleth O'Connell (Ph.D. 1990) and Christina "Curby" (Morgan) O'Connell, his wife and former Department staffer, have created this endowment for undergraduate students. A portion of the funds have been designated for an incoming first year student. This money is given in two payments; half is distributed upon arrival to the University and the other half upon entering the major.

Outstanding Research Awards

Exclusively open to CSE graduate students, this award is given in recognition of their exceptional research efforts.

Outstanding Service Awards

All faculty, staff and students who contribute to the Department's success by working beyond the expected are eligible.

Outstanding Teaching Awards

This award is given to a member of the faculty, a lecturer or Teaching Assistant who demonstrates exemplary ability in the classroom and in her/his interaction with students.

INDUSTRIAL ADVISORY BOARD

This year's meeting of the Industrial Advisory Board clearly defined the Board's role to help the Department. Also, two new members were added.

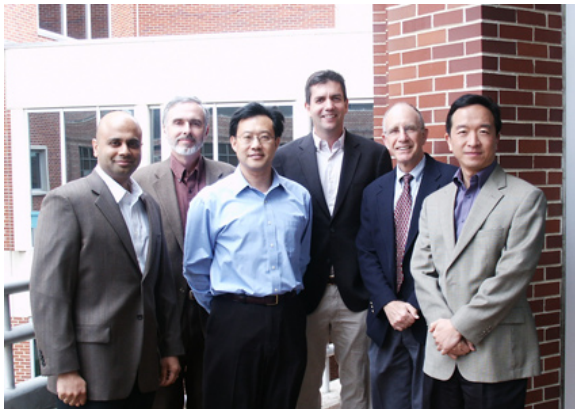
The primary mission of the Board is, as it has always been, to insure the world is aware of the quality research and teaching done in CSE. Going forward, we now have prescribed steps on this will be accomplished.

1. Through the members' prominent corporate positions or via interaction with their extensive network connections, they will watch for internships, jobs, and grant situations for CSE students and assist them in attaining those goals. Board members will also aid faculty members with collaboration opportunities as well new funding sources.
2. As leaders in their respective areas, they will inform the Department of changes and new trends within the computing field and suggest adjustments in strategic planning to meet these shifts. Their guidance will be a vital component in raising the Department of Computer Science and Engineering to its greater level of recognition.
3. During these challenging economic times, the Board will give direction for organizing individual and major donation activities. They will watch for and develop relationship with substantive donors affecting large endowments for increased research funding and expansion as well scholarship funds.

The current board members are: **Richard Baum** (Ph.D '75, IBM Server Group); **James Cates** (MS '71, Altera, Corp.); **Wayne Clark** (BS '73, Cisco Systems); **David Cohen** (Ph.D '77, sente.com, Inc); **Bruce Flinchbaugh** (Ph.D '80, Texas Instruments); **Feng Zhao** (former CSE faculty member [1992-2000] Microsoft Research). The new members to the board are **Shiv Kaushik** and **Doug Roble**. Both are outstanding researchers and leaders in their respective industries.

- Shivnandan (Shiv) Kaushik (MS, '91; Ph.D. '95) excels as the Director of the Systems Software and a member of the Solutions Group where he directs work on the definition and optimization of platform and firmware interfaces to operating systems and core virtualization software. Recently named an Intel Fellow (see page 9), Kaushik holds 12 patents with 29 patents pending in the areas of system software and platform architecture. He has received three Intel Achievement Awards.
- Doug Roble, at Digital Domain, is the Creative Director of Software. As previously mentioned (see page 8), he has received two technical awards from the Academy of Motion Pictures and Sciences. In service to the greater graphics technology community, he is Chief Editor of the Journal of Graphics Tools and is on several panels and committees of SIGRAPH, the most prestigious computer graphics conference, including its Advisory Board. In 2002, he received the Distinguished Alumnus Award from OSU's College of Engineering. Dr. Roble was a student of Dr. Rick Parent and received his Ph.D. in 1992 after receiving his Masters in 1987. Doug resides in California with his wife, and fellow alum, Dr. Deborah Shands.

The Department welcomes and appreciates the advice and leadership provided by our Industrial Advisory Board.



The 2008 Board meeting attendees (l-r): Shiv Kaushik, Bruce Flinchbaugh, Xiaodong Zhang, Doug Roble, Wayne Clark and Feng Zhao.

RETIREMENT DOUBLE HIT

Autumn quarter 2007 saw two small town women leave their "home" for a second time. Only this time they were mature women leaving the professional home where they'd lived for the past thirty plus years. Elizabeth O'Neill, Graduate Student Admissions Coordinator, and Marty Marlatt, Administrative Associate to the Department Chairperson, both decided it was time to leave academia's proverbial ivy covered towers and enjoy the wider world of retirement.

❖ Elizabeth O'Neill - Grad Admissions Coordinator and Mother Hen

Out of the coal mining town of Garrett, Kentucky, **Elizabeth O'Neill** moved to Columbus at a young age and remained. She arrived at OSU in 1975 and began her career in the Department of Chemistry. In 1980, Dr. David Hsiao, a faculty member and Editor-in-Chief of the ACM Transactions on Database Systems, wooed her to join the young, then named, Computer and Information Science Department. Her secretarial skills were quickly noticed and she also began working for Dr. Tse Feng, a faculty member and Editor-in-Chief of the IEEE Transactions on Computers. Word of her work ethic, talents, and pleasant personality obviously spread because in 1986 Elizabeth took a position as the Department of English chairperson's secretary. She was not allowed to remain there long. Dr. Mike Liu requested that she return to Computer Science as his secretary because he'd become the Editor-in-Chief of the IEEE Transactions on Computers. At this point, the Institute of Electrical and Electronics Engineers (IEEE) became aware of her talents and recognized her efforts awarding her the IEEE Appreciation Award for Outstanding Service (1988). During the early '90s Elizabeth took over the Graduate Secretary position in the Computer Science Department. In this position, Elizabeth was responsible for assisting graduate students with the various rules, regulations, and paperwork necessary for them to achieve their goal of graduating. In addition, she opened, sorted, and logged in literally thousands of graduate student applications to the department over the years; including the peak year of 2001 when 1,500 came in.

But Elizabeth was much more than "just a staff member" of CSE. She is a loyal and devoted friend to anyone who showed her the same. She was the unofficial mother hen to more than one of her grad students. With the nickname, "Grandma" she was a stand-in grandparent for more than a few of the babies and toddlers of faculty members and students alike. She played this role for two generations of Fengs. She often held and cooed to the sons of Dr. Tse Feng; then, twenty years later, she did the same with the sons of one of those boys, Dr. Wu-Chi Feng. Now, she is happily concentrating all her warmth, generosity of faith and love upon her own children. Future faculty, staff, and students will have to fend for themselves, at their loss.

❖ Marty Marlatt - Jane of All Positions and Department Heart

When **Marty Marlatt** moved to Columbus from Newcomerstown, Ohio, she wasn't interested in working for OSU. It was too big and confusing for a small town girl. Eventually, after working at two small companies, someone convinced her to give The Ohio State University a chance. After passing the necessary civil service test, she was offered a position in a very young department that was growing rapidly, the Department of Computer and Information Science. She took the job and the rest is history. It must have seemed strange though because in 1974 there weren't any computers out to been seen and most of the science still began with paper and pen. She worked with typewriters and mimeograph machines.

She loved her job, the faculty, the students, and the fellow staff members. She took on many different tasks in the CIS, later CSE, Department. She essentially filled every position on the administrative staff at one time or another; from Human Resources to Annual Report Editor to Building Coordinator to Construction Liaison when the new Dreese was erected. If it needed done, Marty did it. At times the job description sentence, "other duties as assigned" took on an edge of weirdness, as when she needed to rid the building of an irate and misdirected opossum. Throughout this time she acquired a great many fans, admirers and most important, friends; many of them came and went and, unfortunately, some permanently.

Now Marty has more time to devote to many of those friends. She will be doing much more travelling. She has already begun raising her 14th puppy for Canine Companions for Independence. Her gardens will blossom and grow with the attention she gave to the Department before. For Computer Science, the offices will not have quite the same glow and laughter will be a less rowdy.

RESEARCH

As the Department of Computer Science and Engineering enters its fourth decade, OSU- CSE faces a world full of challenges. CSE meets challenges with vigor in our focus areas of research: Artificial Intelligence, Graphics, Networking, Software Engineering and Systems.

The Artificial Intelligence Cluster, a foci since CSE's inception, remains a healthy and growing area of endeavor. The first official lab established within the Department was Dr. **B. Chandrasekaran**'s (now Senior Research Scientist), LAIR (Laboratory for Artificial Intelligence Research). While Chandra, along with **John Josephson**, Research Scientist, continues overseeing students in LAIR, the area has expanded and is now home to five faculty members; Professor **DeLiang (Leon) Wang**, Associate Professors **Chris Brew** and **James Davis**, and Assistant Professors **Mikhail Belkin**, and **Eric Fosler-Lussier**. With more than two dozen research assistants, they examine questions in the dimensions of Speech and Language Technologies, Perception and Neurodynamics, Computer Vision and Machine Learning research.

The **Graphics** Area, a source of CSE pride, is one of the most 'visible' of all the areas. Thanks in large part to the efforts of Professor Emeritus **Charles Csuri,** the man thought of as the Father of Computer Art. CSE Graphics has been a substantive player in the growth of the field. Our faculty and researchers delve into questions within Computational Geometry (Professor **Tamal Dey**, Associate Professor **Raphael Wenger** and Assistant Professor **Yusu Wang**), Computer Graphics and Visualization (Associate Professors **Roger Crawfis**, **Raghu Machiraju** and **Han-Wei Shen**), and Computer Animation (Professor **Rick Parent**).

The **Networking Group**, started by Professor **Ming-Tsan (Mike) Liu**, has a long and prestigious history, graduating many superior Ph.D. students. It's faculty is strong and has a breadth of research offering many opportunities for graduate students. The addition of Ohio Eminent Scholar **Ness Shroff** last year brought projects in wireless and wireline communication networks. Ohio Board of Regents Distinguished Professor **David Lee** has strengthened the security research focus. Professor Anish Arora leads a large sensor network project. Other faculty working on sensor research include Professor **Ten-Huang (Steve) Lai**, Associate Professor **Dong Xuan,** and Assistant Professor **Prasun Sinha**. Professor **Xiaodong Zhang'**s research crosses into the Network through his work in Internet and Distributed Systems.

The **Software Engineering Group** research is a product-oriented view of software which prioritizes process and management, but maintains vigilance to the details so the systems work correctly. A uniquely structured group, a common theme runs through the work: establishing behavioral properties of a software system by reasoning -- modularly -- about the source code of its components. The faculty includes Professors **Bruce W. Weide**, Associate Professors **Eitan Gurari**, **Timothy J. Long**, **Atanas (Nasko) Rountev**, **Neelam Soundarajan Paolo A.G. (Paul) Sivilotti**, and **Ken Supowit**. Also included are Senior Research Scientist **Jay Ramanthan** and Clinical Assistant Professor **Rajiv Ramnath** who oversee CETI, "CERCS for Enterprise Transformation and Innovation". CERCS is the National Science Foundation funded multi-institutional Center for Experimental Research in Computer Systems at Georgia Institute of Technology.

The **Systems Group** has developed into one of the most dynamic units of CSE. Their experimental research projects, intensively funded by government and industry, range from Core Computer Systems and Architecture, to High-End and Distributed Systems and to Datamining and Databases. Full Professors **Gagan Agrawal**, **D. K. Panda**, **P. Sadayappan** and **Xiaodong Zhang** serve as senior leaders striving to keep ahead of the Associate Professors **Hakan Ferhatosmanoglu** and **Srinivasan Parthasarathy** and Assistant Professors **Hui Fang** and **Feng Qin**. This group is further enhanced by the work of Professor **Joel Saltz**'s Biomedical Informatics Department at the OSU Medical Center. Associate Professor **Atanas (Nasko) Routev** also collaborates with several system faculty on compiler and software reliability. New Assistant Professor **Radu Teodorescu** joins the Systems Group to work on Computer Architecture.

People-Centric Wireless Sensor Networking

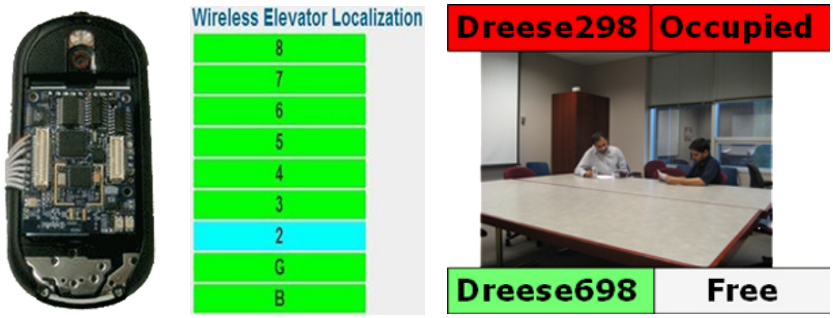
Wireless sensor networks (WSNs) – built from small, battery-operated computers that communicate sensed information by radio – give unprecedented access to fine-grained physical information. Operationally, true wireless means easy deployment at lowered cost in both remote as well as urban settings, in contexts relevant to governments, businesses, and end-users. Examples include detecting whether someone has entered a restricted area, measuring the popularity of trade-show booths via devices embedded into participant badges, sensing which machines in a device farm are vibrating anomalously and likely to break, and knowing how busy a restaurant is.

From a technical perspective, true wireless means limited resources, battery being the primary one, but also memory, bandwidth, and speed. Limiting resources to this level creates many challenges, efficiency being the central challenge. The average cell phone typically needs to last about a day on a single battery charge, but wireless sensor nodes need to last years! This means nodes must be almost always in a sleep mode, waking up minimally to perform the sensing task at hand and possibly exchange information with other nodes, and then return to sleep just as quickly. Nodes' sleep/wake up cycles must therefore be coordinated, and even adapted to demand, such as keeping a lower duty cycle at night than during the day to correspond to reduced demand. Another issue is management is of the resources. Since WSNs are typically edge network fabrics, they need to be accessed, controlled, maintained, and configured at the aggregate level via the Internet and with little human involvement. Solving this adequately becomes a priority unto itself as forecasts indicate network fabric will dominate the Internet traffic in just a few years.

The Dependable Distributed and Networked Systems Group, led by **Dr. Anish Arora**, is involved with all aspects of end-to-end design of WSNs: scalability, energy-efficiency, security, fault-tolerance, and network health maintenance are prominent considerations. The team is also developing experimentation and rapid-prototyping infrastructures, including new languages to make programming easier. Two of their recent projects are Peoplenet and Kansei.

PeopleNet

Throughout Dreese Labs, sensors have been embedded so users, with specially-equipped cell phones, can retrieve a variety of information, such as where the elevators are or whether conference rooms are occupied. This is accomplished merely by local information exchange with other cell phones and sensors in the neighborhood. PeopleNet exchanges information without using the cellular networks and core networks. Our researchers are spreading the coverage to other buildings on campus, allowing for even more scenarios. As an example, if Anish wishes to play squash with Randy, he may know before he walks over the distance to the squash courts if Randy is already at the courts and on which court is warming up. If Randy is not at the courts, he may know which court is empty without needing to go to the reservation site. And if he's running late, he may let Randy know by sending him a local message. Peoplenet would give him the information he needs.



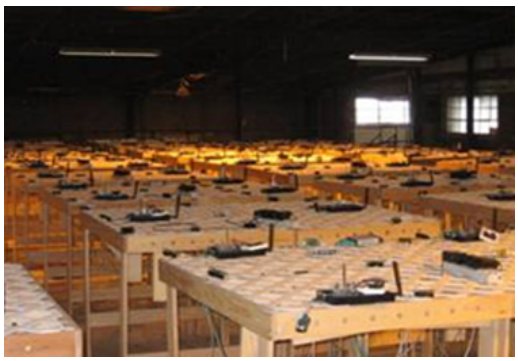
The inside of the celphone. Screen shots of what the user sees when querying.

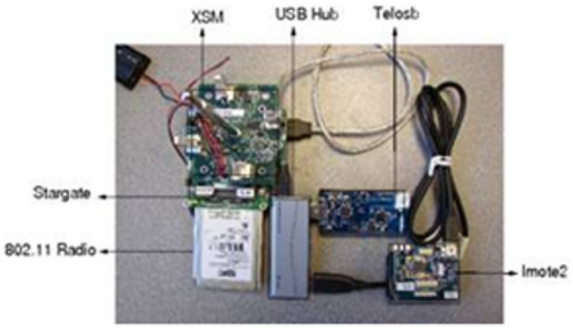
PeopleNet will also leverage sensor networks outside the building. For instance, a camera network outside the building can detect a person of interest. It would then alert an inside-the-building network and coordinate to hand-off tracking the person when he or she enters the building.

Applications would be written so that searching across these multiple fabrics could easily done, thus recognizing the lack of threat or enabling a quicker reaction to a threat.

Kansei

In 2004, while completing what was then the world's largest WSN, ExScal(http://cse.ohio-state.edu/exscal/), the group realized the need for convenient and remote at-scale testing; we addressed this need by developing the Kansei testbed (http://cse.ohio-state.edu/kansei/). Kansei comprises many hundreds of various types of WSN devices: XSM motes, TelosB motes, Imote2, Stargate, and Sunspot. It supports experimentation with various WSN OS's, including TinyOS. Key infrastructure services include a management and control plane to run experiments and return results, fine-grained instrumentation to inject data and faults, change security keys or radio frequencies, and a health service to monitor and, when possible, autonomically correct the testbed. Kansei is part of the infrastructure of the newly formed Institute for Sensing Systems (ISS) at Ohio State and is presently being integrated into NSF's GENI initiative, http://geni.net/. This effort will build the tools for virtualization, programmability, and integration of edge fabrics with respect to the core enterprise.





TeX4ht Translating LaTeX

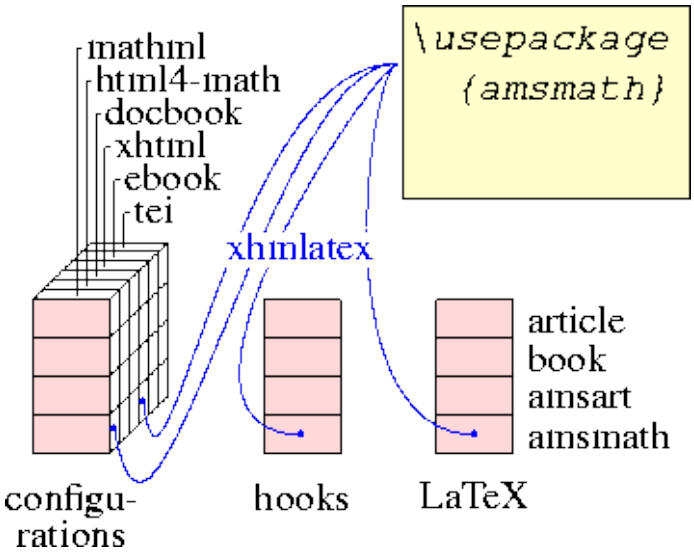
Today's world is designated as the "Information Age." Attaining, dissecting, and using information is now crucial to every aspect of industry, academia, and even our home lives. LaTeX is the authoring language recommended by the American Mathematical Society for preparing technical and scientific documentation. Scientific word processors can export documents into LaTeX, but many authors also use LaTeX directly through text editors. Dozens of systems have been developed to translate LaTeX into other formats. Dr. **Eitan Gurari**'s TeX4ht system is generally considered to be the best application for this task.

Much of TeX4ht's superiority derives from its design as an extension to the native LaTeX implementation, rather than an independent LaTeX parser built from scratch. TeX4ht indirectly seeds the standard LaTeX macros with configurable hooks to capture the logical structure of the documents, and post-processes the output of the compilations into desirable target formats. In some respects, the approach is similar to that taken by parser generators like YACC, where context free grammars reveal the structure of the programs and direct the calls to semantics actions that produce the target code.

The TeX4ht distribution offers configurations addressing data-oriented targets (e.g., HTML, MathML, DocBook, OpenDocuments, JavaHelp), speech-oriented targets (e.g., JSML, emacspeak), and a self-reflexive target (i.e., jsMath). The configurations support numerous languages (e.g., Europeans and far east), offer many options (e.g., different levels of sectioning pagination), and are easily modified by users. TeX4ht is included within all the recent major distributions of LaTeX and is available for different operating systems including MS Windows, Linux, and Mac OS. The system is implemented using a literate programming approach introduced in Gurari's book "TeX

and LaTeX: Drawing and Literate Programming", McGraw-Hill, 1994.

Work continues to develop and expand TeX4ht. In particular, effort is invested in finding a way for a translation that would produce Nemeth Braille, a task that has rebuffed many other researchers. Recent student involvements addressed issues related to matrix translation into braille (M.Sc. work of Harmanpal Singh Dhaliwal), construction of speech browsers for math (undergraduate project by Daniel Galron, and M.Sc. project by Karen Manukyan), and highly-configurable user-interfaces to be used in braille utilities (M.Sc. work of Nandan Bagchee).



Dr. Gurari and his TeX4ht work is another strong case for the ways in which CSE is making vital contributions to not just the computing field, but the greater world around us.

Making Sense of Noise

Human speech recognition shows remarkable robustness in a variety of listening conditions, including competing talkers, environmental sounds, and ambient noise. Understanding how speech is recognized under these conditions is fundamentally important not only for auditory perception but also for automatic speech recognition where robustness to acoustic interference remains elusive.

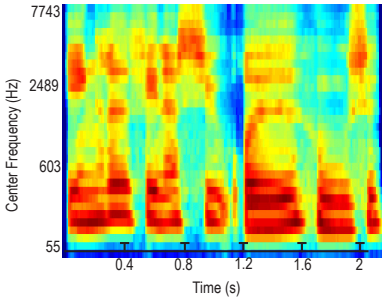
The Perception and Neurodynamics Laboratory led by Prof. **DeLiang Wang** aims to develop algorithms for solving real-world problems related to machine perception as well as understanding neurocomputational mechanisms underlying perceptual processes. In an effort to better understand mechanisms of speech perception in noise, Wang recently took a sabbatical leave in Oticon. Located on the outskirts of Copenhagen, Oticon is the oldest and one of the largest hearing aid manufacturers in the world with a separate research center and state-of-the-art facilities for conducting hearing research.

The research Prof. Wang undertook at Oticon concerns an influential concept, called Ideal Binary Mask, originated in the Perception and Neurodynamics Lab. In audition, a signal is typically represented along time and frequency, leading to a two-dimensional matrix where each element is called a time-frequency unit. For a mixture of target speech and noise, the ideal binary mask is a binary matrix where 1 indicates that the signal-to-noise ratio within the corresponding time-frequency unit exceeds a certain threshold and 0 indicates otherwise. The mask is "ideal" because its construction requires the availability of premixed speech and noise, and the mask has certain mathematical optimality. Wang and his students originally developed the concept in order to quantify the computational goal of speech segregation. The problem of speech segregation is popularly known as the cocktail party problem, i.e. how to segregate a target voice from a very noisy environment, which is widely regarded as one of the most challenging problems in artificial intelligence. As a means of segregation, a binary mask retains time-frequency regions of a mixture

that correspond to 1 in the mask and eliminate those corresponding to 0. In other words, binary masking applies a pattern of binary gains to the mixture signal.

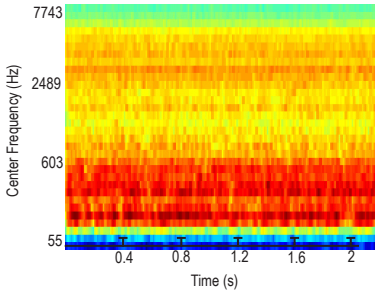
Collaborating with Oticon researchers, Wang discovered that pure noise when gated by the ideal binary mask produces almost perfectly intelligible speech. This process of turning on or off noise is illustrated in the diagrams A, B, C, and D shown.

Wang's findings are very surprising as the information encoded in binary gains is greatly reduced compared to that contained in original speech, even in comparison with the so-called Shannon speech, which refers to perceivable speech from bands of noise modulated by speech envelopes – first demonstrated in a dramatic experiment by Robert Shannon and colleagues in 1995. Ideally masked noise contains little speech-specific information. Both spectral and temporal aspects of the speech signal are severely degraded. Despite this drastic reduction of speech information, Wang and collaborators found that listeners are apparently capable of hearing speech. The results of Wang's experiment challenge commonly held explanations for human speech recognition. On the other hand, the results likely open new avenues for speech segregation, automatic speech recognition, coding, and compression in speech communication, and design of hearing aids and cochlear implants.

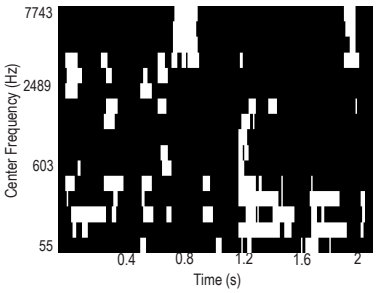


A

Parts A and B show the two-dimensional representations of a sentence and a noise, respectively. 'dB' stands for decibels.

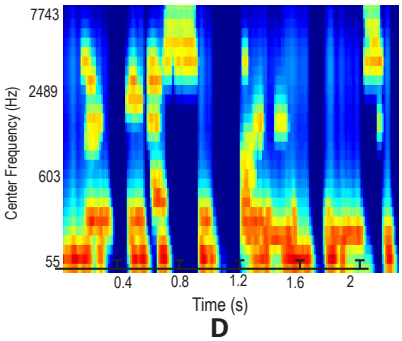


B



C

Part C shows the ideal binary mask with 16 frequency channels, where 1 is indicated by white and 0 by black



D

Part D shows the result of the noise in B gated by the ideal mask in C. The gated noise in D is then presented to listeners.

GRANTS, AWARDS & GIFTS

Legend
Primary Investigator (in alphabetical order according to the name of the first CSE member to whom the funds are assigned)

- *Grant Title*
  Co-PIs (CSE members' names are bolded)
  (OSU Department name initials defined at the end of the section.)
  Sponsor
  Term - Amount

New CSE Awards: 07/01/2008 - 06/30/2008

Chris Brew

- *Third Workshop On Issues In Teaching Computational Linguistics*
  National Science Foundation (NSF)
  6/1/08 – 5/31/09 $13,160

Emre Ertin (ECE)

- *Sectored Antenna-based MAC Protocol for WNSs - Year 2*
  Electronics and Telecommunications ResInst.
  Anish Arora, Umit Ozguner (OSU-ECE)
  1/1/08-12/31/08 $130,471

James Davis

- *Wright Center of Innovation, Institute for the Development and Commercialization of Advanced Sensor Technology (IDCAST)*
  Ohio Department of Development
  Randy Moses (OSU-ECE), John Volakis (OSU-ECE)
  2/26/07-2/25/10 $190,000

- *Center for Automatic Target Recognition Research*
  Air Force Research Laboratory (AFRL)
  5/1/08-3/31/09 $408,000

Tamal Dey

- *National Science Foundation (NSF) Collaborative Research: Nonsmoothness in Meshing and Reconstruction*
  National Science Foundation (NSF)
  Edgar Ramos (Universidad Nacional de Colombia)
  12/1/07-9/30/09 $156,069

Mary Beckman (Linguistics)

- *DHB/Collaborative Research: Using Machine Learning to Model the Interplay of Production Dynamics and Perception Dynamics in Phonological Acquisition*
  National Science Foundation (NSF)
  Eric Fosler-Lussier
  1/15/08-12/31/10 $273,284

David Lee

- *CPATH T: NEWPATH: Nurturing, Through Entrepreneurship, IT World Leaders*
  National Science Foundation (NSF)
  Stephen Camp (OSU-COB), Eylem Ekici (OSU-ECE), Walleed Muhanna (OSU-COB), **Rajiv Ramnath, Han-Wei Shen, Neelam Soundarajan, Bruce Weide, Dong Xuan**
  7/1/07-6/30/12 $606,822

D.K. Panda

- *Research on High Performance and Scalable MPI Over InfiniBand*
  Mellanox Technologies
  4/1/08-3/31/09 $112,599

Srinivasan Parthasarathy

- *SGER: An Event-Driven Approach for Analyzing Interaction Networks*
  National Science Foundation (NSF)
  8/1/07-7/31/08 $58,408

Jay Ramanathan

- *eGOV Server Migration/Hosting, Content Management, Security and BPM*
  City of Columbus
  Rajiv Ramnath
  12/6/07-4/30/09 $50,000
- *Center for Experimental Research in Computer Systems- Research Site*
  National Science Foundation (NSF)
  Rajiv Ramnath
  5/1/08-4/30/13 $150,000

Francis Holtzhauer (OSU-COPH)

- *Training of Public Health Personnel and Public Health Partners in the "Planning P Process" for a Type 3 Incident*
  Ohio Department of Health
  Anand Desai (OSU-PPM), Joann Pearsol (OSU-COPH), **Rajiv Ramnath**
  4/21/08-8/8/08 $110,206

Steven Gordon (OSC)

- *Improving American Competitiveness through Workforce Education in Cyberinfrastructure Applications*
  National Science Foundation (NSF)
  Cathleen Carey (OSU-OLN), Jose Castro (OSU-IWSE) Steven Gordon (OSC) Ashok Krrishnamurthy (OSC), **Rajiv Ramnath**
  4/1/08-3/31/11 $999,942

P. Sadayappan

- *An Octave Implementation of a Multiresolution Numerical Simulation System*
  Argonne National Lab
  1/1/08-6/30/08 $50,000
- *Loop Transformations*
  Oak Ridge National Lab
  1/1/08-6/30/08 $50,000

Prasun Sinha

- *NeTS-NOSS: Collaborative research: Energy-Efficient Distributed Sensor Network Control: Theory to Implementation*
  National Science Foundation (NSF)
  Ness Shroff
  9/1/07-8/31/10 $204,017.00
- *Collaborative proposal: NOSS: Doing More with Less: Tracking Movements Using a Sparse Sensor Network*
  National Science Foundation (NSF)
  9/1/-81/10 $467,661.00

DeLiang Wang

- *Sequential Organization and Room Reverberation in Speech Segregation*
  Air Force Office of Scientific Research (AFOSR)
  2/1/08-11/30/13 $874,369.00

Rongxing Li (OSU-CEEGS)

- *Biologically-Inspired Target Recognition Methods for Multispectral/Hyperspectral and Multiplatform Image Analysis*
  National Geospatial Intelligence Agency
  DeLiang Wang
  8/15/07-5/14/09 $450,000.00

Ness Shroff

- *Stochastic control of multi-scale networks: Modeling, analysis and algorithms*
  Army Research Office
  5/29/2008 -5/28/2013 $6,456,625
- *FIND: Collaborative research: Towards an analytic foundation for network architectures*
  National Science Foundation (NSF)
  9/1/07 – 8/31/10 $200,000

Yusu Wang

- *CAREER: Geometric and Topological Methods in Shape Analysis, With Applications in Molecular Biology*
  National Science Foundation (NSF) CAREER
  2/1/08-1/31/13 $420,000

Bruce Weide

- *Collaborative Research: Logical Support for Formal Verification*
  National Science Foundation (NSF)
  Harvey Friedman (OSU-Mathematics)
  9/1/07-8/31/08 $75,000

Xiaodong Zhang

- *Collaborative research: LEAPNET: NOSS: Self-Adaptable All Terrain Sensor Networks*
  National Science Foundation (NSF)
  9/1/07-8/31/09 $141,139.00

Stuart Zweben

- *Wright Center of Innovation in Advanced Data Management and Analysis: Infrastructure Support for WCI ADMA Funded Equipment*
  Wright State University (subcontract with Ohio Department of Development)
  10/1/04-6/30/09 $25,555

Existing Awards: 07/01/06-06/30/07

Legend
Primary Investigator (in alphabetical order according to the name of the first CSE member to whom the funds are assigned)

- *Grant Title*
  Co-PIs (CSE members' names are bolded)
  (OSU Department name initials defined at the end of the section.)
  Sponsor
  Term - Amount

Gagan Agrawal

- *ST-CRTS: Enabling Processing of Large-Scale Scientific Data through Compilers Supported XML Abstractions*
  National Science Foundation (NSF)
  1/15/06-12/31/08 $299,997
- *REU: ST:CRTS: Enabling Processing of Large Scale Scientific Data Through Compiler Supported XML Abstractions*
  National Science Foundation Research Experiences for Undergraduates (NSF REU)
  1/15/08-12/31/08 $10,700
- *CEO: P--A Data-Intensive Cyberinfrastructure Component for Coastal Environmental Forecasting and Analysis*
  National Science Foundation (NSF)
  Hakan Ferhatosmanoglu
  10/1/06-9/30/09 $1,400,000

Anish Arora

- *Collaborative Research: NETS-NOSS State Based Specifications for Controlling and Configuring Sensor Networks*
  National Science Foundation (NSF)
  09/01/05-08/31/07 $230,000
- *HDCCSR: Scalable Dependability In Componentized Software Via Self-Stabilization.*
  National Science Foundation (NSF)
  0915/03-08/31/07 $480,127

Mikhail Belkin

- *CAREER: Geometry and High-Dimensional Inference*
  National Science Foundation (NSF)
  1/1/07-12/31/11 $498,972

Chris Brew

- *Tuition: Combining statistical and morphologically informed techniques to address the out-of-vocabulary problem in Arabic*
  Dayton Area Graduate Studies Institute
  6/11/07 – 6/10/2008 $62,486
- *CAREER: Hybrid methods for acquisition and tuning of lexical information*
  National Science Foundation (NSF)
  2/1/04 – 1/31/09 $500,000

Shari Speer (OSU-Linguistics)

- *Intonation in Spontaneous English & Japanese Dialogue*
  National Institutes of Health
  Donna Byron, Kiwako Ito (OSU-Linguistics)
  07/01/06-06/30/08 $1,319,267

B. Chandrasekaran

- *Artificial Intelligence Techniques And Advanced Decision Architectures*
  Micro Analysis & Design
  David Woods (OSU-IWSE)
  06/01/01-09/30/08 $2,759,422

David Woods (IWSE)

- *Advanced Decision Architectures: Building Information Superiority in the Army through User-Centered Decision Support*
  Micro Analysis & Design
  Gary Allread, Wayne Carlson,
  B. Chandrasekaran, Emily Patterson (OSU-IWSE), Nadine Sarter (U. of Michigan), Philip Smith (OSU-IWSE)
  06/01/01-09/30/07 $544,791

James Davis

- *Multi-Level Detection, Tracking, and Registration of Anomalous Behavior*
  Wright Brothers Institute
  04/01/07-12/31/07 $100,000
- *CAREER: Computer Recognition of Human Activity*
  National Science Foundation (NSF)
  03/01/03-02/29/08 $500,000

Tamal Dey

- *Implementation-Friendly Geometric Algorithms for Provable Surface and Volume Meshing*
  National Science Foundation (NSF)
  09/01/04-08/31/07 $180,000
- *Collaborative Research: Non-Smoothness in Meshing and Reconstruction*
  National Science Foundation (NSF)
  10/1/06-9/30/09 $429,402

Hakan Ferhatosmanoglu

- *CAREER: Exploration of Dynamic Sequences in Scientific Databases*
  National Science Foundation (NSF)
  07/15/06-07/14/11 $455,000

Eric Fosler-Lussier

- *Lexicon Building for Multi-Language Speech Recognition*
  Dayton Area Graduate Research Institute
  06/20/07-06/18/08 $62,329
- *CAREER: Breaking the Phonetic Code: Novel Acoustic-Lexical Modeling Techniques for Robust Automatic Speech Recognition*
  National Science Foundation (NSF)
  12/15/06-11/30/11 $502,952
- *ITR: Automatic Speech Attribute Transcription (ASAT): A Collaborative Speech Research Paradigm and Cyberinfrastructure with Applications to Automatic Speech Recognition (ASR)*
  Georgia Institute of Technology (National Science Foundation (NSF) Subcontract)
  10/01/04-08/31/08 $461,000
- *Lexicon Building for Multi-Language Speech Recognition*
  Dayton Area Graduate Studies Institute
  06/19/06-9/30/08 $124,479

Mark Pitt, (Linguistics)

- *Recognizing Phonological Variants of Spoken Words*
  National Institute for Deafness & Other Communication Disorders
  Eric Fosler-Lussier
  07/01/04-06/30/09 $702,746

Raghu Machiraju

- *ITR/NGS: A Framework for Discovery, Exploration, and Analysis of Evolutionary Simulation Data (DEAS)*
  National Science Foundation
  Srinivasan Parthasarathy, John Wilkins, (OSU-Physics)
  09/15/03-08/31/08 $616,600

D.K. Panda

- *Coordinated Fault Tolerance for High Performance Computing*
  Department of Energy (DoE)
  9/15/06-9/14/11 $1,000,000
- *High-end computing and networking research testbed for next generation data driven, interaction applications*
  National Science Foundation (NSF)
  Gagan Agrawal, **P. Sadayappan**, **Joel Saltz**, **Han-Wei Shen**
  09/15/04-08/31/09 $1,529,997
- *Research on High Performance and scalable MPI over InfiniBand*
  Mellanox Technologies, Inc.
  04/01/06-03/31/07 $110,346
- *Performance Evaluation of Cluster Networking and I/O Technologies (PECNIT)*
  Avetec
  07/01/06-12/31/08 $749,996
- *CPA: Designing next Generation Communication and I/P Subsystems with Multi-Core Architecture*
  National Science Foundation (NSF)
  07/01/07-06/30/10 $375,000
- *Accelerator for Offloading Services of Next Generation Data-Centers*
  RNET Technologies
  01/01/07-12/31/07 $74,999
- *Research on High Performance and Scalable MPI over InfiniBand*
  Mellanox Technologies, Inc.
  04/01/07-03/31/08 $111,000

DK Panda & P. Sadayappan

- *Programming Models for Scalable Parallel Computing*
  Department of Energy (DoE)
  9/15/06-9/14/11 $1,500,000

Richard Parent

- *ITR- (NHS)- Multi-Level, Active Attention Surveillance*
  National Science Foundation (NSF)
  James Davis, **Raghu Machiraju**, Alan Murray, (OSU-Geography), David Woods, (OSU-IWSE)
  10/01/04-09/30/07 $1,300,000

Srinivasan Parthasarathy

- *CAREER: A Scalable Framework for Mining Scientific and Biomedical Data*
  National Science Foundation (NSF)
  01/15/04-12/31/08
  $288,082
- *High Performance Data Mining for Protein Crystallization*
  Department of Energy (DoE)
  08/15/04-08/14/07 $309,336
- *NGS: A Services-Oriented Framework for Next Generation Data Analysis Centers*
  National Science Foundation
  Tahsin Kurc, (OSU-BMI), **Joel Saltz**
  08/01/04-07/31/08 $300,000
- *Scalable Data Analysis: An Architecture Conscious Approach*
  National Science Foundation (NSF)
  06/01/07-05/31/10 $325,000

P. Sadayappan

- *An Integrated Framework for Compile-Time/Run-Time Support for Multi-Scale Applications on High-End Systems*
  National Science Foundation (NSF)
  Atanas Rountev
  09/01/05-08/31/08 $355,587
- *ITR/AP: Synthesis of High Performance Algorithms for Electronic Structure Calculations*
  National Science Foundation (NSF)
  Gerald Baumgartner (Louisiana State University), Russell Pitzer, (OSU-Chemistry)
  09/15/01-08/31/07 $1,950,900
- *Enhancements to Disk Resident Arrays Library*
  Pacific Northwest National Laboratory
  02/03/04-09/30/08 $327,014
- *MOLAR: Modular Linux and Adaptive Runtime Support for HEC OS/R Research*
  Department of Energy (DoE)
  02/01/05-01/31/08 $210,991
- *SOFTWARE: Job Scheduling*
  National Science Foundation (NSF)
  Umit Catalyurek (OSU-BMI), Tahsin Kurc, (OSU-BMI), Pete Wyckoff (OSC), **Joel Saltz**
  09/15/04-08/31/08 $300,167

Jay Ramanathan

- *Collaborative for Enterprise Transformation and Innovation*
  National Science Foundation (NSF)
  Rajiv Ramnath
  08/01/06-07/31/07 $10,000

Han-Wei Shen

- *SciDAC Institute for Ultra scale Visualization*
  Department of Energy (DoE)
  8/15/06-9/14/11 $750,000
- *CAREER: Toward Effective Visualization of Large Scale Time-Varying Data*
  National Science Foundation (NSF)
  02/15/04-01/31/09 $428,178

Ness Shroff

- *Collaborative research: Towards an analytic foundation for network architectures*
  National Science Foundation (NSF)
  11/1/07 – 9/30/08 $58,786.12
- *NESTS – NBD: A high performance control plane for mesh networks: Theory and implementation*
  National Science Foundation (NSF)
  10/1/07 – 8/31/09 $316,438
- *CT-T: Collaborative research: Protecting TCP congestion control: Tools for design, analysis and emulation*
  National Science Foundation (NSF)
  7/1/07 – 7/31/09 $91,875
- *NeTS-NOSS: Robust sensor network architecture through neighborhood monitoring and isolation*
  National Science Foundation (NSF)
  7/1/07 – 8/31/09 $132,4775
- *Design of urban sensor networks (MURI)*
  Purdue University
  6/15/07 – 11/14/10 $400,000

Donald Stredney (OSC)

- *Validation/Dissemination Virtual Temporal Bone Dissection*
  Children's Research Institute Columbus
  Bradley Clymer, (OSU-ECE), Ashok Krishnamoorthy, (OSC), Petra Schmalbrock, (OSU-Radiology), **Han-Wei Shen**, Janet Weisenberger, (OSU-Speech & Hearing)
  07/01/06-06/30/07 $135,343

Prasun Sinha

- *CAREER: On-The-Fly Protocols for Data Dissemination in Wireless Mesh Networks*
  National Science Foundation (NSF)
  0/15/06-12/31/11 $412,000

DeLiang Wang

- *Collaborative Research: Separating Speech from Noise to Improve Intelligibility*
  National Science Foundation (NSF)
  1/15/06- 12/31/08 $144,914
- *Study of Speech and NonSpeech Separation in Aging*
  Veterans Administration
  04/01/06-03/31/11 $500,00
- *Monoaural Speech Segregation By Interating Primitive And Schema-Based Analysis*
  Air Force Office of Scientific Research
  02/15/04-12/31/07 $672,434

Yusu Wang

- *Feature Extraction, Characterization, and Visualization for Protein Interaction via Geometric and Topological Methods*
  Department of Energy Young Investigator Award (DoE)
  8/15/06-8/14/09 $300,000

Bruce Weide

- *TWICE Support of TECH CORPS Ohio TECH CORPS Ohio*
  Bettina Bair
  09/01/05-08/31/07 $3,700

Dong Xuan

- *Defending Against Physical Attacks in Sensor Networks*
  Army Research Office
  Anish Arora, **Steve Lai**
  03/15/07-03/14/10 $280,000
- *2008 International Conference On Distributing Computing Systems (ICDCS) Travel Support*
  National Science Foundation (NSF)
  12/01/06-11/30/07 $35,000
- *CAREER: Algorithm Design for Optimization Problems in Network Over-Provisioning*
  National Science Foundation (NSF)
  12/15/05-11/30/11 $400,060

Xiaodong Zhang

- *Algorithms Design and Systems Implementation to Improve Buffer Management for Fast I/O Data Accesses*
  National Science Foundation (NSF)
  06/01/07-05/31/10 $275,000
- *International Conference on Parallel Processing (ICPP) 2007*
  National Science Foundation (NSF)
  09/15/06-12/31/07 $35,000
- *Collaborative Research: CSR-EHS: System Research on Media Streaming to Heterogeneous Mobile Devices*
  National Science Foundation (NSF)
  09/15/06-08/300/08 $119,314
- *Memory Caching And PreFetching to Improve I/O Performance in High-End Systems*
  National Science Foundation (NSF)
  10/1/06-9/30/08 $93,999
- *Sign Recognition*
  Honda Research & Development
  Kikuo Fujimura (Honda Research Institute USA)
  01/01/07-12/31/07 $53,918
- *Research in Man-Machine Interaction*
  Honda Research & Development
  Kikuo Fujimura (Honda Research Institute USA)
  01/01/07-03/31/08 $54,704
- *Modeling and System Support to Balance the Resource Demand and Supply in High Performance Computing*
  National Science Foundation (NSF)
  11/01/05-8/31/07 $275,468
- *Collaborative Research: Next Generation Internet Proxy Systems*
  National Science Foundation (NSF)
  11/1/05-8/31/08 $130,000
- *Collaborative Research: Foundations of Solving Large Direct and Inverse Scattering Problems – Algorithms and Systems*
  National Science Foundation (NSF)
  11/1/05-6/30/08 $132,257

Stuart Zweben

- *Wright Center of Innovation in Advanced Data Management and Analysis: Kansei*
  Wright State University (subcontract with Ohio Department of Development)
  Anish Arora
  10/01/03-06/30/08 $222,797
- *Wright Center of Innovation in Advanced Data Management and Analysis: Large-Scale Sensor Network Management and Analysis for Security and Monitory*
  Wright State University (subcontract with Ohio Department of Development)
  James Davis
  10/01/03-06/30/08 $7,000
- *Wright Center of Innovation in Advanced Data Management and Analysis: Audio-Based Analysis and Surveillance*
  Wright State University (subcontract with Ohio Department of Development)
  DeLiang Wang
  10/01/03-06/30/08 $18,000
- *Wright Center of Innovation in Advanced Data Management and Analysis: Large Format Stereoscopic Projection System*
  Wright State University (subcontract with Ohio Department of Development)
  Han-Wei Shen
  10/01/03-06/30/08 $122,600
- *Wright Center of Innovation in Advanced Data Management and Analysis: High Performance and Scalable Data-Centers with Multi-Core Architectures and Emerging Networking Technologies*
  Wright State University (subcontract with Ohio Department of Development)
  DK Panda
  10/01/03-06/30/08 $600,000

Members of the local organizing committee, chaired by Chris Brew, for the 46th Annual Meeting of the Association for Computational Linguistics (ACL). This meeting combined the Annual Meeting of the Association for Computational Linguistics (ACL) with the Human Language Technology Conference (HLT) of the North American Chapter of the ACL. CSE and the Department of Linguistics jointly hosted the event. CSE members who served on the committees in the picture are grad student, Josh King (far left), Chris Brew (third from left) and Eric Fosler-Lussier (second from right). This conference in particular "covers a broad spectrum of disciplines working towards enabling intelligent systems to interact with humans using natural language, and towards enhancing human-human communication through services such as speech recognition, automatic translation, information retrieval, text summarization, and information extraction."

Gifts: 07/01/06-06/30/07

- *Advanced Message Passing Algorithms for RDMA-enabled Interconnects*
  Sun Microsystems
  D.K. Panda
  $150,000
- *2007 IBM Faculty Award*
  IBM
  Srinivasan Parthasarathy
  $20,000

Explanations of Initials

OSC	Ohio Supercomputing Center
OSU-CEEGS	Civil and Environmental Engineering and Geodetic Science Department
OSU-COPH	College of Public Health
OSU-ECE	Electrical and Computer Engineering
OSU-IWSE	Industrial, Welding & Systems Engineering Department
OSU-OLN	Ohio Learning Network
OSU-PPM	School of Public Policy and Management

Faculty Service:
Journal Editorial Boards & Major Conference Chair Positions

Gagan Agrawal
- *IEEE Transactions on Parallel and Distributed Systems*

Anish Arora
- *ACM Transactions on Sensor Networking*
- *Journal of Real Time Systems*
- *Journal of New Generation Computing*

Chris Brew
- *Journal of Artificial Intelligence Research*

James Davis
- *Journal of Machine Vision and Applications*

Tamal Dey
- *Journal of Discrete and Computational Geometry*
- Executive Board of the Social Modeling Association

Ten-Hwang (Steve) Lai
- *ACM/Springer Journal of Wireless Networks*
- *Journal of Information Science and Engineering*
- *International Journal of Ad Hoc and Ubiquitous Computing*
- *International Journal of Sensor Networks*
- *Encyclopedia of Computer Science and Engineering*
- General Co-Chair, 36th International Conference on Parallel Processing (ICPP '07)

David Lee
- *IEEE Journal of Selected Areas in Communications (Senior Editor)*
- *I/S: A Journal of Law and Policy for the Information Society*
- Chair of Executive Committee, International Conference of Network Protocols (ICNP)
- Chair of Steering Committee, International Conference of Network Protocols (ICNP)

Ming T. Liu
- *International Journal of Communication Systems*
- Chair of Steering Committee, International Conference on Distributed Computing Systems (ICDCS)
- Co-Chair, Steering Committee, International Conference on Parallel Computing (ICPP)

D. K. Panda
- *Journal of Parallel and Distributed Computing*

Richard Parent
- *IEEE Transactions on Visualization on Visualization and Computer Graphics*
- *The Visual Computer*

Srinivasan Parthasarathy
- *IEEE Intelligent System*
- *Journal of Data Mining and Bioinformatics*
- *Encyclopedia on Geographical Information Sciences*
- *Data Mining and Knowledge Discovery, an International Journal*

Atanas (Nasko) Rountev
- *International Journal of Information and Software Technology*

Han-Wei Shen
- *IEEE Transactions on Visualization and Computer Graphics*

Ness Shroff
- *Computer Networks*
- *IEEE/ACM Transactions and Networks*
- Co-Chair of Program Committee, 8th ACM International Symposium on Mobile AdHoc Networking and Computing (MobiHoc '08)

DeLiang (Leon) Wang
- *Journal Cognitive Neurodynamics*
- *EURASIP Journal on Audio, Speech, and Music Processing*
- *Journal of Neurocomputing*
- *Journal of Neural Computing Applications*
- *IEEE Transactions on Neural Networks*
- Governing Board, International Neural Network Society

Xiaodong Zhang
- *IEEE Transactions on Parallel and Distributed Systems (Associate Editor-in-Chief)*
- *IEEE Transactions on Computers*
- *IEEE Micro*
- *Journal of Parallel and Distributed Computing*
- *Journal of Computer and Science and Technology (Executive Editor-in-Chief)*
- Co-Chair of Program Committee, 36th International Conference on Parallel Processing (ICPP '07)
- Co-Chair of Program Committee, 17th International World Wide Web Conference (WWW '08)

VISITING SPEAKERS

Distinguished Guest Speakers

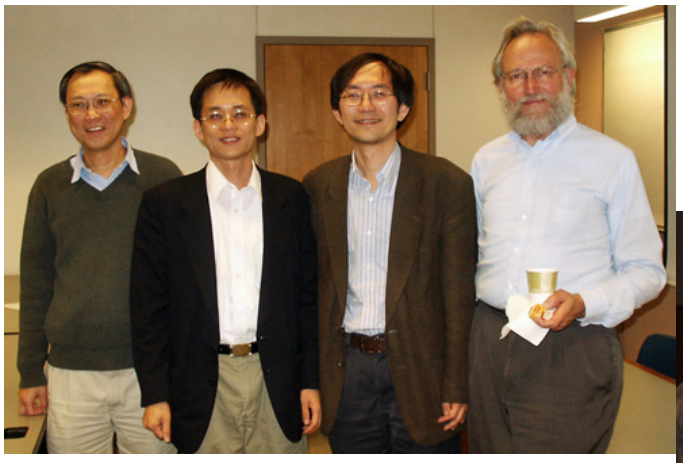
- Laxmi N. Bhuyan University of California, Riverside
  Application Oriented Networking (AON): Adding Intelligence to Next-Generation Internet Routers
- Vivek Sarkar Rice University
  Programming Challenges for Petascale and Multicore Parallel Systems
- Yu-Chee Tseng National Chiao-Tung University, Taiwan
  Wireless Sensor Networks: Applications, Protocols, and Deployment
- Professor Bernard Widrow Stanford University
  "Cognitive" Memory and Its Applications

Dr. Bernard Widrow lunches with Eric Fosler-Lussier, Hui Fang and Hojjat Adeli, Lichtenstein Professor from OSU - Civil and Environmental Engineering and Geodetic Science.. Dr. Widrow's talks was one of the most popular events in the academic year, attracting people from beyond the Ohio State community.

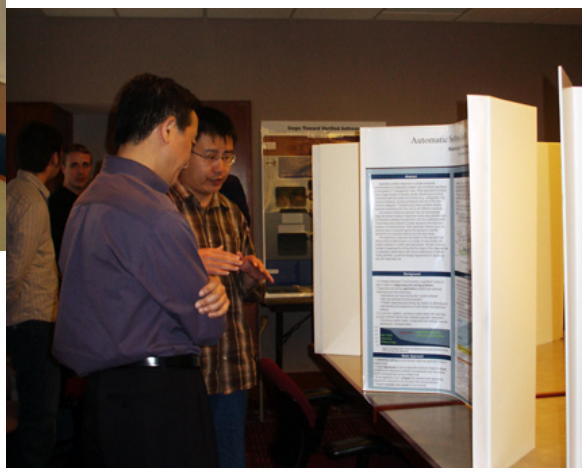
Guest Speakers

- Jeff Beall Dreamworks Animation, PDI/Dreamworks
  How to Build an Animated Blockbuster
- Vartika Bhandari University of Illinois, Urbana-Champaign
  Heterogeneous Multi-Channel Wireless Networks: Routing and Scheduling Issues
- Koushik Chakraborty University of Wisconsin - Madison
  Over-provisioned Multicore Systems
- Christoph Csallner Georgia Institute of Technology
  Combining Static And Dynamic Analyses For Automated Bug-Finding
- Samir Das Stony Brook University
  MobiSteer: Using Steerable Beam Directional Antenna for Vehicular Network Access
- Sanjoy Dasgupta University of California,
  San Diego Random Projection Trees and Low Dimensional Manifolds
- Franz Franchetti Carnegie Mellon University
  Spiral: Generating Software and Hardware Implementations for Linear Transforms
- Hector Gonzalez University of Illinois, Urbana-Champaign
  Mining Massive Moving Object Datasets: From RFID Data Flow Analysis to Traffic Mining
- Anil R. Hirani University of Illinois, Urbana-Champaign
  Calculus on Meshes
- Jeremy Kubica Google
  Big Data Problems: From Computational Astronomy to Online Advertising

- Wang-Chien Lee The Pennsylvania State University
  Supporting Complex Multi-dimensional Queries in P2P Systems
- Peng Ning North Carolina State University
  Providing DoS-Resistance for Authenticated Broadcast in Wireless Sensor Networks
- Bryan Pardo Northwestern University
  Teaching Machines to Listen
- Valerio Pascucci Lawrence Livermore National Laboratory
  Multi-scale Morse Theory and Data Streaming for Science Discovery
- Ozgur Simsek University of Massachusetts, Amherst
  Autonomous Development of Skill Hierarchies
- Radu Teodorescu University of Illinois, Urbana-Champaign
  Helping Moore's Law: Multilayer Techniques to Address Parameter Variation
- Gary Wassermann University of California, Davis
  Techniques and Tools for Engineering Secure Web Applications
- Philip M. Wells University of Wisconsin - Madison
  Adapting to Hardware Uncertainty: Virtualization for the Multicore Era
- Afra Zomorodian Dartmouth College
  Topological Data Analysis: Theory and Practice



Back to back talks made for a reunion of sorts in the CSE department. When Dr. Yu-Chee Tseng (second from right) graduated from the Department in 1994, Dr. Doug Kerr (far right) was on his dissertation committee. Dr. Wang-Chien Lee (third from right) was an advissee of Dr. Ten-Hwang (Steve) Lai (far left).



At a mini-poster session during the Industrial Advisory Board meeting, Xiaoning Ding (right, Ph.D. student) presents his research to Advisory Committee member Feng Zhao (left).

STUDENTS

Teaching Ten Year Statistical History

	AU 1997	AU 1998	AU 1999	AU 2000	AU 2001	AU 2002	AU 2003	AU 2004	AU 2005	AU 2006	AU 2007
Faculty	31.5	30	28.5	29	30	29	31	31	32	33	35
Course Enrollment/ Autumn Qtr.	3,630	4,124	3,693	3,977	4,103	4,076	3,650	3,125	3,187	3,238	3,386
	97-98	**98-99**	**99-00**	**00-01**	**01-02**	**02-03**	**03-04**	**04-05**	**05-06**	**06-07**	**07-08**
Students Taught	13,098	14,230	14,278	14,278	14,006	13,878	12,208	10,623	10,844	10,641.	11,185

Graduate Program

The Department of Computer Science and Engineering Graduate Program strives to develop researchers, educators and practicing professionals with superior skills in computer science and engineering. Students have the options to obtain either a Master's degree or Doctorate or both. The program admits about fifty new students each year. Masters and Doctorate degrees are offered with an emphasis on specialized research areas, including a dual masters degree in CIS and Biomedical Communications.

Admission to the CSE Graduate Program has always been highly competitive. During the 2006-2007 academic year, we received 619 applications for graduate admissions to the Autumn 2007 quarter.

	AU 1997	AU 1998	AU 1999	AU 2000	AU 2001	AU 2002	AU 2003	AU 2004	AU 2005	AU 2006	AU 2007
Graduate Students Enrolled	155	169	160	157	159	164	174	169	188	184	235
	97-98	**98-99**	**99-00**	**00-01**	**01-02**	**02-03**	**03-04**	**04-05**	**05-06**	**06-07**	**07-08**
Graduate Student Applications	536	703	857	940	1,542	1,508	712	589	694	619	705
Graduate Students Supported	128	119	111	130	175	156	149	158	163	135	135
M.S. Degrees Awarded	56	64	58	36	19	30	31	27	21	33	37
Ph.D. Degrees Awarded	12	10	10	8	4	7	7	11	18	17	32
Ph.D. Degrees (cumulative)	287	297	307	314	318	325	332	343	361	378	410

2007-2008 Doctorates Bestowed

Name Advisor
Other Degrees Earned
Home Post Graduation Destination
Dissertation Title

Fatih Altiparmak Dr. Hakan Ferhatosmanoglu
B.S.C.I.S., Bilkent Üniversitesi
Nevehir, Turkey Epic Systems
Online Management and Mining of Heteregenous and Dynamic Time-Series

Bonny Banerjee Dr. Balakrishana Chandrasekaran
B.Engr., University of Madras; M.S., M.S., The Ohio State University
Kolkata, India Securboration
Investigation in Solving Visual Problems for Diagrammatic Reasoning

Gregory Buehrer Dr. Srinivasan Parthasarathy
B.S.Ch.E., University of Toledo; M.S. The Ohio State University
Columbus, OH, USA Microsoft Live Labs
Scalable Mining on Emerging Architectures

Hui Cao Dr. Anish Arora
B.Engr., Shenyang University of Technology; Master's, Tsinghua University; M.S., The Ohio State University
Lansdale, PA, USA Qualcomm
Stabilization of Sensor Networks

Sriram Chellappan Dr. Dong Xuan
B.Engr., University of Madras; M.S., M.S., The Ohio State University
Chennai, India University of Rolla, Missouri
On Deployment and Security in Mobile Wireless Sensor

Kai-Wei Fan Dr. Prasun Sinha
B.S., M.S., National Chiao Tung University; M.S. The Ohio State University
Hsinchu County, Taiwan, R.O.C. Cisco Systems, San Jose, CA
On Structure-Less and Everlasting Data Collection in Wireless Sensor Networks

Xiaoyang Gao Dr. P. Sadayappan
B.S., Peking University
Beijing, P. R. C.
Intergrated Complier Optimizations For Tensor Contractions

Amol Ghoting Dr. Srinivasan Parthasarathy
B.Engr, University of Mumbai; M.S., University of Southern California; M.S., The Ohio State University
Mumbai, India IBM T. J. Watson Research Center
Memory - and Knowledge - Conscious Data Mining

Leonid Glimcher Dr. Gagan Agrawal
B.S.C.S.E., M.S., The Ohio State University
Moscow, Russia Cisco Systems - North Carolina
A Grid-Based Middleware for Scalable Processing of Remote Data

Wenjun Gu Dr. Dong Xuan
B.S., M.S., Shanghai Jiao Ton University; M.S., The Ohio State University
Shanghai, P. R. C. Microsoft - Richmond, VA
Defending Against Node-Targeted Attacks in Wireless Networks

Lei Guo Dr. Xiaodong Zhang
B.S., M.S., University of Science & Technology of China
Yingkou, P. R. C. Yahoo! Search
Insights into Access Patterns of Internet Media Systems: Mearsurements, Analysis, and System Design

Sriram Krishnamoorthy Dr. P. Sadayappn
B.Engr., Anna University, Chennai; M.S., The Ohio State University
Chennai, India Pacific National Labs
Optimizing Locality and Parallelism through Program Reorganization

Vinodkrishnan Kulathumani — Dr. Anish Arora
B.Engr., University of Mumbai; M.S., The Ohio State University
Mumbai, India — West Virginia University
Network Abstractions fro Reliable Application Design Using Wireless Sensor Networks

Unmesh Kurup — Dr. Balakrishana Chandrasekaran
B.Tech., Cochin University of Science and Technology
Cochin, India — Rensselaer Polytechnic Institute (RPI) (post-doc)
Design and use of A Bimodal Cognitive Architecture for Diagrammatic Reasoning and Cognitive Modeling

Liya Li — Dr. Han-Wei Shen
B.Engr., M.S., Beijing Institute of Technology
Columbus, OH, USA — NVIDIA
Advanced Flow Visualization

Yipeng Li — Dr. DeLiang Wang
B.S., Tsinghua University; M.S. (Mechanical Engineering), The Ohio State University; M.S., The Ohio State University
Pucheng, P. R. C. — Microsoft - Richmond, VA
Monaural Musical Sound Separation

Sha Liu — Dr. Prasun Sinha
B.S., Master's, University of Science and Technology, China; Masters of Applied Statistics, The Ohio State University
Chongqing, P. R. C. — Epic Systems – Madison, WI
Energy Efficient MAC Layer Design for Wireless Sensor Networks

Kishore Rao Mosaliganti — Dr. Raghu Machiraju
B.Tech., Master's, Indian Institute of Technology, Madras
Columbus, OH, USA — Post-Doctoral Researcher Fellow at Havard Medical School – Boston, MA
Microscopy Image Analysis Algorithms for Biological Microstructure Characterization

Ozgur Ozturk — Dr. Hakan Ferhatosmanoglu
B.S., Bilkent Üniversitesi; M.S., Oregon Health and Science University
Izmit, Turkey — Oracle
Feature Extraction and Similarity-Based Analysis for Proteome and Genome Databases

Manoj Thankappan Pillai — Dr. Mario Lauria
B.E., University of Allahabad, India; M.Tech., Indian Institute of Technology, India; M.S., The Ohio State University
Tiruvall, India
Efficient Data Redundancy in Storage Clusters

Yang Shao — Dr. DeLiang Wang
B.Engr., Nanjing University of Aeronautics and Astronautics; Masters, Fudan University
Chicago, IL, USA
Sequential Organizations in Computional Auditory Scene Analysis

Vinay Sharma — Dr. James Davis
B.Engr., Birla Institute of Technology and Science
Kerala, India — Texas Instruments
Simultaneous Object Detection and Segmentation using Top-down and Bottom-up Processing

Mariana Sharp — Dr. Atanas Rountev
B.S., M.S., University of Bucharest, Romania; M.S., The Ohio State University
Columbus, OH, USA — Canton, NY
Static Analyses for Java in the Presence of Distributed Components and Large Libraries

Guoqiang Shu — Dr. David Lee
B.S., Peking University; M.S., Chinese Academy of Sciences; M.S., The Ohio State University
Beijing, P. R. C. — VMWare
Formal Methods and Tools for Testing Communication Protocol System Security

Laura Cristina Stoia — Dr. Donna K. Byron
B. S., University of Bucharest; M.S., The Ohio State University
Bucharest, Romania — Google
Noun Phrase Generation for Situated Dialogs

Jian Sun — Dr. Tamal Dey
B.Eng., M.S., Tsinghua University
Jiangsu, P. R. C. — Post-doc at Stanford University
Reconstructing and Analyzing Surfaces in 3-Space

Sayantan Sur — Dr. D. K. Panda
B.Tech., University of Calicut; M.S., The Ohio State University
East Brunswick, NJ
Scalable and High-Performance MPI Design for Very Large InfiBand Clusters

Karthikeyan Vaidyanathan — Dr. D. K. Panda
Masters, Birla Institute of Technology and Science
Chennai, India — Intel Research – Bangalore, India
High-Performance and Scalable Soft Shared State for Next-Generation Datacenters

Abhinav Vishnu — Dr. D. K. Panda
B.Tech., Banaras Hindu University; M.S., The Ohio State University
Hapur, India — IBM T. J. Watson
Reconstructing and Analyzing Surfaces in 3-Space

Nagawjayalakshmi Vydyanathan — Dr. P. Sadayappan
B.Engr., M.Tech., Birla Institute of Technology and Science
Chennai, India — Siemens
Locality Conscious Scheduling Strategies for High-Performance Data Analysis Applications

Chao Wang — Dr. Srinivasan Parthasarathy
B.Engr., Huazhong University of Science and Technology; Masters, Beijing University of Aeronautics and Astronautics; M.S., The Ohio State University
Wuhan, P. R. C. — Yahoo!
Exploiting Non-Redundant Local Patterns and Probabilistic Models for Analyzing Structured and Semi-Structured Data

Xun Wang — Dr. Dong Xuan
B.Engr., Masters, East China Normal University; M.S., The Ohio State University
San Ramon, CA, USA — Cisco Systems, Inc.
Widespread Internet Attacks: Defense-Oriented Evolution and Countermeasures

Hooding the new Doctors.
Above, Dr. Srinivasan Parthasarathy hoods his advisee Amol Ghoting. It's all smiles as well for Laura Stoia as she receives her hood from Dr. Donna Byron.

2007 - 2008 Master of Science Degrees

Name
Advisor
Home
Other Degrees

Khushbu Agarwal
Dr. Srinivasan Parthasarathy
Agra, India
B.Engr., Birla Institute of Technology, Ranchi

Tan Apaydin
Dr. Hakan Ferhatosmanoglu
Columbus, OH, USA
B.S., Bilkent Universitesi

Sitaram Asur
Dr. Srinivasan Parthasarathy
Bangalore, India
B.Engr., Visveswariah Technological University, Bangalore

Uday Kumar Reddy Bondhugula
Dr. P. Sadayappan
Hyerbad, India
B.Tech., India Institute of Technology at Madras

Adriane Amelia Boyd
Dr. Eric Fosler-Lussier
Asheville, NC, USA
B.A. (Honors), University of North Carolina at Chapel Hill; M.A. (Linguistics), The Ohio State University

Hui Cao
Dr. Anish Arora
Lansdale, PA, USA
B.Engr., Shenyang University of Technology; Masters, Tsinghua University

Lei Chai
Dr. D. K. Panda
Qingdao, P. R. C.
B.Engr., Zhejiang University

Yisheng Chen
Dr. Rick Parent
Hangzhou, P. R. C.
B.S.C., Zhejiang University

Kai-Wei Fan
Dr. Prasun Sinha
Hsinchu County, Taiwan, R. O. C.
B.S., M.S., National Chiao Tung University

Leonid Glimcher
Dr. Gagan Agrawal
Moscow, Russia
B.S.C.S.E., The Ohio State University

Wenjun Gu
Dr. Dong Xuan
Columbus, OH, USA
B.S., M.S., Shangahi Jiao Tong University

Jingjing He
Dr. Srinivasan Parthasarathy
Changsha, P. R. C.
B.Engr., Beijing University of Posts and Telecommunications

Wei Huang
Dr. D. K. Panda
Hangzhou, P. R. C.
B.Engr., Zhejiang University

Mohammad Kamrul Islam
Dr. P. Sadayappan
Westerville, OH, USA
B.S., Bangladesh University of Engineering and Technology; M.S., Wright State University

Guarav Khanna
Dr. P. Sadayappan
New Delhi, India
B.Engr., University of Delhi

Ramkrishnan Kulathumani
Dr. P. Sadayappan
MaladWest, Mumbai, India
B.Engr., University of Mumbai

Domin Lee
Dr. Rick Parent
Seoul, South Korea
B.S., Hanyang University

Yipeng Li
Dr. Han-Wei Shen
Pucheng, P. R. C.
B.S., Tsinghau University

Sha Liu
Dr. Prasun Sinha
Chongqing, China
B.S., Masters, University of Science and Technology of China

Qingda Lu
Dr. P. Sadayappan
Hefei, P. R. C.
B.Engr., Beijing Institute of Technology; M.S., Peking University

Amith Rajith Mamidala
Dr. D. K. Panda
Hyderabad, India
B.Tech., Indian Institute of Technology, Madras

Karen Levonovich Manukyan
Dr. Eitan M. Gurari
Columbus, OH, USA
Diploma, Odessa State Polytechnic University, Ukraine

Jeremy John Morris
Dr. Eric Fosler-Lussier
Columbus, OH, USA
B.S., Bowling Green State University; M.A. (Linguistics), The Ohio State University

Sundeep Narravula
Dr. D. K. Panda
Hyderabad, India
B.Tech., Indian Institute of Techonology at Madras;

Ranjit Mario Noronha
Dr. D. K. Panda
Buffalo, NY, USA
B.S., University of Mumbai, India; M.S., State University of New York at Binghampton

Aleksandar Vladimir Pantaleev
Dr. Atanas Rountev
Rousse, Bulgaria
B.A., American University of Bulgaria

Rajkiran Panuganti
Dr. P. Sadayappan
Columbus, OH, USA
B.Tech., Indian Institute of

Jason E. Sawin
Dr. Atanas Rountev
Joseph, OR, USA
B.A., Lewis-Clark College

Yang Shao
Dr. Srinivasan Parthasarathy
Chicago, IL, USA
B.Engr., Nanjing University of Aeronautics and Astronautics

Guoqiang Shu
Dr. David Lee
Beijing, P. R. C.
B.S., Peking University; M.S., Chinese Academy of Sciences

Nitin Sivakrishnan
Dr. Gagan Agrawal
Perumbavoor, India
B.Tech., Indian Institute of Technology, Madras

Sayantan Santanu Sur
Dr. D. K. Panda
Columbus, OH, USA
B.Tech., University of Calicut

Shirish Tatikonda
Dr. Srinivasan Parthasarathy
Hyderabad, Andhra Pradesh, India
B.Engr., Masters, Birla Institute of Technology and Science

Duygu Ucar
Dr. Srinivasan Parthasarathy
New York City, NY, USA
B.S., Bilkent Üniversitesi

Abhinav Vishnu
Dr. D. K. Panda
Hapur, India
B.Tech., Banaras Hindu University

Ying Wei
Dr. Rick Parent
Hangzhou, P.R.C.
B.S., Zhejiang University, China.

Zhaohui Zhou
Dr. Gagan Agrawal
Columbus, OH, USA
B.S., Wuhan University

2008 Graduate Student Research Poster Exhibit

This year's event grew in participation and attendance building a popular new tradition within the Department. Below is a list of this year's presenters, their advisor and their abstract titles.

Bruce Adcock Derek Bronish, Jason Kirschenbaum	Bruce Weide	*Steps Toward Verified Software*
Tan Apaydin	Hakan Ferhatosmanoglu	*Dynamic Data Organization for Online Bitmap Indexes*
Sitaram Asur	Srinivasan Parthasarathy	*Mining Dynamic Interaction Graphs*
Joe Bollinger	J. Ramanathan & R. Ramnath	*Adaptive Complex Enterprise Architectures*
Guadalupe Canahuate	Hakan Ferhatosmanoglu	*Similarity Searches over Bitmap Indexes*
Lei Chai	D. K. Panda	*High Performance and Scalable MPI Intra-node Communication Middleware*
Feng Chen	Xiaodong Zhang	*FlexFetch: A History-Aware Scheme for I/O Energy Saving in Mobile Computing*
Ai Chen	Ten H. Lai	*Measuring and Guaranteeing Quality of Barrier-Coverage in Wireless Sensor Networks*
David Chiu	Gagan Agrawal	*Enabling Ad Hoc Queries over Low Level Geospatial Datasets*
Xiaoning Ding	Xiaodong Zhang	*Automatic Software Fault Diagnosis by Exploiting Application Signatures*
Kai-Wei Fan	Prasun Sinha	*Anycasting For Low Energy Communications In Multi-Hop Wireless Sensor Networks*
Qi Gao	Prof. Feng Qin	*FirstAid: Automatically Fix Common Memory Bugs in Software during Production Runs*
Mike Gibas	Hakan Ferhatosmanoglu	*A General Framework for Modeling and Processing Optimization Queries*
Wei Huang	D. K. Panda	*High Performance Cluster Computing with Virtual Machines*
Mohammad Kamrul Islam	P. Sadayappan	QoS in Job Scheduling
Gaurav Khanna	P. Sadayappan	*A Data-Locality Aware Mapping and Scheduling Framework for Data-Intensive Computing*
Vinod Kulathumani	Anish Arora	*Distance Sensitive Snapshots In Wireless Sensor Networks*
Matthew Lang	Paul Sivilotti	*Modular Verification of Maximality Properties*
Thang Le	Dong Xuan	*Providing Differentiated Services in Multi-channel WSNs*
Joshua A. Levine	Tamal K. Dey	*Delaunay Mesh Generation for a Large Class of Domains*
Yipeng Li and John Woodruff	DeLiang Wang	*Monaural Musical Sound Separation*
Qingda Lu	P.Sadayappan	*Data Layout Optimization Techniques for Modern and Emerging Architectures*
Amith R Mamidala	D K Panda	*Scalable and High Performance Collective Communication over modern InfiniBand Multicore Clusters*
Jeremy Morris	Eric Fosler-Lussier	*Discriminative ASR with Conditional Random Fields*
Kishore Mosaliganti	Raghu Machiraju	*Microscopy Image Analysis*
Sivaramakrishnan Narayanan	Prof Joel Saltz	*Semantic Querying of Biomedical Images using Annotations*
Sundeep Narravula	D. K. Panda	*Designing High Performance and Scalable Distribute Data-Center Services over Modern Interconnects*
Ranjit Noronha	D.K. Panda	*Designing High Performance Network File Systems Over InfiniBand*
Alex Pantaleev	Nasko Rountev	*Addressing Horizontal Scalability Issues in Enterprise Applications through Dynamic Analysis*
Rajkiran Panuganti	P. Sadayappan	*ParaM: A Framework For High Productivity Computing*
Preethi Raghavan	Rajiv Ramnath	*IDE for Complex Systems*
Sundaresan Raman	Roger Crawfis	*Distributed Visualization Framework Architecture*
Jason Sawin	Atanas Rountev	*Improved Static Resolution Of Dynamic Features In Java*
Guoqiang Shu	David Lee	*Fuzzer-in-the-Middle: Testing Security and Reliability of Network Protocols*
Kaushik Sinha	Mikhail Belkin	*The Value Of Labeled And Unlabeled Examples When The Model Is Imperfect*
Mukundan Sridharan	Anish Arora	*Peoplenet-A Mobile Sensing Testbed*
Enhua Tan	Xiaodong Zhang	*PSM-throttling: Minimizing Energy Consumption for Bulk Data Communications in WLANs*
Shirish Tatikonda	Srinivasan Parthasarathy	*An Adaptive Memory Conscious Approach for Mining Frequent Trees: Implications for Multi-core Architectures*
Ambrish Tyagi	J. W. Davis	*A Context-Based Tracker Switching Framework*
Karthikeyan Vaidyanathan	D. K. Panda	*Designing Efficient Distributed Data/Resource Sharing Substrate for Current and Next-Generation Data-Centers*
Nagavijayalakshmi Vydyanathan	P. Sadayappan	*Locality Conscious Scheduling Strategies for High Performance Data Analysis Applications*
Kelly Yakovich	Rajiv Ramnath	*Collaboration Space Model for eGovernment Transformation*
Qian Zhu and Leo Glimcher	Gagan Agrawal,	*Grid Middleware for Data Processing*

Undergraduate Program

Overview

As shown in much of this report, CSE's research continues to grow and expand the Department. Yet, the undergraduate education remains that of highest quality. The demand for CSE classes and application for Computer Science majors is rising once again as word of the latest U.S. Bureau of Labor Statistics estimations on U.S. job openings for the next decade spreads into the high school counseling offices. Indeed these projections indicate there will be more openings just for software engineers (i.e., not including the rest of computing) than in all other engineering fields combined. Moreover, 75% of all projected job openings in engineering and computing occupations will be in computing. Students and parents who consider these data can hardly fail to see the career potential in computing fields. Still, we remain challenged to address the persistent gender imbalance in the field as well as the discouragingly low numbers of minority students in not only computing but in all technical fields.

The Department offers undergraduate degrees through three colleges: Engineering, Arts and Sciences and Business. Each of these degree programs is carefully tailored to provide the perspective on computing appropriate to the college in which it is offered. Students from any college may also earn a minor in Computer Science and Engineering (CSE)

	AU 1997	AU 1998	AU 1999	AU 2000	AU 2001	AU 2002	AU 2003	AU 2004	AU 2005	AU 2006	AU 2007
Undergrad Students Enrolled	1124	1358	1519	1556	1741	1562	1209	958	894	795	888
	97-98	**98-99**	**99-00**	**00-01**	**01-02**	**02-03**	**03-04**	**04-05**	**05-06**	**06-07**	**07-08**
B.A., B.S. Degrees Awarded	227	259	296	297	277	335	274	192	124	140	85

Undergraduate Office for Academic Advising

The Undergraduate Office for Academic Advising is an integral area of the Department. The advisors assist computer science students enrolled in the College of Engineering and in the Colleges of the Arts and Sciences. They are the initial contact for every student joining the major and premajor. They also advise OSU and high school students who are exploring computer science as a potential major. When admitted to major, each student is assigned a faculty advisor who assists students in choosing appropriate technical electives in their technical field and for answering questions regarding graduate school and the field of computer science. However, the academic advisors are always available for general support throughout their time in the department.

The office is staffed by three highly professional team members.

- **Peg Steele**, Coordinator of Academic Advisement, has been with the department since early 1998. In 2004 she was named an "Outstanding Advisor" by the National Academic Advising Association and twice received the same recognition from The Ohio State University's chapter of the organization. She currently chairs the NACADA Engineering and Science Commission
- **Nikki Strader,** Academic Advisor & Staff Assistant, is newer to CSE, coming on board in late 2003. From 2006 through 2008, Nikki served as the President of the Academic Advising Association of Ohio State (ACADAOS), and in May 2007, was named one of two Outstanding Advisors at Ohio State by ACADAOS. She is the primary contact for all freshman pre-CSE students.
- Since 2007, the Graduate Administrative Assistant in Advising is **Jason Sawin**. In addition to his advising duties, he is working toward his Ph.D. degree in the area of computer systems. His current research interests focus on the dynamic and static analysis of application code.

2007 - 2008 Bachelors Graduates

College of Arts & Sciences

Deepak C. Bal
John Michial Battagline
Morgan Miller Bode
Nicholas Jeffrey Coats
Alan David Delong
Zachary Scott Evans
Ghazali Farhanida
Andrew Scott Fedus
Nicholas Anthony Fontanini
David Shawn Hadaway
Holliday Keith
Nicolas Brandon McCowin
Nicholas Paul McKay
Shedie Muhammed
David M. Ortiz
Junan Pang
Ian Stuart Robinette
Jonathan F. Schragal
Sean M. Sexton
Hong Soonsang

College of Engineering

Binaebi Akah
Kevin Alderman
Blas Asenjo
Jason Barrat
Joseph Beard
Shain Bergman
Matthew Bobulski
Michael Bongomo
Matthew Boston
Matthew Brand
Jason Chang
Brandon Childers
Jared Combs
Adam Crompton
William Culhane
Matthew Doyle
Zachary Evans
Jeremiah Fincher
Ryan Finneran
Aaron Fleischer
John Fontaine
Gregory Forrest
Robert Galehouse
Mark Geise
Raymond Gerard
Marc Gold
Tobias Gordon
Bharti Gupta
Joseph Handzel
Thomas Henretty
Yun Pyo Hong
Fouad Issac
Adam Kunk
Bryan Kunk
Stephen Landers
Shawn Lee
Thomas Loffing
Christopher Lohmeyer
John Loy
William Malinowski
Michael McGrath
Carol Mckee
Alex Merkert
Nicholas Mitchell
MohdHaikal MohdNashuha
Dustin Perzanowski
Chassity Phelps
Aaron Pikkarainen
Matthew Protacio
Tyler Rausch-Davis
Michael Ryan
Farhad Salehi
Nathan Schey
Adam Schultz
Douglas Showell
Jared Speno
Eric Stegemoller
Matthew Straka
Bo Sun
Kevin Toomey
Benjamin Trube
Gabriel Wagner
Sijia Wang
Jason Ware
David Weinberg

Tenured and Tenure-Track Faculty

Gagan Agrawal

Full Professor

B.S., Computer Science & Engineering, Indian Institute of Technology, Kanpur, India, 1991; M.S., Computer Science, University of Maryland, College Park, Maryland, 1994; Ph.D., Computer Science, University of Maryland, College Park, Maryland, 1996

Department Research Area:
SYSTEMS

Interests: System Software for Parallel and Distributed Environments; Compiler and Runtime Support for Data Intensive Applications; Scalable Data Mining; Performance Modeling and Prediction; and Grid Middleware for Processing Streamlining Data.

Anish Arora

Full Professor

B. Tech., Computer Science and Engineering, Indian Institute of Technology, New Delhi, 1986; M.S., Computer Science, University of Texas, Austin, 1988; Ph.D., Computer Science University of Texas, Austin, 1992.

Department Research Area:
NETWORKING

Interests: Wireless sensor networks; fault-tolerant, secure and timely computing; distributed systems and networks; embedded systems; component-based design; formal methods; concurrency semantics.

Mikhail Belkin

Assistant Professor

Hon.B.Sc. with High Distinction, Mathematics, University of Toronto, 1995; M.S., Mathematics, University of Chicago, 1997; Ph.D., Mathematics, University of Chicago, 2003.

Department Research Area
ARTIFICIAL INTELLIGENCE

Interests: Pattern Recognition And Statistical Analysis Of Natural Data; Manifold And Spectral Methods For Machine Learning; Algorithms For Semi-Supervised Learning And Clustering; Understanding The Value Of Unlabeled Data In Pattern Recognition; Data Mining And Applications To Areas With Abundant Unlabeled Data

Christopher Brew

Associate Professor
Associate Professor of Linguistics and Cognitive Science

B.Sc in Chemistry, University of Bristol, 1980; M.Sc in Experimental Psychology, University of Sussex, 1985; D.Phil, Computational Approaches to Parsing in Dialogue, University of Sussex, 1991.

Department Research Area:
ARTIFICIAL INTELLIGENCE

Interests: Statistical Natural Language Processing, particularly Corpus-based Methods for Lexical Acquisition; Data-driven Speech Synthesis and Spoken Language Generation; Infrastructure for Statistical NLP Corpus Creation, Annotation, Indexing and Processing.

Roger Crawfis

Associate Professor

B.S., Computer Science and Applied Mathematics, Purdue University, 1984; M.S., Computer Science, University of California, Davis, 1989; Ph.D., Computer Science, University of California, Davis, 1995.

Department Research Area:
GRAPHICS

Interests: Computer Graphics; Video Game Technology; Scientific Visualizations; Medical Imaging; and Volume Rendering.

Department Research Area:
ARTIFICIAL INTELLIGENCE

Interests: Computer Vision; Automatic Visual Surveillance and Monitoring; Human Activity Recognition; Video Understanding; and Human-Computer Interaction.

James W. Davis

Associate Professor

B.S., Computer Science, University of Central Florida, 1994; M.S., Media Laboratory, Massachusetts Institute of Technology, 1996; Ph.D., Media Laboratory, Massachusetts Institute of Technology, 2000.

Department Research Area:
GRAPHICS

Interests: Computational Geometry; Geometric Modeling; Shape Modeling.

Tamal K. Dey

Full Professor

B.E., Electronics, Jadavpur University, 1985; M.Tech., Computer Science, Indian Institute of Science-Bangalore, 1987; Ph.D., Computer Science, Purdue University, 1991.

Department Research Area:
SYSTEMS

Interests: Information Retrieval, Bioinformatics, Data Mining and Databases

Hui Fang

Assistant Professor

B.S., Computer Science and Technology, Tsinghua University, China, 2001; M.S., Computer Science, University of Illinois at Urbana-Champaign, 2004; Ph.D., Computer Science, University of Illinois at Urbana-Champaign, 2007.

Department Research Area:
SYSTEMS

Interests: Bioinformatics; Data Streams; High Performance Databases for Multi-dimensional and Scientific Applications, and Multimedia and Spatial Data.

Hakan Ferhatosmanoglu

Associate Professor

B.S., Computer and Information Science, Bilkent University, Turkey, 1997; Ph.D., Computer Science, University of California, Santa Barbara, 2001.

Department Research Area:
ARTIFICIAL INTELLIGENCE

Interests: Automatic Speech Recognition, Corpus-based Computational Linguistics, Spoken Dialogue Systems, Semantics of Path Planning

Eric Fosler-Lussier

Assistant Professor

B.A., Linguistics, University of Pennsylvania, 1993; B.A.S., Cognitive Science, University of Pennsylvania; 1993; Ph.D., Computer Science, University of California, Berkeley, 1999

Eitan M. Gurari

Associate Professor

B.S., Physics, Technion-Israel Institute of Technology, Israel, 1971; M.S., Computer Science, Technion-Israel Institute of Technology, Israel, 1974; Ph.D., Computer Science, University of Minnesota, 1978.

Department Research Area:
SOFTWARE ENGINEERING

Interests: Hypertext Production and Manipulation; Theoretical Computer Science; Literate Programs; and Programmed Figures.

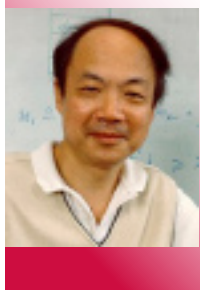
Ten-Hwang (Steve) Lai

Full Professor

B.S., Mathematics, Fu-Jen University, Taiwan, 1972; M.S., Mathematics, Fordham University, 1976; Ph.D., Computer Science, University of Minnesota, 1982.

Department Research Area:
NETWORKING

Interests: Wireless Networks; Mobile Computing; and Parallel and Distributed Computing.



David Lee

Ohio Board of Regents Distinguished Professor

M. A., Mathematics, Hunter College, City University of New York, 1982; M. S. and Ph. D., Computer Sciences, Columbia University, 1985

Department Research Area:
NETWORKING

Interests: Data communications and networking: foundation, reliability and applications.

Ming-Tsan (Mike) Liu

Full Professor

B.S.E.E., Electrical Engineering, National Cheng Kung University, Taiwan, 1957; M.S.E.E., Electrical Engineering, University of Pennsylvania, 1961; Ph.D., Electrical Engineering, University of Pennsylvania, 1964.

Department Research Area:
NETWORKING

Interests: Computer Architecture and Networking; Parallel and Distributed Computing; Wireless and Mobile Computing; and Protocol Engineering and Design.

Timothy J. Long

Associate Professor

B.S., Education, University of Cincinnati, 1972; B.A., Mathematics, Unviersity of Cincinnati, 1972; M.S., Computer & Information Science, The Ohio State University, 1974; Ph.D., Computer Science, Purdue University, 1978.

Department Research Area:
SOFTWARE ENGINEERING

Interests: Design, Implementation, Verification, Testing and Application of Reusable Software Components.

Department Research Area:
GRAPHICS

Interests: Graphics; Visualization; Scientific Computing; and Signal Processing.

Raghu Machiraju

Associate Professor

B.Sc., Electrical Engineering, Delhi University, 1982; M.S., Automation, Indian Institute of Science, Bangalore, 1984; Ph.D., Computer Science, The Ohio State University, 1996.

Department Research Area:
SYSTEMS

Interests: Network-based Computing; Interprocessor Communication; Parallel Computer Architecture; High Performance Networking; Clustered and Heterogeneous Systems; and High-performance Computing.

Dhabaleswar K. (DK) Panda

Full Professor

B.S., Electrical Engineering, Indian Institute of Technology, Kanpur, India, 1984; M.S., Electrical and Computing Engineering, Indian Institute of Science, Bangalore, India, 1986; Ph.D., Computer Engineering, University of Southern California, Los Angeles, 1991.

Department Research Area:
GRAPHICS

Interests: Computer Graphics; Computer Animation; Modeling and Animating Human Figure;Tracking Human Figures in Video

Richard E. Parent

Full Professor

B.S., Computer Science and Mathematics, University of Dayton, 1972; M.S., Computer Science, The Ohio State University, 1973; Ph.D., Computer Science, The Ohio State University, 1977.

Department Research Area:
SYSTEMS

Interests: Data Mining; Parallel and Distributed Computing and Systems; Bioinformatics.

Srinivasan Parthasarathy

Associate Professor

B.E., Electrical Engineering, University of Roorkee, India, 1992; M.S., Electrical Engineering, University of Cincinnati, 1994; M.S., Computer Science, University of Rochester, 1996; Ph.D., Computer Science, University of Rochester, 2000.

Department Research Area:
SYSTEMS

Interests: Operating Systems, Software Reliability, Security and Distributed Systems

Feng Qin

Assistant Professor

B.E., University of Science and Technology of China, 1998; M.E., Chinese Academy of Sciences, 2001; Ph.D., the University of Illinois, Urbana-Champaign, 2006.

Atanas (Nasko) Rountev

Associate Professor

B.S., Computer Science & Engineering, Technical University, Sofia, Bulgaria, 1995; M.S., Computer Science, Rutgers University, 1999; Ph.D., Computer Science, Rutgers University, 2002.

Department Research Area:
SOFTWARE ENGINEERING

Interests: Static and Dynamic Program Analysis; Software Testing; Programming Languages and Compilers; Object-Oriented Software

Ponnuswamy (Saday) Sadayappan

Full Professor

B.S., Electrical Engineering, Indian Institute of Technology, Madras, India, 1977; M.S., Electrical Engineering, State of University of New York, Stony Brook, 1978; Ph.D., Electrical Engineering, State of University of New York, Stony Brook, 1983.

Department Research Area:
SYSTEMS

Interests: Compiler/runtime systems for high-performance computing; performance optimization; high-productivity, high-performance scientific computing.

Joel H. Saltz, M.D.

Chair of the Department of Biomedical Informatics
Joint Appointment - Full Professor

B.S., Mathematics and Physics, University of Michigan, 1977; M.S., Mathematics, University of Michigan, 1978; M.D., Ph.D., Computer Science, Duke University, 1985.

Department Research Area:
BIOMEDICAL INFORMATION

Interests: Bioinformatics; Data Caching; Processing and Parallel I/O

Han-Wei Shen

Associate Professor

B.S., Computer Science, National Taiwan University, 1988; M.S., Computer Science, State University of New York, Stony Brook, 1992; Ph.D., Computer Science, University of Utah, 1998.

Department Research Area:
GRAPHICS

Interests: Computer Graphics; Scientific Visualization; Large Scale Time-Varying Data, Remote Data Exploration; Volume Rendering.

Ness B. Shroff

Ohio Eminent Scholar
Full Professor

B.S., University of Southern California, 1988; M.S.E, University of Pennsylvania, 1990; M.Phil, Columbia University, 1993; Ph.D., Columbia University, 1994.

Department Research Area:
NETWORKING

Interests: Wireless and Wireline Communication Networks.

Department Research Area:
NETWORKING

Interests: Sensor Networking; Ad-hoc Networking; Mobile Computing; Wireless Networking

Prasun Sinha

Assistant Professor

B. Tech., Computer Science and Engineering, Indian Institute of Technology, Delhi, India, 1995; MS, Computer Science, Michigan State University, 1997; PhD, Computer Science, University of Illinois, Urbana-Champaign, 2001.

Department Research Area:
SOFTWARE ENGINEERING

Interests: Distributed Systems; Software Engineering; and Tool-based Support for Testing Component Implementations.

Paul A.G. Sivilotti

Associate Professor

B.Sc.H., Computing Science, Mathematics & Biochemistry, Queen's University, Ontario, Canada, 1991; M.S., Computer Science, California Institute of Technology, 1993; Ph.D., Computer Science, California Institute of Technology, 1998.

Department Research Area:
SOFTWARE ENGINEERING

Interests: Software Engineering; Reasoning about Program Behavior; Specification; Verification; Testing.

Neelam Soundarajan

Associate Professor

B.S., Physics, Bombay Unviersity, India, 1970; M.S., Physics, Bombay University, India, 1972; Ph.D., Computer Science, Bombay University, India, 1978

Department Research Area:
SOFTWARE ENGINEERING

Interests: Combinational Algorithms

Kenneth J. Supowit

Associate Professor

A.B., Linguistics, Cornell University, 1978; Ph.D., Computer Science, University of Illinois, 1981.

Department Research Area:
ARTIFICIAL INTELLIGENCE

Interests: Machine Perception and Neurodynamics

DeLiang (Leon) Wang

Full Professor

B.S., Computer Science, Beijing University, 1983; M.S., Computer Science, Beijing University, 1986; Ph.D., Computer Science, Unviersity of Southern California, Los Angeles, 1991.

Yusu Wang

Assistant Professor

B.S., Computer Science, Tsinghua University (P. R. China), 1998; M.S., Computer Science, Duke University, 2000; Ph.D., Computer Science, Duke University, 2004.

Department Research Area:
GRAPHICS

Interests: Computational Geometry, Algorithms, Computational Biology, Computational Topology, Graphics, Modeling, And Visualization.

Bruce W. Weide

Associate Chair
Full Professor

B.S.E.E., Electrical Engineering, University of Toledo, 1974; Ph.D., Carnegie Mellon University, 1978.

Department Research Area:
SOFTWARE ENGINEERING

Interests: Component-Based Software; Verified Software.

Rephael Wenger

Associate Professor

B.S.E., Computer Science, Princeton University, 1984; Ph.D., Computer Science, McGill University, 1988.

Department Research Area:
COMPUTER GRAPHICS

Interests: Computational Geometry; Computer Visualization; Isosurface Reconstruction; and Image Processing.

Dong Xuan

Associate Professor

B.S., Electronic Engineering, Shanghai Jiao Tong University, China, 1990; M.S., Electronic Engineering, Shanghai Jiao Tong University, 1993; Ph.D., Computer Engineering, Texas A&M University, 2001.

Department Research Area:
NETWORKING

Interests: Scalable QoS Guarantees; Network Security; and Application Layer Networking

Xiaodong Zhang

Chairperson of
Computer Science & Engineering
Robert M. Critchfield Professor

B.S., Electrical Engineering, Beijing University of Technology, 1982; M.S., Computer Science, University of Colorado at Boulder, 1985; Ph.D., Computer Science, University of Colorado at Boulder, 1989.

Department Research Area:
SYSTEMS

Interests: Distributed and High Performance Systems

Department Research Area:
SOFTWARE ENGINEERING

Interests: Reusable Software; Quality Evaluation; and Engineering Education.

Stuart H. Zweben

Full Professor
Associate Dean
College of Engineering

B.S., Mathematics, City College of New York, 1968; M.S., Statistics and Computer Science, Purdue University, 1971; PhD., Computer Science, Purdue University, 1974.

New Faculty Arriving Autumn 2008

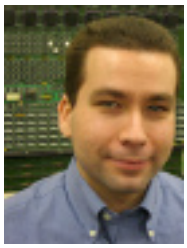
Department Research Area:
SYSTEMS

Interests: Computer Architecture, Multicore and Parallel Architectures, Support for Software Debugging, Nanoscale Technology Scaling, Reliability, Variability and Power Management.

Radu Teodorescu

Assistant Professor

Dipl. Eng. in Computer Science, Technical University of Cluj-Napoca, Romania, 2002; M.S., Computer Science, University of Illinois at Urbana-Champaign, 2005; Ph.D., Computer Science, University of Illinois at Urbana-Champaign, 2008.



Clinical Faculty

Research Interests: Workflow and Work-Management Systems; Complex Enterprise Systems; Distributed Dystems; Systems Integration; Software Engineering; Enterprise Architecture; Enterprise Strategic Planning

Rajiv Ramnath

Assistant Professor of Practice
Director, Collaborative for Enterprise Transformation and Innovation (C.E.T.I.)

B.Tech., Indian Institute of Technology, New Delhi, India, 1981; M.S., Computer & Information Science, The Ohio State University, 1983; Ph.D., Computer & Information Science, The Ohio State University, 1988

Emeritus appointments

Professor Emeritus

Balakrishnan Chandrasekaran
Charles A. Csuri
Sandy Mamrak
Mervin E. Muller

Associate Professor Emeritus

Clinton R. Foulk
Douglas S. Kerr
William F. Ogden
Anthony E. Petrarca

Adjunct faculty

Kikuo Fujimura

Courtesy Appointments

Wayne Carlson	Chair, Industrial Design
Harvey M. Friedman	Mathematics
Kun Huang	Biomedical Informatics
Furrukh Khan	Electrical and ComputerEngineering
Michael Knopp	Chair, Radiology
Alan Saalfeld	Geodetic Science

Researchers

Balakrishnan Chandrasekaran

Professor Emeritus

Senior Research Scientist

B.E., Electrical Engineering, Madras University, India, 1963; Ph.D., Electrical Engineering, University of Pennsylvania, 1967

Research Interests:
Artificial Intelligence and Cognitive Science, specifically Knowledge Systems, Diagrammatic Reasoning, Cognitive Architecture, and Decision Support Systems.

Jay Ramanathan

Senior Research Scientist
Director, Collaborative for Enterprise Transformation and Innovation (C.E.T.I.)

B.S. , Computer Science, Purdue University, 1970; M.S. in Computer Science, Purdue University, 1972; Ph.D. Computer Science, Rice University, 1977.

Research Interests:

Methods For Analysis and Engineering of Complex Adaptive Enterprise Architectures Using Pattern Ontologies, Complexity Theory, Autonomic Programming as Well as Technologies Such as Middleware, Workflow, Mobile Computing, Agents, and Web Services.

John Josephson

Research Scientist

B.S., Mathematics, The Ohio State University 1968; M.S., Mathematics, The Ohio State University, 1970; Ph.D., Philosophy, The Ohio State University, 1982

Research Interests:

Artificial Intelligence; Computational Epistemology, Abductive Inference, Causal Reasoning, Multiple Criteria Decision Making, Perception, Diagnosis, Theory Formation, Logic of Investigation and Foundations of Science.

William M. Leal

Research Scientist

B.A. Mathematics, University of California, Berkeley, 1969; M.S. Computer Science, University of South Alabama, Mobile, 1994; M.S. Computer Science, The Ohio State University, 2001; Ph.D., Computer Science, The Ohio State University, 2001.

Research Interests:

Wireless Sensor Networks, Dynamic Resource Management, Compositional Stabilization.

Senior Lecturers

Research Interests:

Computer Networking and Security.

Gojko Babic

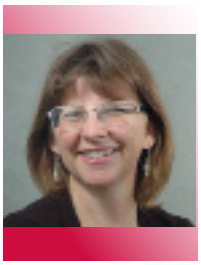
B.S., Electric Engineering, University of Sarajevo, 1972; M.S., Computer Science, Florida Institute of Technology, 1975; Ph.D., Computer Science, The Ohio State University, 1978.

Research Interests:

Women in Computing; Effects of Technology on Business and Culture; and Computer Education.

Bettina Bair

B.S., Business Administration, University of Phoenix, 1987; M.B.A., University of Denver, 1992.



Research Interests:

Software Engineering; Computer Science Education

Paolo Bucci

Laurea in Scienze Dell' Informazione, Universita' Degli Studi di Milano, Italy, 1986; M.S., Computer & Information Science, The Ohio State University, 1989; Ph.D., Computer & Information Science, The Ohio State University, 1997.

Research Interests:

Business Technology and Applications.

Debby Gross

B.S., Chemical Engineering, Massachusetts Institute of Technology, 1977; M.B.A., University of Chicago, 1987.

Research Interests:

Software Engineering and Computing Education.

Wayne Heym

B.Phil., Miami University, 1978; M.S., Cornell University, 1980; M.S., Computer & Information Science, The Ohio State University, 1989; Ph.D., Computer & Information Science, The Ohio State University, 1995.

Research Interests:

Computational Learning Theory.

H. David Mathias

B.S., Computer Science, University of Delaware, 1991; M.S., Computer Science, Washington University, 1993; D.Sc., Computer Science, Washington University, 1996.

Part-Time Lecturers

Moez Chaabouni
Michael Compton
Matt Curtin
Steve Gomori
Charles Giles
John Heimaster
Robert Joseph
Perumal Krishnasamy
Igor Malkiman
Michelle Mallon
Robert Mathis
Prasad Mikkilineni
Doyt Perry
Steven Romig
Ron Salyers
Richard Sharp
Al Stutz
Edward Warbis
Robert Weekley

Administrative Staff

Carrie Casto: Grants Administrator.
Catrena Collins: Human Resources Officer
Tamera Cramer: Public Relations Coordinator.
Tom Fletcher: Office Support Associate
Don Havard: Fiscal Officer
Sherry Little: Administrative Associate to the Department Chairperson.
Z. Lynn Lyons: Graduate Admissions and Graduate Studies Coordinator.
Kitty Reeves: Academic Program Administrator
Ewana Witten: Office Coordinator and Receptionist

Computing Services Staff

Michael Compton -- Director, Computing Services
Chris Jackson -- Systems Administrator
Aaron Jenkins – Systems Manager
Bob Joseph-- Systems Developer/Engineer, DBA
Tami King -- Sr. Systems Developer/Engineer
Dave Kneisly -- Systems Administrator
Todd Lucall -- Systems Administrator
Shaun Rowland -- Manager, Software Support and Development
Ted Welch -- Systems Administrator
Kat Wenger -- Systems Manager

SELECT FACULTY PUBLICATIONS

Artificial Intelligence

U. von Luxburg, **M. Belkin**, and O. Bousquet, "Consistency of Spectral Clustering", *The Annals of Statistics, 2008*.

K. Sinha, and **M. Belkin**, "The Value of Labeled and Unlabeled Examples When the Model Is Imperfect", *Proceedings of 21st Annual Conference on Neural Information Processing Systems* (NIPS 2007), December 2007.

J. Li, and **C. Brew**, "Which are the Best Features for Automatic Verb Classification", *Proceedings of 46th Annual Meeting of the Association for Computational Linguistics*, 2008.

V. Sharma, and **J. Davis**, "Integrating Appearance and Motion Clues for Simultaneous Detection and Segmentation of Pedestrians," *Proceedings of IEEE International Conference on Computer Vision*, October 2007.

M. Keck, and **J. Davis**, "3D Occlusion Recovery using Few Cameras," *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition*, June 2008.

A.Tyagi, and **J. Davis**, "A Recursive Filter For Linear Systems on Riemannian Manifolds," *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition*, June 2008.

H. Fang, "A Re-examination of Query Expansion Using Lexical Resources", *Proceedings of 46th Annual Meetings of the Association for Computational Linguistics*, 2008.

E. Fosler-Lussier and J. Morris, "Crandem Systems: Conditional Random Field Acoustic Models for Hidden Markov Models," *Proceedings of International Conference on Acoustics, Speech and Signal Processing* (ICASSP 2008), Las Vegas, NV. 2008.

I. Heintz, **E. Fosler-Lussier**, and **C. Brew**, "Latent Phonetic Analysis: Use of Singular Value Decomposition to Determine Features of CRF Phone Recognition," *Proceedings of International Conference on Acoustics Speech and Signal Processing* (ICASSP 2008), Las Vegas, NV. 2008.

E. Fosler-Lussier, L. Dilley, N Tyson, and M. Pitt, "The Buckeye Corpus of Speech: Updates and Enhancements," *Proceedings of Interspeech*, Antwerp, Belgium, August 2007.

C-H Lee, M. A. Clements, S. Dusan, **E. Fosler-Lussier**, K. Johnson, B-H Juang, and L.R. Rabiner, "An Overview on Automatic Speech Attribute Transcription (ASAT)", *Proceedings of Interspeech*, Antwerp, Belgium, August 2007.

S.Srinivasan, and **D. L. Wang**, "Transforming ," *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 15, pp. 2130-2140, 2007.

M.S. Pedersen , **D. L. Wang** , J.Larsen, and U. Kjems, "Two-Microphone Separation of Speech Mixtures," *IEEE Transactions on Neural Networks*, vol. 19, pp. 475-492, 2008.

Roman N. and **D. L. Wang**, "Binaural Tracking of Multiple Moving Sources," *IEEE Transactions on Audio, Speech, and Language Processing*, vol. 16, pp. 728-739, 2008.

D. L. Wang and P.S. Chang, "An Oscillatory Correlation Model of Auditory Streaming," *Cognitive Neurodynamics*, vol.2.pp. 7-19, 2008.

Computer Graphics

Visualization and Graphics

K. Mosaliganti, **R. Machiraju**, K. Huang, and G. Leone, "Geometry-driven Visualization of Microscopic Structures in Biology," Computer Graphics Forum, the *International Journal of The Eurographics Association,* (Proceedings of EuroVis 2008), pp. 871-878.

F. Janoos, B. Nouanesengsy, X. Xu, **R. Machiraju**, and S.Wong, "Robust 3D Reconstruction, Classification and Uncertainty Visualization of Dendritic Spines", Computer Graphics Forum, the *International Journal of the Eurographics Association* , (Proceedings of EuroVis 2008), pp. 879-886.

K. Mosaliganti, F. Janoos, R. Sharp, R. Ridgway, **R. Machiraju**, K. Huang, P.Wenzel, A. de Bruin, G. Leone and **J. Saltz**, "Detection and Visualization of Surface-Pockets to Enable Phenotyping Studies", Special Issue on Mathematical Methods in Biomedical Image Analysis, *IEEE Transactions on Medical Imaging*, volume 26(9), pages 1283-1290, September 2007.

F. Janoos, S. Singh, O. Irfanoglu, **R. Machiraju**, and **R. Parent**, "Activity Analysis Using Spatio-Temporal Trajectory Volumes in Surveillance Applications." *IEEE Symposium on Visual Analytics Science and Technology*, November 2007.

J. Woodring, and **H.-W. Shen**, "Multi-Scale Time Activity Data Exploration via Temporal Clustering Visualization Spreadsheet", *IEEE Transactions on Visualization and Computer Graphics*, 2008.

T. Tu, and **H-W. Shen**, "Visualizing Changes of Hierarchical Data using Treemaps," *IEEE Transactions on Visualization and Computer Graphics*, Vol. 13, No. 6, pp. 1286-1293, 2007.

Y. Hong, and **H-W. Shen**, "Parallel Reflective Symmetry Transformation for Volume Data", *Computers & Graphics*, 32(1), pp. 41-45, January 2008.

Computational Geometry

M. Belkin, J. Sun, and **Y. Wang**, "Discrete Laplace Operator for Meshed Surfaces", *Proceedings of 24th Annual Symposium on Computational Geometry*, June 2008.

S.-W. Cheng, **T. K. Dey,** E. Ramos, and T. Ray, "Sampling and Meshing a Surface with Guaranteed Topology and Geometry," Society for Industrial and Applied Mathematics (SIAM) *Journal Computing*, vol. 37, 1199-1227, 2007.

T. K. Dey, J. Giesen, E. A. Ramos, and B. Sadri, "Critical Points of the Distance to an Epsilon-Sampling on a Surface and Flow-Complex-Based Surface Reconstruction," *International Journal of Computational Geometry and Applications*, vol. 18, 29-61. Invited paper, 2007.

T. K. Dey and **R. Wenger.** "Stability of Critical Points with Interval Persistence," *Discrete & Computational Geometry*, vol. 38, 479-512, 2007.

K. Buchin, **T. K. Dey**, M. John, and J. Giesen, "Recursive Geometry of the Flow Complex and the Topology of the Flow Complex Filtration," *Computational Geometry - Theory and Applications*, vol. 40, 115-157, 2008.

S.-W. Cheng, and **T. K. Dey**, "Maintaining Deforming Meshes", *Proceedings of ACM-SIAM Symposium on Discrete Algorithms* (SODA 2008), 112-121.

T. K. Dey, and J. Levine, "A Practical Delaunay Refinement Algorithm for a Large Class of Domains", *Proceedings of 16th International Meshing Roundtable* (IMR07), 477-494.

T. K. Dey, and J. Levine, "Delaunay Meshing of Isosurfaces", *IEEE Proceedings of Shape Modeling and Applications (SMI07*), 241-250.

L. J. Guibas and **Y. Wang**, "Towards Unsupervised Segmentation of Semi-rigid Low-resolution Molecular Surfaces", *Algorithmica,* 48(4): 433-438, August 2007.

H. Wu, M. Wong, I. Liu, and **Y. Wang**, "Placement-Proximity-Based Voltage Island Grouping under Performance Requirement", *IEEE Trans. Computer-Aided Design*. 26 (7): 1256—1269, July 2007.

H. Sun, **H. Ferhatosmanoglu**, M. Ota, and **Y. Wang**, "An Enhanced Partial Order Curve Comparison over Multiple Protein Folding Trajectories", *Proceedings of Interantional Conferenc on Computational Systems Bioinformatics*, 6: 299-310, 2007.

S. Raman, and **R. Wenger**, "Quality Isosurface Mesh Generation Using an Extended Marching Cubes Lookup Table", *Computer Graphics Forum*, 27, 2008, pp. 791-798.

T. K. Dey and **R. Wenger**, "Stability of Critical Points with Interval Persistence", *Discrete and Computational Geometry*, 38, 2007, pp. 479-512.

H. Gupta, and **R. Wenger**, "Constructing Pairwise Disjoint Paths with Few Links," *ACM Transactions and Algorithms*, 3, 2007.

D. J. Smiraglia, R. Kazhiyur-Mannar, C. C. Oakes, Y. Z. Wu, P .Liang, T. Ansari, J. Su, L. J. Ruch, L. T. Smith, L. Yu, C. Liu, Z. Dai, S. S. Chen, S. H. Wang, J. Costello, I. Loshikhes, D. W. Dawson, J. S. Hong, M. A. Teitell, A. Szafranek, M. Camoriano, F. Song, R. Elliott, W. Held, J. M. Trasler, C. Plass, and **R. Wenger**, "Restriction Langmark Genomic Scanning (Rlgs) Spot Identification By Second Generation Virtual RLGS In Multiple Genomes With Multiple Enzyme Combinations", *BMC Genomics*, 8:445, 2007.

Computer Networking

H. Zhang, **A. Arora,** Y-R Choi, and M. Gouda, "Reliable Bursty Convergecast In Wireless Sensor Networks", *Computer Communications (Elsevier),* special issue on Sensor-Actuated Networks,30(13), pp. 2560--2576, 26 September 2007.

A. Arora, M. Gouda, J. Hallstrom, T. Herman, **W. Leal**, and N. Sridhar, "A State-Based Language for Sensor-Actuator Networks", Special issue on wireless sensor network architecture*, ACM SIGBED Review*, 4(3), 2007, 25-30.

V. Kulathumani and **A. Arora**, "Distance Sensitive Snapshots in Wireless Sensor Networks", *Proceedings of the International Conference on Principles of Distributed Systems (OPODIS)*, Springer-Verlag LNCS 4878, 2007.

H. Cao and **A. Arora**, "Stabilization in Dynamic Systems with Varying Equilibrium", *Proceedings of the 9th International Symposium on Stabilization, Safety, and Security of Distributed Systems* (SSS), Springer-Verlag LNCS 4838, 2007, pp. 67-81.

T. Sang, **A. Arora**, and H. Zhang, "On Exploiting Asymmetric Wireless Links Via One-Way Estimation", *Proceedings of the 8th ACM international symposium on Mobile on Mobile Ad hoc Networking and Computing* (MOBIHOC), 2007, pp. 11-21.

D. Zhou, and **T.H. Lai,** "An Accurate and Scalable Clock Synchronization Protocol for IEEE 802.11-Based Multihop Ad Hoc Networks," *IEEE Trans. on Parallel and Distributed Systems*, pp. 1797-1808, December 2007.

M.T. Sun, C.W. Yi, C.K. Yang, and **T. H. Lai,** "An Optimal Algorithm for The Minimum Disc Cover Problem", Algorithmica Vd.50, pp. 58-71, January 2008.

A Chen, S. Kumar, and **T. H. Lai,** "Designing Localized Algorithms for Barrier Coverage", Proceedings of ACM MobiCom 2007.

A. Chen, **T. H. Lai,** and **D. Xuan,** "Measuring and Guaranteeing Quality of Barrier-Coverage in Wireless Sensor Networks", *Proceedings of ACM MOBIHOC 2008*.

X. Bai, **D. Xuan**, Z. Yun, **T. H. Lai**, and W. Jia, "Complete Optimal Deployment Patterns for Full Coverage and k-Connectivity (k<6) Wireless Sensor Networks", *Proceedings of ACM MobiHoc 2008.*

G. Shu, Y. Hsu and **D. Lee,** "Fuzz Testing and Communications Protocol Security Flaws" *Proceedings of 28th IFIPWG6.1 International Conference on Formal Techniques for Networking and Distributed Systems* (FORTE 2008) June 10-13, 2008.

G. Shu, D. Chen, Z. Liu, N. Li, L. Sang and **D. Lee,** "VCSTC: Virtual Cyber Security Testing Capability – An Application Oriented Paradigm for Network Infrastructure Protection", *Proceedings of the 20th IFIP Int. Conference on Testing of Communicating Systems* (TESTCOM) and the 8*th Int. Workshop on Formal Approaches to Testing of Software* (FATES), June 10-13, 2008.

L. Lin, **N. B. Shroff**, and R. Srikant, "Energy-Aware Routing in Sensor Networks: A Large System Approach", *Ad hoc Networks Journal,* Special Issue on Recent Advances in Wireless Sensor Networks, Volume 5, Issue 6, August 2007, pp. 818-831.

L. Lin, **N. B. Shroff,** and R. Srikant, "Asymptotically Optimal Energy-Aware Routing for Multihop Wireless Networks with Renewable Energy Sources," *IEEE/ACM Transactions on Networking*, vol. 15, no. 5, October 2007, pp. 1021-1034.

I. Khalil, S. Bagchi, and **N. B. Shroff**, "MOBIWORP:Mitigation of the Wormhole Attack in mobile Multihop Wireless networks," *Ad Hoc Networks Journal*, Vol.6, Issue 3, May 2008, pp. 344-362.

I. Khalil, S. Bagchi, and **N. B. Shroff**, "LITEWORP: Detection and Isolation of the Wormhole Attack in Static Multihop Wireless Networks," *Computer Networks Journal*, Volume 51, Issue 13, September 2007, pp. 3750-3772.

G. Sharma, R. R. Mazumdar, and **N. B. Shroff**, "Delay and Capacity Trade-offs in Mobile Ad Hoc Networks: A Global Perspective," *IEEE/ACM Transactions on Networking*, vol. 15, No. 5, October 2007, pp. 981-992.

D. Lee, G. I. Chandrasekaran, M. Sridharan and **P. Sinha** "Association Management for Data Dissemination over Wireless Mesh Networks", *Elsevier Computer Networks*, Vol. 51, Number 15, pp 4338-4355, October 2007.

K. –W. Fan, S. Liu, and **P. Sinha**, "Structure-free Data Aggregation in Sensor Networks", *IEEE Transactions on Mobile Computing*, Vol. 6, Number 8, pp 929-942, August 2007.

H. Luo, X. Meng, R. Ramjee, **P. Sinha**, and L. Li, "The Design and Evaluation of Unified Cellular and Ad-Hoc Networks", *IEEE Transactions on Mobile Computing*, Vol. 6, Number 9, pp 1060-1074, September 2007.

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2007 - 2008 CSE COURSE LIST

Couse Number	Title	CRHRS
100	Introduction to Computing Technology	3
101	Computer-Assisted Problem Solving	4
105	Computer-Assisted Problem Solving for Construction Management	4
200	Computer Assisted Problem Solving for Business	5
201	Elementary Computer Programming	4
202	Introduction to Programming and Algorithms for Engineers and Scientists	4
203	Computational Thinking in Context: Interactive Animations and Games	4
204	Computational Thinking in Context: Digital Images and Sound	4
214	Data Structures for Information Systems	4
221	Software Development Using Components	4
H222	Development of Software Components (for honor students)	4
222	Development of Software Components	4
230	Introduction to C++ Programming	4
294	Group Studies	1-4
294P	Computational Thinking in Context: Science and Engineering	4
314	Business Programming with File Processing	4
321	Case Studies in Component-Based Software	4
360	Introduction to Computer Systems	4
459	Programming Languages for Programmers	1
459.11	The UNIX Programming Environment	1
459.21	Programming in C	1
459.22	Programming in C++	1
459.23	Programming in Java	1
459.31	Programming in LISP	1
459.41	Programming in COBOL	1
459.51	Programming in Perl	1
489	Professional Practice in Industry	2
493	Individual Studies	1-5
494	Group Studies	1-5
494J/421	Software Development in Java	3
494R	Programming in C#	1
502	Object-Oriented Programming for Engineers and Scientists	3
541	Elementary Numerical Methods	3
551	Introduction to Information Security	3
560	Systems Software Design, Development, and Documentation	5
581	Interactive Computer Graphics	4
601	Social and Ethical Issues in Computing	1
612	Introduction to Cognitive Science	3
616	Object-Oriented Systems Analysis	4
621	Introduction to High-Performance Computing	3
H625	Introduction to Automata and Formal Languages (for honor students)	3
625	Introduction to Automata and Formal Languages	3
630	Survey of Artificial Intelligence I: Basic Techniques	3
634	Computer Vision for Human-Computer Interaction	3
651	Network Security	3
655	Introduction to the Principles of Programming Languages	4
660	Introduction to Operating Systems	3
662	Operating Systems Laboratory	3
668	Applied Component-Based Programming for Engineers and Scientists	3
670	Introduction to Database Systems I	3
671	Introduction to Database Systems II	3
674	Introduction to Data Mining	3
675	Introduction to Computer Architecture	na
675.01	Introduction to Computer Architecture	3
675.02	Introduction to Computer Architecture	4
676	Microcomputer Systems	3
677	Introduction to Computer Networking	3
678	Internetworking	3
679	Introduction to Multimedia Networking	3
680	Introduction to Analysis of Algorithms and Data Structures	3
H680	Introduction to Analysis of Algorithms and Data Structures (for honor students)	3
681	Introduction to Computer Graphics	4
682	Computer Animation	4
693	Individual Studies	1-5
694	Group Studies	1-5
694A	Computer Animation - Algorithms and Techniques	4
694G	Game Design and Development Project	4
694L	Introduction to Visualization	4
694X	Applied Information Security Project	4
699	Undergraduate Research in Computer Science and Engineering	1-5
721	Introduction to Parallel Computing	4
725	Computability and Unsolvability	3
730	Survey of Artificial Intelligence II: Advanced Topics	3
731	Knowledge-Based Systems	4
732	Computational Linguistics	4
733	Foundations of Spoken Language Processing	3
735	Machine Learning and Statistical Pattern Recognition	3
737	Proseminar in Cognitive Science	2
741	Comparative Operating Systems	3
755	Programming Languages	3
756	Compiler Design and Implementation	4
757	Software Engineering	3
758	Software Engineering Project	4
760	Operating Systems	3
762	Web-Services-Based Distributed Systems Project	4
763	Introduction to Distributed Computing	3
767	Applied Use-Case-Driven Object-Oriented Analysis and Design for Engineers and Scientists	3
769	Applied Enterprise Distributed Computing for Engineers and Scientists	3
770	Database System Implementation	3
772	Information System Project	4
775	Computer Architecture	3
777	Telecommunication Networks	3
778	Computer-Aided Design and Analysis of VLSI Circuits	4
779	Introduction to Neural Networks	3
780	Analysis of Algorithms	3
781	Introduction to 3D Image Generation	4
782	Advanced 3D Image Generation	3
H783	Honors Research	1-5
784	Geometric Modeling	3
788	Intermediate Studies in Computer and Information Science	1-5
793	Individual Studies	1-5
794	Group Studies	1-5
794J	Applied Enterprise Services Architectures	3
794K	Applied Enterprise IT Architectures II	3
875	Advanced Computer Architecture	3
885	Seminar on Research Topics in Computer Science and Engineering	1
888	Advanced Studies in Computer and Information Science	1-5
891	Interdisciplinary Seminar	na
891.01	Interdisciplinary Seminar on Biomedical Images	1-2
894	Group Studies	1-5
894G	Computer Communication Networks I	3
894J	Computer Communication Networks II	3
999	Research	1-18