Dear CSE Alumni, parents, friends and colleagues,

The upcoming year of 2008 marks the 40th anniversary of the CSE Department. The accomplishments of the department have been impressive. Our department is a well established research and education family for nurturing and fostering talents and for scientific discoveries and technical innovations. CSE would like to celebrate the successes of our graduates who have distinguished themselves and made contributions in their respective fields. The CSE faculty and staff members are proud of each of those achievements. The newsletter Buckeye Blog will be published periodically to share information in the CSE-OSU community - so we need to hear from you, our alum!

In this newsletter, you will learn of new developments in the department: faculty recruiting, research projects and the progress and achievements of our students. You will also see stories about the work and lives of selected alumni.

I hope you enjoy reading the first issue of Buckeye Blog. We intend it to be a window highlighting our department’s recent activities and alumni news. Please keep us informed about your professional and personal development and successes. We will be very happy to share your achievements via our/your newsletter.

Xiaodong Zhang
Chair and Robert M. Critchfield Professor
Department of Computer Science and Engineering
The Ohio State University
Jim Davis: Vision for the Future of Surveillance

The future of video surveillance and monitoring is currently taking shape at The Ohio State University. Jim Davis, Associate Professor, is developing a new automatic video surveillance system that uses Computer Vision and Artificial Intelligence to analyze video camera feeds to detect and track people, and also to analyze their actions and behaviors.

Recently on July 10th, several buildings (including Dreese Laboratories) on the OSU campus were evacuated after a suspicious unattended briefcase was reported. The Columbus Bomb Squad retrieved and detonated the briefcase (above). A similar incident of another suspicious package found on campus had been reported just the previous day. In both cases, the packages turned out not to be a threat.

Davis’ goal is to build an intelligent video surveillance system that would have the ability to automatically detect an unattended package and to immediately alert security of its presence. In addition to detecting the threat, the system would continue to track the person who left the package, thus giving more information to security personnel.

One of the central themes and concepts behind this research project is “preemptive analysis.” Rather than using surveillance cameras as a forensic tool to examine recorded video after something nefarious occurs, Davis aims to use surveillance cameras and computers to look automatically for suspicious behavior, and also try to predict particular types of events before they happen. The key is to have the computer first analyze surveillance videos and automatically discover the human activity patterns that typically occur in an area. Having determined what is considered normal behavior in a certain area, the system can then detect any abnormal activity.

“You can think of it as moving from cognitive and perceptual overload to cognitive and perceptual management.”

Davis says. However, there will be times when a human operator may want to give particular guidance or “rules” to the system. For example, the system may be instructed to send an alert if a person enters an area that was labeled as “secure – do no enter.” The main research challenge is to create a system that can accurately and automatically learn most of the necessary information needed to model and detect behavior patterns, but still provide a means for user input.

The purpose of this intelligent video surveillance system is to help, not replace, security personnel. Currently in a security control center, there may be only one or a few people trying to watch a very large number of television monitors showing the surveillance video feeds (below). Because people can only focus on a few monitors at a time, much of the surveillance area is left unattended. With the smart surveillance system proposed by Davis, computers with automatic video analysis capabilities could look simultaneously across multiple video cameras for abnormal behavior patterns. If an unusual pattern is detected, the system could alert the security personnel.

“You can think of it as moving from cognitive and perceptual overload to cognitive and perceptual management,” Davis says.

A network of video cameras has been mounted on various buildings around Dreese Laboratories on the
OSU campus as a testbed for the project (above). Central to the research is the use of both color and thermal video cameras. The color cameras are standard commercial cameras that can orient to different areas using pan, tilt and zoom control. Thermal cameras detect the amount of thermal radiation in the scene and convert the information into an image showing hotter objects with brighter pixels. For example, the figure below shows the warmer bodies against the cooler background. The main advantage of using thermal cameras is that they can see in the daytime as well as in complete darkness. Together, the color and thermal cameras provide a complementary means of 24-7 persistent sensing.

Naturally, any video surveillance system will have to deal with issues related to privacy. A benefit to the proposed automatic surveillance system is that it is based on analyzing human activity and behavior patterns; therefore, issues related to person identification are reduced. Davis adds, “I don’t care who you are; I care about what you do.” Such an activity-based system will also eliminate issues related to racial profiling.

Davis’s research plays an important role given the heightened Homeland Security needs for technically advanced surveillance systems. The research also has much broader implications, and may be applicable to search and rescue, border patrol, law enforcement and many other types of military applications. Davis’ work has already been featured in various media outlets (including multiple TV and print interviews). Support for Davis’ research has been provided by the National Science Foundation and US Air Force Research Laboratory. He has published multiple papers on this research and has presented several lectures on the topic to both academic and industry audiences.

Overall, Davis’ research on designing “smart surveillance cameras” is a continually growing project. He expects the project to lead to new technical capabilities, which will also bring a safer future.

Extending the reach of this Computer Vision research, Vinay Sharma, graduate research assistant to Davis, will be graduating in December, 2007 and joining CSE Alumni Bruce Flinchbaugh (’80) at Texas Instruments in the Vision R&D group.

Although Davis dedicates himself to this important research project, he still makes time for his other passion, drumming. Playing since age 12, he freelances as a drummer in Columbus and enjoys listening to and playing jazz. Who knows what’s next, video analysis of musicians?
An Update from Doug

I graduated with a PhD from the Computer Science Department in 1992. My career didn’t immediately take off though. I had met my wife-to-be in grad school (This meeting, by the way, was “facilitated” by Elley Quinlan and certain members of the Computer Science office staff. They were quite sneaky and subtle and I owe them a lot!) and she still had over a year to go on her PhD.

So I spent my first year out of school as a Lecturer in the CSE Department. During that time I sent resumes all over the place. My mother, of all people, saw an article in the New Yorker about a brand new visual effects facility opening in Los Angeles. Its principles were James Cameron (future “King of the World”) and Scott Ross (ex-president of ILM). They must have been desperate - in the summer of 1993 they offered me a job and I took it, leaving Deborah to suffer through a chilly Ohio winter while I worked like crazy 3 blocks from the beach.

Taking the job at Digital Domain turned out to be a very good move on my part (Thanks, Mom!) It’s been a wild ride, but the work has been terrifically rewarding. My thesis was on integrating vision techniques and computer graphics. I brought some of that technology to the company and built a suite of computer vision tools that helped the artists integrate computer graphics effects with the film shot on set. This was new technology for the industry and gave the artists new abilities and saved them a ton of work. Other people noticed the tools too and in 1998 I won a Scientific and Technical Academy Award for the work. The ceremony was insanely fun and I got a kiss on the cheek from Anne Heche as she gave me the award!

It’s over 14 years since I joined the company and I’m still working at Digital Domain. Visual effects facilities are unique in the realm of “places where geeks can work.” Nowhere in the world is there a better mix of technology and art. I’m now the Creative Director of the Software department which means that I still get to write code and lead the technical direction of the department without having to do too much management.

I work side by side with incredibly talented artists doing crazy-complicated mathematics and software engineering. Anything I or other members of the software department produce is immediately used and abused by the artists to create effects we didn’t even think of when we first started the project. The problems change all the time too.

I’ve always kept my hand in computer vision applications, but I’ve also worked on fluid simulation, image processing, deformable models, motion capture and more! And I’ve been part of creating some very nifty movies: Apollo 13, The Fifth Element, Titanic, X-Men, Lord of the Rings, The Day After Tomorrow, Flags of our Fathers, Pirates of the Caribbean III and Transformers, just to name the good ones. (Yes, we’ve worked on some less than memorable movies, but the effects have always been good!)

Outside of Digital Domain, I have tried to stay active in the research community. I have been involved in SIGGRAPH in one way or another since the late 1990s. In 2001 I was chair of the Sketches program for SIGGRAPH. I have had 7 sketches accepted to the conference, participated in 3 courses and been on an advisory committee for the conference. In 2005 I was invited to be the keynote speaker for the Symposium of Computer
Wayne Clark Receives College of Engineering Distinguished Alumni Award

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 is currently the architect for Intelligent Networking Services at Cisco Systems Inc., where he has made significant contributions in networking areas. He is a strong advocate in promoting industrial and academic collaborations for U.S. engineering education to help students and curriculum adapt to the changing world.

Clark was one of the original employees of Cisco Systems Inc., a global company that designs and sells networking and communications technology for applications in government, education, and businesses and industries throughout the world. Clark’s name and his technical contributions have become an important part of the internet revolution history.

Clark was the founding architect and technical leader of Cisco’s IBM Networking Group. Systems Network Architecture (SNA) is a set of network protocols developed by IBM for its mainframe computers. Under his leadership, this group successfully transformed the IBM Corporate enterprise networks defined by 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. He also provides technical and organizational leadership by defining grid computing standards in the internet. Clark holds several patents and has been the keynote speaker at international conferences in communications and networking applications.

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.

Animation. I also joined the Digital Imaging and Technology Sub-committee of the Technical Academy Awards committee in 2002. (And yes, the sub-committee has the unfortunate abbreviation of DITS). Last year I co-chaired the sub-committee with Rick Sayre from Pixar. I am also the Editor-In-Chief of the Journal of Graphics Tools.

Deborah and I have been incredibly lucky. We’ve found fascinating jobs and have a terrific, busy life in Los Angeles. It really all started with our degrees from OSU. The Computer Science Department and the people in it provided a vital, creative, cutting edge environment for both of us. The knowledge we gained and the contacts we made were essential for our careers. We both had a very good, rewarding time at OSU - little did we know it was just the beginning and how far it would take us!

Deborah Shands and Doug Roble Weber

An Update from Deborah

While at Ohio State, I studied distributed computing and databases. Both were very interesting topics and great background for the work that I literally fell into in my first job: computer and network systems security. The security field fascinates me with tough technical problems and high consequences for failure to address them. I’ve worked in security research at McAfee Research and, for the past 3 years, at The Aerospace Corporation. My research has focused on distributed systems security and, more specifically, on scalable security administration in federated systems. Along the way, I’ve been very fortunate to have received funding from DARPA for a few of my research projects, chaired the 2007 IEEE Symposium on Security and Privacy, and participated in the 2007 National Academy of Engineering Frontiers of Engineering Symposium.

Doug and I live in Culver City, CA (in the midst of Los Angeles). When we’re not working, we like to hike, bike, cook and hang out our dog, Weber.
David Ebert, BS ’86, MS ’87, PhD ’91, is a Full Professor in the School of Electrical and Computer Engineering at Purdue University. He is currently Director of both PURVAC: Purdue University Regional Visualization and Analytics Center, and PURPL: Purdue University Rendering and Perceptualization Lab. David is married to former staff member Susan Wrights Ebert.

Stephen Edwards, MS ’92, PhD ’95, is an Associate Professor in Computer Science at Virginia Tech. His Web-CAT received the 2006 XCaliber Award from Virginia Tech’s Center for Innovation in Learning. Web-CAT is a plug-in-based web application that supports electronic submission and automated grading of programming assignments. The XCaliber Award is given in recognition of the outstanding contributions to learning that faculty and teams of faculty and staff are making as they develop courseware using technology. Steve is married to Diane Hodge and has two children: Matthew and Amanda.

Joe Hollingsworth, PhD ’92, has recently been promoted to Full Professor in the Computer Science Program at Indiana University Southeast. Joe lives with his wife Janet, and they have two children: a daughter, Emma and a son, Max.

Vince Scheib, BS ’00, currently works at Emergent Game Technologies making Gamebryo, a game graphics engine middleware. He was previously employed at Studio Gigante in Chicago, The Collective, as well as various other gaming companies.

Kathy Johnson-Throop, MS ’86, PhD ’93, is currently the Branch Chief for Medical Informatics and Health Care Systems at the NASA Johnson Space Center. She is married and has four children: Leila, age 10, Nathaniel, age 10, Rebecca, age 4 and Sara Jean, age 2.

Scott King, MS ’94, PhD ’01, has received a promotion to Associate Professor with tenure in the Computer Science Department at Texas A&M University, Corpus Christi. Scott is married to Tami, who currently works remotely from Texas for the OSU-CSE Department. They have one son, Graham.

Brent Watkins, BS ’98, MS ’04, is currently a Character Technical Director at DreamWorks Animation in Glendale, CA. His credits include Over The Hedge, Bee Movie (coming this November), and How To Train Your Dragon (coming fall of 2009). Brent is currently working on designing and implementing the character department’s portion of a new studio production pipeline. He is engaged to be married in June of 2008.

Brad Winemiller, BS ’96, is Technical Director at Pixar Animation Studio. Brad has worked on a variety of Pixar films in many different capacities including digital effects artist, model-maker, rendering artist, software engineer, and set dresser. Films which he has contributed to include Ratatouille, Cars, Finding Nemo, Monsters, Inc., Toy Story 2 and A Bug’s Life.

Do you have any suggestions or news about yourself or other alumni for the newsletter? Email us! Send your suggestions to alumni@cse.ohio-state.edu.
Tamer Özsu Appointed Director, School of Computer Science at the University of Waterloo in Ontario, Canada

Tamer Özsu received his MS in 1981 and PhD in 1983 in computer and information science from Ohio State. Özsu is now the Director of the David R. Cheriton School of Computer Science at the University of Waterloo in Canada. He was also named as an ACM Fellow in 1996.

Özsu’s research encompasses Distributed Data Management with a focus on Internet-scale data distribution and management. His book, Principles of Distributed Database Systems, is going into its third edition and is considered the classic text on this topic. Patrick Valduriez, the book’s co-author, has been Özsu’s long-term collaborator whom he met during his time as a graduate student at Ohio State. Additionally, Özsu also researches XML Data Management and Multimedia Data Management.

In addition to scholarly activities, Özsu has been very active within the scientific community. He served as Chair of ACM Special Interest Group on Management of Data (SIGMOD), Editor-in-Chief of The VLDB Journal, and a trustee of the VLDB Endowment. He served as member and chair of the CIS Grant Selection Committee of the Natural Sciences and Engineering Research Council of Canada, and has served on the Management Committee of the Canadian Genome Analysis and Technology Program.


Even though Özsu says he worked hard to quickly finish his PhD due to required military service in his home country of Turkey, he describes his time at Ohio State as “A wonderful experience, both socially and professionally.” From research to intramural sports to hanging out at Tommy’s Pizza, Özsu enjoyed his experience and says, “it was a very tight-knit group of graduate students who interacted very well with faculty members.”

Amit Sheth, MS ’83, PhD ’85, is an IEEE Fellow and also received an IBM Faculty Award. In 2006, he was named the LexisNexis Eminent Scholar for Advanced Data Management and Analysis at Wright State University, Dayton, OH. He directs the Kno.e.sis Center for Knowledge Enabled Information and Services Science. Prior to moving to Wright State, Amit was a professor at the University of Georgia where he founded and directed the LSDIS Lab.

Julie Barnes, Ph.D. ’90, is Associate Dean in the College of Arts and Sciences. She served as chair of the Department of Computer Science from 2001-2005. Professor Barnes has taught a variety of courses in computer science from computer literacy and programming to usability engineering and compiler design. Her current research area is in usability engineering, specifically how instructions can be presented on the World Wide Web.

In Arts & Sciences, Professor Barnes oversees the Student Services area. She supervises the academic advisors in the college, deals with student issues, and coordinates student recruitment and retention activities.
IBM Recognizes Huang and Krishnamoorthy

IBM has recognized two CSE students for their outstanding research endeavors. Sriram Krishnamoorthy has received an IBM PhD Fellowship, and Wei Huang has received an IBM PhD Scholarship for the 2007-08 academic year. The IBM Fellowship program is a prestigious and highly competitive international competition which honors exceptional PhD students.

Sriram is a PhD candidate in Professor P. Sadayappan’s High-Performance and Parallel Computing Research Group. Sriram and Professor Sadayappan have investigated both compile-time and run-time approaches to simplifying the task of writing efficient parallel programs, primarily relating to data movement cost. He is currently focusing on the design and implementation of a run-time environment for efficient execution of the code generated by the tensor contraction expressions engine (TCE), an optimized code generation system for quantum chemistry calculations.

Huang is a PhD student in the Network Based Computing Laboratory (NBCL), led by Professor DK Panda. Huang’s research topic, High Performance Computing (HPC) with Virtual Machines, is aimed at achieving both high performance and high productivity computing via modern Virtual Machine (VM) technologies.

Buehrer Awarded Microsoft Research Live Labs Fellowship

Greg Buehrer, a member of Srini Parthasarathy’s Data Mining Research Lab, was awarded a two year fellowship from Microsoft Research Live Labs. As part of his fellowship, Greg will spend the next two summers at Live Labs.

Greg’s summer 2007 at Live Labs was exciting. His first project involved developing graph compression techniques with Kumar Chellapilla and the Live Labs Web Search team. A link server is a system designed to facilitate random access queries on web graphs. The web has on the order of tens of billions of pages (nodes) and hundreds of billions of hyperlinks (edges). By using data mining techniques on the graph, it has been compressed 15-fold reliably. Also, the method improves the run-times for random access queries, is highly scalable, natively discovers underlying communities and removes the constraint of globally sorted URLs.

The second half of the summer was spent using click stream data to improve run-time rankings of pages for user queries. Specifically, he investigated detection algorithms for behavioral query and click spam. By eliminating Bot traffic from query streams, the search group will be able to weight rankings at run-time.

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 co-author 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, co-presented an invited tutorial on InfiniBand and GigE entitled Designing High-End Computing Systems with InfiniBand and 10-Gigabit Ethernet.
Congratulations to CSE Spring and Summer quarter graduates!

The Department wishes you the best of luck in your future endeavors.

PhD
Amol Ghoting
Keith Marsolo
Mariana Sharp
Jian Sun
Xun Wang

Master’s
Andrew Hess
Ramkrishnan Kulathumani
Nitin Sivakrishnan
Zhaohui Zhou

Bachelor’s
Forhad Ahmed
Dongyoung Ahn
Derek Austin
Divyanshu Bansal
Paul Betts
Rebekah Billing
Ilsa Bolano
Derek Bistline
Ilya Borodulin
Peter Brooks
Michael Brown
Brian Buckley
Daniel Burgher
Michael Busch
Timothy Callahan
Aaron Cardwell
Eric Caspary
Justen Castle
Adam Champion
Derick Chan
Hye Jung Choi
Michael Christman
Hao-Jen Chung
Adam Cohen
Jared Combs
Jared Curtis
Daniel Davis
Dorsey Dick
Matthew Doyle
Benjamin Dumford
Christopher Foley
Sean Foster
Farhanida Ghazali
Joseph Herriott
Nathan Hessler
Justin Holewinski
Keith Holliday
Jeffrey Holycross
John Homan
Soonsang Hong
Brent Huffman
Parag Jagdale
Lisa Kan
Jason Karns
Elizabeth Kearns
Robert Keller
Joseph Kidwell
Jason Kim
Minwoo Kim
William Koch
Jason Labar
Brett Lalonde
Shareef Lahham
Frank Lamantia
Joel Lehman
Jordan Lehmiller
Sean Ludemann
Jerry Lou

John Loy
David Manley
Michael McGrath
Ryan Mitchell
Robert Mohr
Alexander Moore
Mohd Haikal
Mohd Nashuha
Travis Nauman
Elizabeth Neiderman
Poonam Patel
Jonathan Perry
Yevgen Polishchuk
Jason Profitt
Matthew Protacio
David Pryor
Scott Ramer
Edward Rho
Anthony Rudd
Rahul Sareen
Michael Schamer
Neal Schneider
Steve Schwarcz
Muhammed Shedie
Douglas Showell
Eric Stegemoller
Matthew Straka
David Telintelo
Kyle Trout
Daniel Um
Harshit Varia
Nathaniel Wagner
Jason Ware
Matthew Yoho
Lei Zheng
Ruby Zheng
A Novel Tool for Automatic Discovery of Protein Functional Sites

Hakan Ferhatosmanoglu and Yusu Wang have developed a new tool that automatically discovers functional regions using the three-dimensional structure information of a protein. (LFM-Pro: A Tool for Detecting Significant Local Structural Sites in Proteins. A. Sacan, O. Ozturk, H. Ferhatosmanoglu, Y. Wang. Bioinformatics, Vol. 23, No. 6, pp. 709-716, March, 2007). Classical approaches for identifying these local regions involved years of intensive genetic and molecular biology experiments, whereas the new computational tool has made it possible to find these functional sites in a matter of a few minutes. The method is based on automated analysis of a database which contains tens of thousands of experimentally determined protein 3D structures. The distance field to backbone atoms is utilized to detect structural centers with geometrical and biochemical significance.

The success of the tool shows that geometry and topology of the structure together with biochemical environment information enables highly accurate predictions of the functional site locations. Effective discovery of protein functional sites achieved by this project has tremendous impact in bioscience research. Applications include helping molecular biology experiments focus better, classifying yet uncharacterized proteins and drug design and targeting.

This multi-disciplinary project supplies an important tool for researchers in biotechnology and drug design. Developments in these areas will have profound impact on society through extending lifespan, enhancing health and improving agricultural productivity. This tool is one of the first to experiment with the possibility of incorporating certain geometrical/topological information in the search for functionally active regions of proteins. Its results show that it is possible to detect functional sites by limiting the search to the regions suggested by the geometry. There are too many biochemical parameters to be considered in deciding if a region is an active site. Assigning correct weights to the parameters is not trivial. Wrong methods in following steps of the process, after locating candidates, would make this tool’s results unsuccessful. However, researchers designing this tool overcame this obstacle to show that geometrical information is valuable in predicting functional sites.

CSE Welcomes New Assistant Professor

In October, the CSE Department welcomes new assistant professor Hui Fang. Professor Fang received her PhD in Computer Science from the University of Illinois at Urbana-Champaign in 2007. Her primary research interest is information retrieval, with a focus on developing effective and robust retrieval models. She is also interested in bioinformatics, data mining and databases. Professor Fang received the ACM SIGIR 2004 Best Paper Award for her work on information retrieval models. Her focus will be on developing effective models that can help users access text information more effectively and efficiently.
Ness Shroff Joins ECE and CSE as Ohio Eminent Scholar

Ness Shroff joins OSU as the Ohio Eminent Scholar of Networking and Communications, and Professor of ECE and CSE. He received his PhD from Columbia University in 1994. Prior to arriving at Ohio State, he was Professor of ECE at Purdue University, and director of CWSA, a university-wide center on wireless systems and applications.

His research interests span the areas of wireless and wireline communication networks. He is especially interested in fundamental problems in the design, performance, pricing and security of these networks. His research is funded by various companies such as Intel, Hewlett Packard, Nortel, AT&T, BAE systems and LG Electronics; and government agencies such as the NSF, DARPA, Indiana Department of Transportation and the Indiana 21st Century Fund.

Shroff is an editor for IEEE/ACM Transactions on Networking and the Computer Networks Journal, and past editor of IEEE Communications Letters. He has served on the technical and executive committees of several major conferences and workshops and was the technical program co-chair of IEEE INFOCOM’03, the premier conference in communication networking. Shroff also served as the conference chair of IEEE Computer Communications Workshop (CCW’99), the program co-chair for the symposium on high-speed networks, Globecom 2001, and the panel co-chair for ACM Mobicom’02. He was also a co-organizer of the NSF workshop on Fundamental Research in Networking in 2003. In 2008, he will serve as the technical program co-chair of ACM Mobihoc 2008.

Shroff is a fellow of the IEEE. He received the IEEE INFOCOM 2006 best paper award, the IEEE IWQoS 2006 best student paper award, the 2005 best paper of the year award for the Journal of Communications and Networking, the 2003 best paper of the year award for Computer Networks, and the NSF CAREER award in 1996 (his INFOCOM 2005 paper was also selected as one of two runner-up papers for best paper).

Parthasarathy, Asur and Ucar Win ACM SIGKDD 2007 Best Paper

Data Mining Research Lab (DMRL) graduate students Sitaram Asur and Duygu Ucar along with their advisor Professor Srini Parthasarathy have received a Best Paper award (in the applications category) for their work on An Event Based Framework for Characterizing the Behavior of Interaction Graphs at the annual ACM Knowledge Discovery and Data Mining (SIGKDD) conference in 2007.

The work described 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 five years — a truly remarkable record.
Outstanding Paper Award from IEEE Computational Intelligence Society

Leon Wang has received the 2005 IEEE Transactions on Neural Networks Outstanding Paper Award (bestowed in 2007) for his paper The Time Dimension for Scene Analysis, published in Vol.16, pp.1401-1426. This award is sponsored annually by the IEEE Computational Intelligence Society and recognizes a single paper published in IEEE Transactions on Neural Networks. Wang will receive this award at the 2008 World Congress on Computational Intelligence, to be held in Hong Kong, June 1-6.

In this paper (posted at http://www.cse.ohio-state.edu/~dwang/papers/Wang_tnn05.pdf), Wang starts with two problems considered by Frank Rosenblatt to be the most challenging to the development of his perceptron theory more than 40 years ago, and points out that the main challenge is the binding problem which refers to how sensory elements in a scene organize into perceived objects. The theme of the paper is that the time dimension is essential for systematically attacking Rosenblatt’s challenge. Oscillatory correlation theory is discussed as an adequate representation theory to address the binding problem. Recent advances in understanding oscillatory dynamics have overcome key computational obstacles for the development of oscillatory correlation theory, which in turn have substantially advanced the capability of neural networks for figure-ground separation. In the end, Wang forcefully argues that the time dimension is necessary for versatile computing.

Recent Publications

Tamal Dey has published Curve and Surface Reconstruction: Algorithms with Mathematical Analysis, Cambridge University Press, New York, 2007. This book contains recent results in sampling theory of surfaces that aid reconstructions from point cloud data, a scenario encountered in many applications of science and engineering. The book is the first of its kind and is meant for advanced studies in geometric modeling and computer graphics.


Professor Prasun Sinha, along with students Sha Liu and Kai-Wei Fan, were among the Best Paper Finalists at Sensor, Mesh and Ad Hoc Communications and Networks, in June, 2007 in San Diego. Their paper, CMAC: An Energy Efficient MAC Layer Protocol Using Convergent Packet Forwarding for Wireless Sensor Networks, was among the top four papers.

Recent Grants & Awards

The Army Research Office has awarded a MURI grant to Ness Shroff and collaborators from Penn State, Harvard, Duke and the University of British Columbia. This project, led by Penn State, 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.

David Lee is leading an NSF-sponsored project that will fund a team from CSE, ECE, OSC, the Fisher College of Business and TechColumbus to create and operate the NEWPATH program: a new educational program to produce CSE, CIS and ECE graduates who are well equipped at conceiving new ideas for IT-centered products and services and moving those ideas into start-up companies and markets. Students in the program will be aided directly by NEWPATH program funds to support unique opportunities. The program will begin freshman year, continue through the OSU Entrepreneurship Minor program and internships with TechColumbus companies, and end with a novel “E-Practicum” modeled on a successful MBA course sequence that will be adapted to the needs of upper-division undergraduate students with a particular focus on IT products and services.
NSF is supporting Bruce Weide and Harvey Friedman (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 NSF 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.

NSF has awarded OSU a Human and Social Dynamics award entitled *Using Machine Learning to Model the Interplay of Production Dynamics and Perception Dynamics in Phonological Acquisition* led by Mary Beckman (Linguistics) and Eric Fosler-Lussier. The collaborative award, along with researchers at the Universities of Wisconsin and Minnesota, 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 (Mapping and GIS Laboratory) and Leon Wang (CSE and Perception and Neurodynamics Laboratory) 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, multiscale and multiplatform images. This project intends to develop a system that quickly analyzes and extracts information from remote sensing images covering large areas.

Professor 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.

Sri Parthasarathy has received a highly competitive IBM Faculty Fellowship for 2007-2008 for his work on *Architecture Conscious Data Analysis and Management*. He will investigate the performance of key data mining and indexing kernels on the Sony-Toshiba-IBM Cell Broadband Engine Architecture. The Cell architecture is an exciting new high performance architecture that grew from the challenge to provide a cost and power effective solution for the gaming industry (it is the processor within the Sony Play Station console). However, as recent research has shown, the Cell architecture promises to have a much broader impact than was originally intended, i.e., beyond the gaming industry.

Ness Shroff and Prasun Sinha have received a NSF NeTS-NOSS grant to investigate energy efficiency in sensor networks entitled *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 Professor 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. This project proposes 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 proposed Trap Coverage model allows for holes of bounded size in the deployment, leading to substantial savings in total number of sensors required to provide coverage.

NSF has awarded Srin 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.

Donna Byron will collaborate with Joy Hanna of Oberlin College Department of Psychology on a newly awarded NSF project entitled *Establishing and Breaking Conceptual Pacts with Dialog Partners*. The project will apply recent psycholinguistic results to investigate how conversations between people and computer-generated characters can be made more efficient.
Remember When? This photo of computer science faculty and staff was taken in 1974. Can you match the names to the faces? E-mail us at alumni@cse.ohio-state.edu, the person with the most correct answers will win a prize! Answers will be posted in the following newsletter.

Bill Buttleman, Tom DeLutis, Ron Ernst, Clint Fouk, Dick Hang, Bobbie Harrison, Jane Hundley, Don Kalmey, Clyde Kearns, Doug Kerr, John Klippert, Harvey Koch, Mike Liu, Tony Lucido, Marty Marlatt, Dan Moore, Tony Petrarca, Jerry Rothstein, Ernie Staveley, Cee Taylor, Marshall Yovits (chair), Stu Zweben

Visualization Images from Han-Wei Shen and Visualization Research Group

A rendered image of the energy field over New Orleans downtown at 2:30pm, December 14, 1996. where a ship slammed into a riverfront shopping mall along the Mississippi river. Such a rendered image can provide scientists an overview of underlying data and help them to analyze it. This data, however, consist of 11 million cells (more than 200 MB), which is hard to be rendered interactively by conventional techniques.

A visualization of the simulation inside the Super Phoenix Nuclear Reactor (the data was from Bruno Notrosso, Electricite de France).

Visualization of a 3-D time-varying jet turbulence simulation. Three time steps from the data are fused together into one volume. Each time step is color coded from red to green to blue from earliest to latest time. This visualization allows for a clearer understanding of how the data changes over time without relying on the viewer's short-term and visual memory to reconstruct relationships from animation or individual frames.

Visualization of a hurricane computer simulation created by the National Center for Atmospheric Research. The visualization uses volume rendering and boolean operations for the viewer to perform visual queries. This image displays cloud cover as well as the precipitation amount in the eye of the hurricane.
Many Thanks to Our Alumni and Friends!

We appreciate the following alumni/ae, faculty, staff and friends who directed their Ohio State gifts to the Computer Science and Engineering Department. Listed below are our benefactors over the past two years. These donations are making a difference. Private support can help us to attract outstanding students and promising young faculty. We have used gift dollars to improve research and teaching labs, as well.

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May we include your news in the CSE Newsletter? Yes No

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