



Message from the Department Chairperson

Dear CSE Alumni, Parents, Friends and Colleagues,

Despite the global economic recession and the budget constraint, you will learn from this issue of the newsletter that CSE keeps improving and growing! We have observed a continuous increase in undergraduate enrollment since 2005. The graduate program has been enhanced at an even faster pace. CSE has become the largest graduate program hosting more than 320 graduate students in the College of Engineering.

At the end of last year, we said goodbye to three senior faculty and staff members: John (JJ) Josephson, Tim Long and David Mathias. They have worked in the department for many years and made various contributions before their retirements.

The department welcomes Tim Welsh, our new Director of Development from the College of Engineering. He will be working with the department and our alumni as we explore ways to increase alumni involvement in departmental activities and the creation of a departmental alumni society. You can learn more about Tim on page fourteen.

The department has further extended the Industry Advisory Committee by adding another two more distinguished alumni. Ray Harishankar, MS'90 is an IBM Fellow, and CTO of Global Solution and Asset Management within IBM Global Business in Dublin, Ohio and Julie Hartigan, MS'89, PhD'94 is the CTO of Federal Programs at Expert Systems in Washington D.C. We welcome our newest members, and look forward to gaining from their expertise at our upcoming advisory board meeting.

Over the past several years, we have made increasingly larger efforts to connect with our alums all over the US and all over the world. As a frequent traveler, I can always meet Ohio State alums (most of them are CSE graduates) no matter where I go. For example, I wrote this message during the time I was stranded in Paris after a conference because of the volcanic ash clouds. Again, I met CSE graduates in the Bank of the Seine. I would like to thank all of the alumni and friends of the department who continue to make contributions to the department. The increase in contributions has allowed the department to give out more students scholarships this year than ever before. We have acknowledged our most recent donors on page fifteen.

I hope you enjoy reading this new issue of the newsletter, where you can find many good news stories and achievements of our alums and our department. Please continue to keep us informed, and I will talk to you again in the fall issue of the newsletter.

Xiaodong Zhang
Chair and Robert M. Critchfield Professor
Computer Science and Engineering

Computer Science Ranking at Ohio State Improves Again

According to the US News and World Report 2011 Edition of America's Best Graduate Schools released in April, the ranking of CSE at Ohio State has continued to improve, moving up to 28th among all PhD granting Computer Science Departments and 14th among public universities. The department was ranked 34th in 2006 and 31st in 2008.

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Joe Bollinger and Harry Xu Receive IBM PhD Fellowships

CSE PhD students Guoqing (Harry) Xu and Joe Bolinger have been awarded an IBM PhD Fellowship for the 2010 - 2011 academic year.

Joe is a PhD candidate under the supervision of Jay Ramanathan and Rajiv Ramnath. His primary research interests are in design methodologies for collaborative tools that support service organizations. More generally, he is interested in human computer interaction, service and management science, software engineering, and anything that might help people work together and socialize more enjoyably online.

Joe has worked with local IT organizations to study the management and governance processes that these groups use to manage increasingly complex collections of computational resources, which enable critical business services. His research has led to the development of new tools that can better support and monitor these kinds of highly unstable and ad-hoc work processes. Such tools can help prevent the costly errors that result from unplanned downtime or resource mismanagement, and can support broader organizational improvement and learning strategies. Joe received his BS in Computer Science from Ohio State in 2005, Magna Cum Laude.

Joe is a member of the CETI NSF-IUCRC Program (<http://www.ceti.cse.ohio-state.edu>) at The Ohio State University, whose mission is to uniquely integrate research, practice, and education to provide varied opportunities for students, professionals, and industry collaborators.

Harry is a PhD candidate under the supervision of Dr. Atanas Rountev. 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. He has published several papers in top programming language and software engineering conferences including PLDI, ECOOP, FSE, and ICSE. In 2008, he received the Distinguished Paper Award in the International Conference on Software Engineering for his paper entitled *Precise Memory Leak Detection for Java Software Using Container Profiling*.

During the past two summers, Harry interned at the IBM TJ Watson Research Center. He has worked closely with IBM researchers on performance optimization for large-scale and long-running Java programs. For example, he has developed JVM-based tools that can detect inefficient operations by finding high-cost-low-benefit data structures and by profiling copy activities. Many performance problems in real-world applications have been revealed using these tools. Significant performance improvement can be seen after optimizing away these detected problems. Harry was honored this year by the CSE Department with a Departmental Graduate Research Award. Harry received both his MS and BS degrees with distinction in Computer Science from East China Normal University, Shanghai, China.



Harry Xu



Joe Bollinger

According to IBM, their PhD Fellowship Awards Program is an intensely competitive worldwide program, which honors exceptional PhD students who have an interest in solving problems that are important to IBM and fundamental to innovation in many academic disciplines and areas of study.

The Department Says Goodbye to Some Old Friends

This past year, three members of our department retired; Professor **Tim Long**, Senior Lecturer **David Mathias** and Research Scientist **John (JJ) Josephson**. The Department had a party on December 8th to honor their achievements and celebrate their contributions to the department. We wish David, JJ and Tim all the best in their endeavours.



Tim Long's primary research was in structural complexity theory, but he also contributed immensely to the work of

the Resolve/Reusable Software Research Group. Equally at ease teaching both theory courses and intro-level CS courses, he earned distinct teaching awards at the department, college and university level, as well as the IEEE Computer Society's Computer Science and Engineering Undergraduate Teaching Award. Tim and his wife, Donna, spent much of each winter quarter in Las Cruces until recently shifting their attention to Asheville, NC, where they now own a home and reside as of January 2010.



David Mathias earned his undergraduate degree from the University of Delaware and his doctorate from Wash-

ington University in St. Louis Missouri. In his time with CSE, David won the department faculty teaching award a few times and became one of our most outstanding teachers for many years. David is also an accomplished furniture maker and plans to write a book on this topic. David's wife Patty's career is now leading him and their two sons, Dylan and Zachary, on an adventure to Lausanne, Switzerland.



John (JJ) Josephson received his PhD from Ohio State in mathematics and philosophy. JJ's primary interests are computational epistemology, abductive inference, causal reasoning, perception and information fusion. He served as the associate director for the Laboratory for AI Research (LAIR). After retiring, JJ plans to do a lot of what you see above, spending quality time with his granddaughter, Dov.

Powering the World's Fastest Supercomputers

The TOP500 list of supercomputers was presented at Supercomputing 2009 in Portland, Oregon on November 17th. The latest ranking includes several top-ranked supercomputers utilizing Professor **Dhableswar (DK) Panda's** MVAPICH 2 software, including the 5th most powerful system (with 71,680 cores) at the National Super Computer Center in Tianjin, China. This system is used in China for petroleum exploration and engineering tasks including simulating aircraft designs.

The software, called MVAPICH2 – which originally stands for “MPI for InfiniBand on VAPI Layer,” works by connecting traditional supercomputing software with innovative networking technology that speeds data flow. The focus is to improve the efficiency and speed of communication by increasing bandwidth and reducing latency. The MVAPICH2 library is utilized by applications to facilitate high performance computing faster and with capability to handle faults. Users of supercomputers as well as clusters typically use a Message Passing Interface (MPI) library to write their parallel applications and run it on the underlying system. The overall performance and parallel speedup of a user application on a parallel system is heavily dependent on the performance of the MPI library. During the last eight years, the MVAPICH library has become the major open-source library in the cluster community. As the MPI standard moved to MPI-2, Panda's team also designed an enhanced version of their MPI library, known as MVAPICH2. The designs in MVAPICH2 have been extended to the emerging 10 GigE/iWARP and RDMA over Converged Ethernet (RoCE) networking technologies. Currently, both of these libraries are being used by more than 1,110 organizations worldwide, in 56 countries. There have been more than 40,000 downloads of this software from the OSU site alone. The software is also available in an open-source manner integrated with the software stacks of many server and networking vendors including the common RedHat and SuSE Linux distributions.



The field of parallel computing has become so ubiquitous such that companies like Proctor and Gamble use this technology to design the curvy shape of Pringles potato chips and analyze its aerodynamics behavior when it passes through the product pipeline without breaking. Even the U.S. Postal Service uses it to carry out efficient sorting of mail in their large mailing centers and to keep track of the movement of hundreds of millions of pieces of mail worldwide. MVAPICH2 software is enabling hundreds of thousands of MPI users worldwide to accelerate their diverse applications. More information regarding this and other projects can be found at <http://mvapich.cse.ohio-state.edu/>.



DeLiang Wang

Cocktail party problem within reach?

Listen! What do you hear? Perhaps music playing in the background, someone walking by, heater ventilation, or distant voices. Regardless, it is likely that you can identify more than one sound source, an ability of human audition

that is vividly illustrated by the great German scientist Hermann Helmholtz in his 1863 masterpiece, *On the Sensations of Tone*:

“In the interior of a ball-room ... we have a number of musical instruments in action, speaking men and women, rustling garments, gliding feet, clinking glasses, and so on ... a tumbled entanglement [that is] complicated beyond conception. And yet ... the ear is able to distinguish all the separate constituent parts of this confused whole.”

A particularly important aspect of this problem, apparent from Helmholtz's description, is how to perceive target speech in such complex acoustic environments. This was later termed the “cocktail party problem” by Colin Cherry when he wrote in the 1950s:

“One of our most important faculties is our ability to listen to, and follow, one speaker in the presence of others. This is such a common experience that we may take it for granted; we may call it the ‘cocktail party problem.’ No machine has yet been constructed to do just that.”

Unfortunately for the field of artificial intelligence, Cherry's assessment of machine performance is as accurate today as it was more than half a century ago.

Constructing a system that can segregate the mixture of sounds, that is, solve the cocktail party problem, is not just another milestone in AI but of major significance for a wide range of real-world applications.

Consider hearing aids for instance. About 30 million Americans suffer from some degree of hearing loss. This significant demographic is expected to grow even larger as baby boomers enter their senior years. The large majority of them have irreversible hearing loss, and hearing aids are the primary means of alleviating the deficits associated with hearing loss. Hearing loss manifests itself in two main ways: decreased audibility of sounds and increased difficulty in speech segregation. Modern

hearing aids through acoustic amplification succeed in overcoming the first handicap. However, the second handicap – the inability of speech understanding in cocktail party environments – is little helped by hearing aids because amplification magnifies speech and noise alike. Despite extensive effort over several decades, the interference of background noise remains the single greatest problem reported by hearing aid wearers.

For the last ten years, DeLiang Wang's Perception and Neurodynamics Laboratory (PNL) has been sharply focusing on solving the cocktail party problem. Looking back at numerous failed attempts, Wang, who holds joint appointments in CSE and Center for Cognitive Science, does not believe that the solution lies in a witty idea or clever design. Instead, he takes a very different approach which is directly inspired by McGill Psychologist Albert Bregman who proposed a seminal theory of how the human auditory system analyzes the acoustic input, called Auditory Scene Analysis. The approach, known as Computational Auditory Scene Analysis or CASA, aims to solve the cocktail party problem using principles of human auditory scene analysis.

Following the CASA approach, PNL has developed influential algorithms for multi-pitch tracking, monaural speech separation, and binaural segregation based on sound locations. These algorithms have made big strides towards solving the speech segregation problem. Together with Guy Brown, Wang edited and wrote much of a recent Wiley/IEEE Press book, *Computational Auditory Scene Analysis: Principles, Algorithms, and Applications*. This 2006 book has quickly become a standard reference, and helped to firmly establish CASA as a primary approach to sound separation.



Wang gives his acceptance speech after receiving the Helmholtz Award from the International Neural Network Society, the top honor in the field for sensation and perception at the World Congress on Computational Intelligence in Hong Kong, June 2008.

In an effort to directly help design hearing aids that better separate the target speech from interfering sounds, Wang spent his last sabbatical leave at Oticon from 2006-2007. Located in Copenhagen, Oticon is the world's oldest and second largest hearing aid manufacturer. Besides helping to incorporate PNL's algorithms into Oticon's hearing aids, the research conducted by Wang at Oticon led to a surprising discovery that listeners achieve nearly perfect speech recognition from pure noise that is appropriately turned on and off in time and frequency. The time-frequency switching is guided by a matrix called Ideal Binary Mask, a concept originated in PNL on the basis of auditory masking effects. 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 speech and noise, the ideal binary mask is a binary matrix where 1 indicates that the signal is stronger than the noise within the corresponding time-frequency unit and 0 indicates otherwise. As a means of segregation, a binary mask keeps time-frequency regions of the mixture corresponding to 1 in the mask but zeroes out the rest. In other words, binary masking applies a pattern of binary gains to the mixture signal.

This process of turning on or off noise is illustrated in the figure below. That noise gated by the ideal binary mask produces almost perfectly intelligible speech is extremely surprising, even to Wang himself, as the information encoded in binary gains is greatly reduced from original speech. The results of this dramatic experiment likely open completely new avenues for automatic speech recognition, coding and compression in speech communication, and design of hearing aids and cochlear implants.

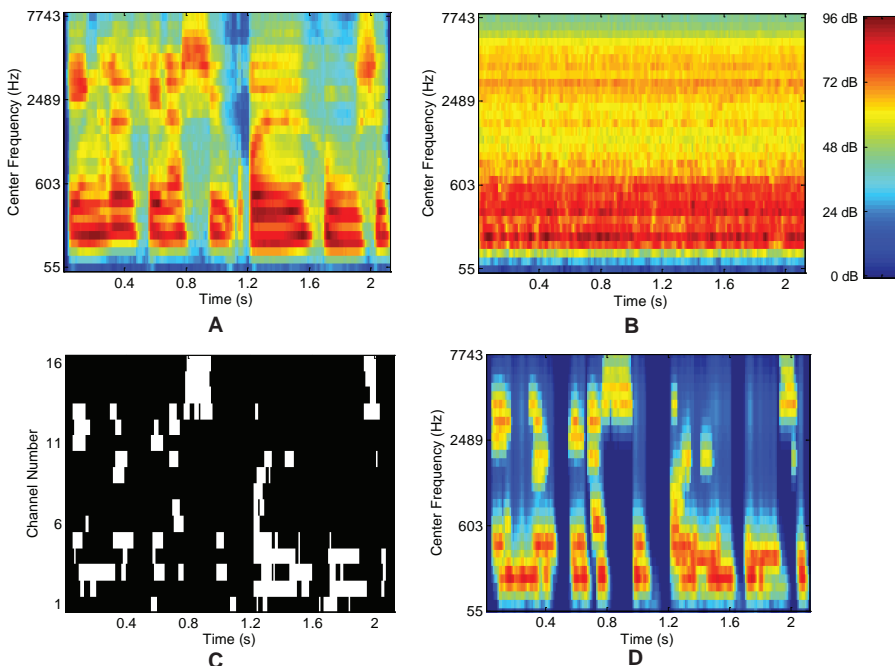
“
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As far as the cocktail party problem is concerned, the clear implication is that the solution is not about estimating the target signal, as has been attempted in the field for many years, but about classifying the mixture. The shift of problem formulation from estimation to

classification has far-reaching ramifications because, now, the cocktail party problem is open to a plethora of powerful machine learning techniques.

Indeed, a University of Texas study published a few months ago reported an algorithm that directly estimates the ideal binary mask using pattern classification and this algorithm produced, for the first time, a significant improvement of human speech recognition in noise. “Although this study makes some limiting assumptions, it is a breakthrough in the long pursuit of improving human speech intelligibility,” said Wang, “and I expect a lot of progress in the coming years.”

Is a solution to the cocktail party problem finally in sight?



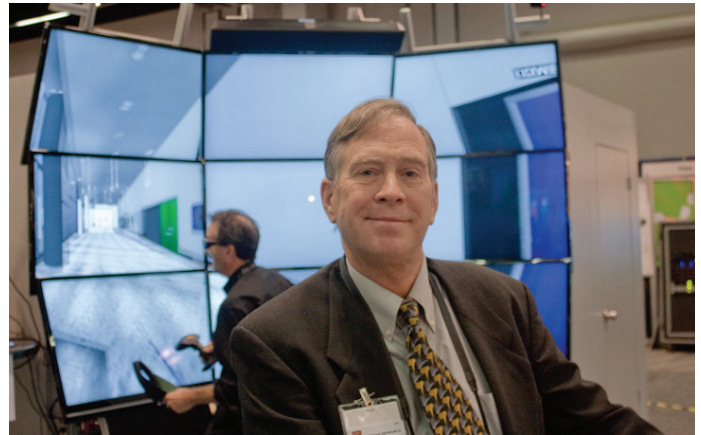
Parts A and B show the two-dimensional representations of a sentence and a noise, respectively ('dB' stands for decibels). Part C shows the ideal binary mask with 16 frequency channels, where a white pixel indicates 1 and a black indicates 0. Part D shows the noise in B gated by the ideal mask in C. See the similarity between A and D.

Tom DeFanti

Computer Graphics Pioneer

At age 24, with his OSU/CSE doctoral degree in hand, thanks to an OSU fellowship and a research assistantship in Prof. Charles Csuri's Computer Graphics Research Lab, Tom DeFanti moved to the University of Illinois at Chicago (UIC) in 1973 as an assistant professor of computer science and set up, with Dan Sandin, the Electronic Visualization Laboratory (EVL)--which 37 years later is still quite well and thriving. In 1976, Tom helped computer animation pioneer Larry Cuba create the computer graphics for the 1977 movie Star Wars (using the same graphics language he developed for his PhD). In 1977, Tom became secretary of the ACM/SIGGRAPH organization, as well as becoming active in working on and growing its annual conference from hundreds to thousands of attendees. He was tenured in 1978 and promoted to associate professor. In 1978, he began doing R&D for Bally/Midway, the maker of PacMan and Space Invaders in the US and created the operating system and programming language of one of the first "personal computers" (the Bally Home Library Computer), which later got produced as the Datamax UV-1, a system popular with digital video artists for many years. Tom became chair of the SIGGRAPH organization from 1981-1985 and proactively led its expansion with its fast-growing annual conference, SIGGRAPH Video Review publication, and many international alliances. Tom is also a Fellow of the Association for Computing Machinery and the 1988 recipient of the ACM Outstanding Contribution Award.

In 1986, Tom married Kathy Tanaka and later had sons Ian (1987) and Connor (1992). Also in 1986, Tom started his long association with Dr. Larry Smarr of the National Center for Supercomputing Applications at the University of Illinois at Urbana-Champaign. Tom shortly thereafter hired Maxine Brown to be EVL associate director, who, with Larry's guidance, propelled EVL from a very modest lab to the best-funded lab at UIC for many years. The affiliation with Larry led Tom, along with Maxine and Bruce McCormick of TAMU, to edit the acclaimed 1987 report for the National Science Foundation entitled "Visualization in Scientific Computing." Another high point was SIGGRAPH'92, which Maxine chaired, a 35,000-person conference in Chicago that brought for the first time, under Tom's leadership, 45Mb/s networking to a SIGGRAPH conference. Also debuting at that conference was the CAVE™ virtual reality system, conceived by Tom and Dan. Trying to extend the idea of videoconferencing, then just in its infancy, to 3D (that is, CAVE-to-CAVE) communications, led Tom and Maxine to get involved with high-speed networking. At SC'95 in San Diego, Tom, assisted by Maxine, organized the I-WAY event, which showcased over 60 US collaborations (and 1 Canadian) that required advanced networking to do scientific computing. Based on the success of SC'95, Tom and Maxine submitted an unsolicited proposal to NSF to build STAR TAP, an international advanced networking exchange "hub" in Chicago for research



and education networks. Started in 1997, it continues its growth as StarLight, managed by close colleague Joe Mambretti at Northwestern University, and has become the largest such exchange in the world, and is a model for building such exchanges in many countries that form the Global Lambda Integrated Facility (GLIF).

For almost 20 years, Tom, Dan, Greg Dawe, and current EVL director Jason Leigh built and networked CAVEs and then started creating huge tiled LCD panels, building a 100-megapixel tiled display in 2004. Larry had since moved to University of California, San Diego (UCSD) in 2000 and became founding director of the California Institute for Telecommunications and Information Technology (Calit2). Together, Larry and others from UCSD, as well as Tom, Maxine and Jason at UIC, successfully got \$13.5M of NSF funding in 2002 for the 7-year OptiPuter project to build a global network-based computer. In 2004, Tom, as a UIC distinguished professor, achieved emeritus status and moved to Del Mar, California, to become a research scientist at Calit2, bringing Kathy, Ian, and Connor. Greg also moved to San Diego and works at Calit2, and Dan is a frequent visitor and consultant.

At Calit2, between 2005 and 2007, Tom and Greg built the Star-CAVE, a 34-projector CAVE, and an 80-megapixel version of Dan Sandin's Varrier Autostereo virtual reality display. Tom's latest projects include GreenLight (an NSF-funded instrument to measure power usage for GPU, FPGA, and conventional computing architectures), KAUST's advanced visualization research facilities, and CineGrid (providing means to transmit and archive digital motion pictures). Tom, Dan, Maxine, Greg, Larry, Jason, and Joe, along with new faculty, researchers and students at UIC and UCSD, work together every day, using and extending the transformative capabilities of cyberinfrastructure.



1971



Bruce Flinchbaugh

Texas Instruments Fellow – Retrospective 30 Years after Ohio State

Graduate school at Ohio State was a time of wonder for me. Such wonderful people, starting with faculty members Chandra (my advisor), Stu Zweben and Lee White, and many, many engaging fellow students and staff, especially my wife to be: Mary Fontana (CSE M.S. 1978) whom I met there.

After attending Chandra's courses on pattern recognition and artificial intelligence, my research interests dwelled on computer vision, which became the passion that has driven my career ever since. I remember sitting in my office on the fourth floor of Caldwell Lab and imagining a camera there to watch everything that happens in the field of view and automatically learn how the world works – 'simply' by observing. I haven't come close to solving that problem. But I learned that if I was to graduate I had to find a lesser problem that I could. Sometimes I wondered if I ever would.

The breakthrough that eventually led to my graduation was a conversation with Rick Parent, then recently graduated fellow doctoral student and now professor in the department. Rick asked if I had discussed with Chandra when I will graduate. I said no, but I thought one more year. He smiled and said, "Two more years." I wondered why he said that, but I turned up the gain. Rick was right.

After post-doctoral research in vision at MIT (1980) and more back at Ohio State (1981), I decided to try a career in R&D. Amid offers from Bell Labs and the Naval Research Laboratory, I found the opportunity at Texas Instruments to be most intriguing.

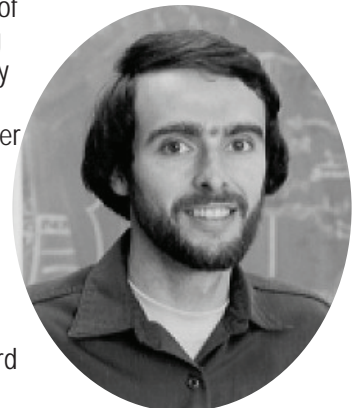
Twenty eight years later, I am still thriving in R&D at TI in Dallas. I love my job. My projects for TI products have tackled diverse imaging, video, vision and graphics applications of embedded processors. I became an R&D manager in 1988, rose through the TI technical ladder to be recognized as a TI Fellow in 2002, and now I am director of the TI Video & Image Processing Laboratory. I have hosted dozens of student interns and served as industry advisor for MIT and U. Illinois master's thesis research projects. And I recruited many Tlers who are much, much smarter than me. For example, among the members of my lab today I have the privilege of working with OSU CSE graduate

Vinay Sharma (Ph.D. 2007) who also has a passion for vision technology.

If there is a theme in my career it is "smart cameras", by which I mean cameras that are programmable with the incoming raw image data fully exposed to software for processing. When the Berlin Wall fell in 1989, I did a bit of guns-to-butter economics thinking and realigned my automatic target recognition research at TI from defense systems to focus industrial video surveillance needs. Throughout the 1990s I led TI vision technology development for video security applications – now known as video analytics. I was TI principal investigator for DARPA Image Understanding Research and the Video Surveillance & Monitoring program. By 1998 we had prototyped the first TI network camera with an embedded processor programmed to detect, track, recognize and map events in the field of view. Today, imaging, video and vision algorithms, software and architectures from projects in my lab are embedded in millions of digital cameras, video surveillance recorders and camera phones around the world. Great fun!

While I remain in wonder, amazed by all of the visual problems our brains solve when we see, I am also very impressed by progress in the computer vision research community. I look forward to watching next-gen engineers build even more useful vision systems.

Bruce Flinchbaugh (M.S. 1976, Ph.D. 1980) is a Texas Instruments Fellow and Director of the TI Video & Image Processing Laboratory. He holds over twenty patents for TI technologies and has published or presented in over 75 technical forums including journals, universities, conferences and trade shows. Bruce received the OSU College of Engineering Distinguished Alumnus Award in 2003 and has served on the CSE advisory board since 1995.



1980

El-Magarmid and Kalyanaraman Named IEEE Fellows



The CSE department is proud to announce that our alumni **Ahmed El-Magarmid**, PhD '85, and **Shivkumar Kalyanaraman**, PhD '97, have been named members of the 2010 IEEE Fellow Class.

Ahmed received this honor for his contributions to transaction management and data integration and quality. Ahmed is a Professor of Computer Science at Purdue University and also serves as Director of the Indiana Center for Database Systems and the Cyber Center in Discovery Park. He received a Presidential Young Investigator award from the National Science Foundation, and distinguished alumni awards from Ohio State University and the University of Dayton in 1993 and 1995, respectively. Ahmed's research interests focus ranges on a large spectrum of foundational and application-oriented database research. He has done work in video databases, data quality and confidentiality, data integration, web service, bioinformatics and multidatabase systems. Ahmed has written six books and more than 150 papers. He has several active grants from state and federal government agencies and industry.



Shivkumar Kalyanaraman received his recognition for contributions to traffic management in computer communication networks. Shiv is a Senior Manager of the Next Gen Systems & Smarter Planet Solutions Department at IBM India Research Labs, Bangalore. He was previously a Manager of the Next Generation Telecom Research group and a Research Staff Member since 2008. He was a full Professor at the Department of Electrical, Computer and Systems Engineering at Rensselaer Polytechnic Institute. He also holds an Executive M.B.A. (EMBA) degree from Rensselaer Polytechnic Institute. Shiv's current research in IBM is at the intersection of emerging wireless technologies and IBM middle-ware and systems technologies with applications to large-scale smarter planet problems (grids, traffic, finance etc). He was selected by MIT's Technology Review Magazine in 1999 as one of the top 100 young innovators for the new millennium. He served as the TPC Co-chair of IEEE INFOCOM 2008, and will be the General co-chair of ACM SIGCOMM 2010 in New Delhi.

IEEE established the grade of fellow in 1912 to recognize engineers who have demonstrated outstanding proficiency and have achieved distinction in their profession. The total fellows selected in any one year does not exceed one-tenth of one percent of the total IEEE membership.



David Ebert, PhD '91, returned to OSU to give an invited lecture to the CSE department. David's talk, *Visual Analytics: Powering Discovery, Decisions and Actions from Floods of Data* discussed the relatively new field of visual analytics and it's potential of visual analytics to dramatically transform scientific discovering, engineering development, medical research, business planning and management, public health, emergency response, and safety. David is a professor in the School of Electrical and Computer Engineering at Purdue University. He is a University Faculty Scholar, a Fellow of IEEE and the Director of the Purdue University Visualization and Analytics Center.



After 20 years with Cisco Systems, **Wayne Clark** BS '73, retired last year. Over his 20 years, he watched the company grow from 400 people to over 100,000. However, he did not stay retired for long. Once the local universities in the Research Triangle Park area of North Carolina discovered his retirement, they approached him with several compelling offers. He now serves as the Research Associate Director of the

Institute for Next Generation IT Systems within the North Carolina State University College of Engineering. He is chairman of the board of external advisors for NCSU's Centennial Campus Partnership office and is an Adjunct Faculty in the NCSU Department of Computer Science. Wayne also serves on the OSU CSE's external advisory board.



Matt Desch, CIS BS '80, of Dallas, Texas, received a 2009 Distinguished Alumni Award from the OSU College of Engineering. Matt is the Chairman and CEO of Iridium Satellite LLC. He is also a member of the CSE External Advisory Board.



Hosam Mahmoud PhD '83, is a Professor of Statistics at The George Washington University and served as chair of the department from 1998 to 2001. He is an elected Fellow of the International Statistical Institute. In addition to two previous books, in 2008, he wrote *Polya Urn Models*.



Scott Grissom, PhD '92, was named Professor of the Year by the Presidents Council, State Universities of Michigan. Scott is a professor in the School of Computing and Information Systems at Grand Valley State University.

Joe Gargiulo, CIS BS '94, of Circleville, Ohio, is director of information security at Safe Auto Insurance Co.

Franz Werling, CIS BS '75, is a data architect at Accenture in Livermore, California.

Jack Hou, CIS BS '95, is a senior engineer for Belden responsible for projects in the Asia Pacific region.

Ruoming Jin Receives NSF CAREER Award



Ruoming Jin, PhD '05, received a National Science Foundation CAREER award for his research entitled *Novel Data Mining Technologies for Complex Network Analysis*. The focus of this project is to develop novel data mining technologies to elucidate the structures and dynamics of complex but ubiquitous networks. A model complex network is a large system of elements that are joined by non-trivial relationships. Examples of such complex networks include the WWW, metabolic and protein

networks, social networks, and economic and financial markets. The underlying principles and laws of these network systems can help construct more effective communication mechanisms, find cures for fatal diseases, and deal with economic crises.

Ruoming is an Assistant Professor of Computer Science at Kent State University. His research focuses on mining complex networks and graph mining, graph databases, and biomedical informatics.

Hari Srihari Visits CSE

In March, **Sargur (Hari) Srihari** PhD '76, visited the CSE Department. Hari is a SUNY Distinguished Professor in the Department of Computer Science and Engineering at the University of Buffalo, where he teaches courses in pattern recognition, machine learning and data mining. With support from the United States Postal Service for over 20 years, he founded CEDAR, the Center of Excellence for Document Analysis and Recognition, in 1991, which had a major impact on the development of various aspects of the field. Research at CEDAR



From left, Srinivas Parthasarathy, Jim Davis, Hari Srihari, Chris Brew and Mikhail Belkin.

led to a new thread of work leading to the first large-scale handwritten address interpretation systems deployed by the IRS and by the USPS.



Lonnie Welch PhD '90, is the Stuckey Professor of Electrical Engineering and Computer Science and Director of the Bioinformatics Laboratory at Ohio University. He is the editor-in-chief and founder of the *International Journal of Computational Bioscience* and Director of the Ohio Bioinformatics Consortium, an Ohio Board of Regents funded state-wide collaboration which aims to strengthen collaboration, encourage Ohio students to participate in bioinformatics-supported STEM disciplines and help current students successfully prepare for careers in the Ohio STEM workforce.

Huang Made a Homecoming Trip

In November, CSE Alum **Chung-Ming Huang**, PhD '91, gave an invited departmental talk entitled "Multimedia Proxy Handoff for Wireless/Mobile Networks."

Chung-Ming is a Distinguished Professor in the computer science and information department at National Cheng Kun University in Taiwan. He also serves as the Director of the Promotion Center for the Telematics Consortium (PCTC) in the Ministry of Education (MOE), and the Principal Project Reviewer of Industrial Development Bureau and Department of Industrial Technology, Ministry of Economic Affairs (MOEA).

His research interests include wireless and mobile network protocol design and analysis, media processing and streaming, web technologies, and network applications and services.



From left back row: Leon Wang, Feng Qin, Hong-Chei Chen, PhD '88, Han-Wei Shen; From left front row: Ing-Miin Hsu, PhD '93, Chung-Ming Huang, PhD '91, Mike Liu, Steve Lai and Lin Chiu, PhD '87. Ing-Miin, Chung-Ming and Lin are all former students of Mike Liu, who retired this past spring after 40 years of service to CSE.

We Want to Hear From You!

Win a Pair of OSU Football Tickets!

Do you have an update to include in the next alumni newsletter? Do you have any suggestions for topics you would like to see covered? Do you have any photos from your college days or today that we can include? We want to hear from you! Email us your updates, photographs or suggestions to Carrie Stein at alumni@cse.ohio-state.edu or mail them in the attached envelope and we will enter your name in a drawing for a pair of football tickets to a home game for the 2010 season. Winners will be notified this summer and announced in our autumn newsletter.





Qin Awarded NSF CAREER Grant

The National Science Foundation has awarded CSE Assistant Professor **Feng Qin** a Faculty Early Career Development (CAREER) Award for his research entitled *Building Immunity to Memory Management Bugs during Production Runs*. Feng's five-year project will explore novel ways to mitigate memory management bugs, a major category of common software defects. Studies show that memory management bugs may account for 43% of the reported software failures. Feng aims to employ a systemic approach for providing immunity to memory bugs during production runs by performing online diagnosis once a memory bug or failure is detected, then generate and apply runtime immune patches to the running program for surviving and preventing memory bug occurrences or failures.

Before joining the department in 2006, Feng received his PhD in computer science from the University of Illinois at Urbana-Champaign. He received his master's degree from the Institute of Software, Chinese Academy of Sciences and his bachelor's degree from the University of Science and Technology in China, both in computer science. Feng's research focuses on software dependability, operating systems and security.

The Faculty Early Career Development (CAREER) Program offers the National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations. Such activities aim to build a firm foundation for a lifetime of leadership in integrating education and research.

The department has a long history of fostering strong young faculty. Feng is the department's 25th Career and National Young Investigator awardee from the National Science Foundation.

Parthasarathy Receives Google Research Award

Google Research has awarded Associate Professor **Srinivasan Parthasarathy** a Google Research Award to investigate hashing algorithms for semi-structured and structured data. The proposed methodology will rely on a transformation step which converts the (semi-)structured datum into a set of pivotal elements. Subsequently, a hashing step will be employed to realize fixed sized signature-sketch of the structured datum. This fixed sized signature sketch can then be used to place data elements according to a prescribed list of requirements. As part of the project they plan to examine the theoretical underpinnings of the above methodology coupled with practical applications for data placement on a distributed cluster of nodes or on next generation storage solutions such as SSDs.



Professor Parthasarathy directs the Data Mining Research Laboratory. His primary research interests are in data mining/machine learning, high performance computing and database systems. His lab seeks to develop efficient and novel algorithms for managing and analyzing complex data. He received the NSF CAREER award and Department of Energy Early Career awards in 2004, and his work has received six best paper awards or similar honors from leading conferences in the field including the VLBD Best Paper Award in 2005 and the ACM SIGKDD Best Applications Paper award in 2007.



Reading Individualization for Elementary Students

Assistant Professor **Eric Fosler-Lussier**, began a six month-long research project to utilize and research the current best practice to "level" reading materials for elementary school students in grades 1-5. The level of a book refers to the grade level it is suitable for. For example, Charlotte's Web is suitable for (the average) 3rd grader. Fosler-Lussier is analyzing traditional approaches to find readability of books like the Spache Readability Formula, the Dale-Chall Formula as well as a Coh-Metrix approach. Coh-Metrix can be used to investigate the cohesion of the explicit text and the coherence of the mental representation of the text. Then, he will investigate the feature descriptions of the text in books on the Fountas and Pinnell Leveled Book List for K-8 through a digitized database of the books. Fosler-Lussier hopes that by applying methods from Machine Learning and the use of learning and test sets of leveled books he can create an automated procedure to rank a book intended for 1st-5th grade school children. Fosler-Lussier's long range goal is to use the knowledge of an individual student's interests and hobbies, measures of the student's reading abilities and enhanced measures of the readability of books to select, change, and create reading material tailored to the individual student's reading abilities and interests.

Grants, Awards & Publications



Jim Davis served as the Co-General Chair of the IEEE Workshop on Motion and Video Computing in Snowbird, Utah in December. In addition, he was featured in "Video Surveillance: Who is Watching You, and Why?" The Why Files: Science Behind the News at <http://whyfiles.org/323cyberspies/>.



Eric Fosler-Lussier gave an invited IBM Research Seminar in Yorktown Heights, New York in October entitled *Integrating Evidence Over Time: A Look at Conditional Models for Speech and Audio Processing*.



Bruce Weide received an NSF grant entitled *Automated Support for Developing Logical Reasoning Skills in Discrete Mathematics Courses*. The Courses, Curriculum and Laboratory Improvement grant is in collaboration with Harvey Friedman from the Math Department and Dennis Pearl from Statistics.



DK Panda recently accepted an invitation to serve on the Editorial Board of IEEE Transactions on Computers. In addition, he received an NSF grant entitled *Dynamic Staging Architecture for Accelerating I/O Pipelines*.



Leon Wang gave a plenary talk at the 2009 International Conference on Neural Information Processing entitled *Speech Segregation as Binary Classification*. The conference was held in Bangkok, Thailand in December.

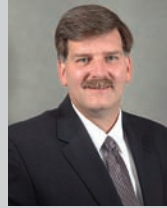


Tamal Dey currently serves as the Chair of the Executive Board for the Solid Modeling Association that oversees the Annual ACM Solid Modeling Conference. He also gave an invited talk at the mini-symposium on *Topologically Robust Computations in Geometric Modeling* in October during the SIAM-ACM Conference on Geometric and Physical Modeling in San Francisco.



Ness Shroff served as co-chair of the NSF Workshop on Future Wireless Communication Networks in November, he also served as PI of the funding grant for the workshop. In December, Ness gave the keynote address entitled *Analytical Foundations for Efficient, Robust and Scalable Design of Multi-hop Wireless Networks* at the 5th International Conference on Mobile, Ad-hoc and Sensor Networks in Wu Yi Mountain, China.

OSU Named Top 50 Undergraduate Game Design Program



Ohio State is one of the 50 best undergraduate institutions in the U.S. and Canada to study game design, according to The Princeton Review. The Princeton Review developed its *Top 50 Undergraduate Game Design Programs* list – the first project of its kind – in partnership with GamePro.

Of the roughly 500 programs at which students can study game design in the U.S. and Canada, The Princeton Review selected the top 50 programs. The comprehensive survey numbered more than 50 questions and covered areas from academics and faculty credentials to graduates' employment and career achievements. Criteria included the quality of the curriculum, faculty, facilities and infrastructure. The Princeton Review also looked at data on scholarships, financial aid and career opportunities.

According to Roger Crawfis, who teaches several of CSE's gaming courses, "we have always been known as a very strong computer graphics and animation department, with many successful students employed in Hollywood animation studios. Leveraging this with our recent success and focus on curriculum and research for computer games has paid big dividends."



Prasun Sinha served as Program Chair for ICST QShine 2009 in Las Palmas de Gran Canaria, Spain.



Nasko Rountev will serve as co-chair of the 9th ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE 2010) to be held in Toronto, Canada.



Xiaodong Zhang gave keynote presentations at two IEEE conferences: ICCCN in San Francisco in August and ICPADS in ShenZhen, China in December, 2009. He was also a keynote speaker at the Annual Conference of Computer Science Deans and Heads of China held in Hong Kong last November.



Kitty Reeves gave an invited talk at the Course Technology Conference 2010 in Tampa, Florida.

Students Create O-H-I-O App

CSE students have helped create a free iPhone application that will allow users to easily share their "O-H-I-O" photos.

The app was created by computer science students working with Ohio State's New Media unit to help promote the university's famous cheer. Computer science undergrads **Phil Evers**, **Phil Vallera** and **Matt O'Brien** took on the project late last year for their capstone class, Computer Science and Engineering 758, which puts computer science students on high-tech industry and university projects. The course was taught by senior lecturer **Tom Bihari**. After the class finished, Evers worked with Ohio State on a freelance basis to complete the project.



"This was a great opportunity to work on a real-world project while still in school," said Evers, who graduated in December and is seeking a software engineering position in the aerospace industry. "To be able to work with a client through the different phases of software development from requirements gathering and design to implementation and testing was very beneficial."

The "O-H-I-O!" app can be downloaded from Ohio State's O-H-I-O Web site, or from iTunes. The app allows users to easily share O-H-I-O photos taken with an iPhone camera or from the iPhoto library, automatically tag O-H-I-O photos with GPS location and more, view any of the 4,000+ O-H-I-O photos, quickly browse-able by category and see the earliest known O-H-I-O photo. Since the O-H-I-O site launched in 2007, students, alumni, fans, faculty and staff have contributed more than 4,500 photos from around the world.



From left, **Dr. Muthu Baskaran**, **Dr. Albert Hartono**, **Dr. Josh Levine**, Professor **Tamal Dey** and Professor **P. Sadayappan** smile after autumn commencement. Muthu and Albert both accepted positions as senior research engineers at Reservoir Labs in New York City and Josh is a post-doctoral researcher at the University of Utah Scientific Computing and Imaging Institute.

Undergraduate Focus

Jamie Colley, a third-year student pursuing a Bachelor of Science degree in Computer and Information Science, is on a completely different academic and professional track than she had imagined when she was younger. Because her mother majored in computer science when she was in college, Jamie wanted

to carve her own path and pursue something different. However, with the combination of her mother's encouragement of computer programming coursework and the unique teaching style of her high school teacher, she quickly learned that she truly belonged in the computer science field.

As a freshman, Jamie landed her first technology internship at *ms consultants*, a small architecture, engineering, and planning firm headquartered in Youngstown, Ohio. While there, Jamie served as a helpdesk troubleshooter and helped with the development of the company's intranet site, project management site, and e-request system. It was there that she realized her passion for developing applications that helped companies optimize their business logic and streamline their internal processes. After her sophomore year, she received an internship position at JPMorgan Chase & Co, where she single-handedly developed four capacity reporting tools for two major global regions. Her performance last summer has earned her a second summer internship with the financial institution, where she will serve as an application development analyst on another technology-based team.

While at Ohio State, Jamie has earned both the departmental ACM award for her role as the webmaster of the OSU ACM-W chapter and the departmental research award for her participation in the Europa research forum. As part of Europa, she is trying to create a partnership between Ohio State and GiveCamp, an organization that provides software services to worthy non-profit organizations that cannot afford their own IT staff. The awards Jamie has received have helped motivate her to forego early graduation in favor taking additional technical courses that will pique her interests and broaden her horizons in computer science. While she says her software engineering design courses and projects have been of the most value to her, she is also hoping to pursue graduate-level courses in artificial intelligence and databases.

After graduating in the spring of 2011, Jamie hopes to find employment where she can apply her knowledge of software engineering to create business solutions. Ultimately, she hopes to further her education in various computing languages and technologies so that she can eventually open her own non-profit agency that benefits those living in poverty here in Columbus.

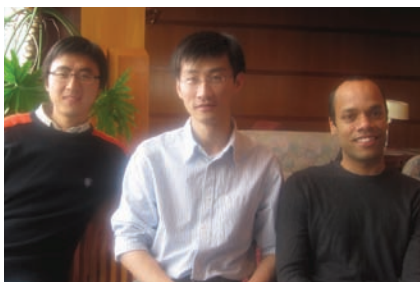
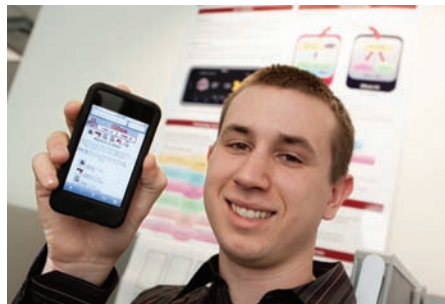
Student Notes

PhD candidate **Raffi Khatchadourian** has been selected by the National Science Foundation for an East Asia and Pacific Summer Institutes for U.S Graduate Students (EAPSI) award. The award will enable Raffi to travel to the University of Tokyo this summer for a ten week research collaboration with Professor Hidehiko Masuhara. Raffi 's project *Automated Refactoring of Legacy Java Frameworks to Annotation Types* will allow developers to utilize new language- centric annotation types that facilitate a more declarative, concise, and uniform way for metadata specification that makes using frameworks simpler and more intuitive. Raffi received his BS in Computer Science from Monmouth University in New Jersey. In 2008, he was a visiting graduate student in computing at Lancaster University in the United Kingdom. He received the OSU CSE Graduate Teaching Associate Award for 2010.



Qian Zhu was a finalist for a Best Student Paper Award at Supercomputing 2009 in Portland, Oregon. Her paper entitled *Supporting Fault-Tolerance for Time-Critical Events in Distributed Environments*. Qian is a PhD candidate in the Data-Intensive and High Performance Computing Lab. The paper was co-written with her advisor **Gagan Agrawal**.

Computer science and engineering student **Alex Stevens** is working with peers in his department and in the College of Art to develop an iPhone app called iShoe to give football fans a more enriching experience when they're watching games in Ohio Stadium. The project is part of an initiative launched by Rajiv Ramnath, Director of Ohio State's Collaborative for Enterprise Transformation and Innovation, who is leading an initiative to match students with businesses to develop various computer-related projects and products. Photocredit: Kevin Fitzsimons.



From left, **Guoqing (Harry) Xu**, **Feng Chen** and **Shirish Tatikonda**

Congratulations to **Guoqing (Harry) Xu**, **Feng Chen** and **Shirish Tatikonda** who each received the Departmental Graduate Student Research Award.

Harry is a PhD candidate under the supervision of Dr. Atanas Rountev. He is working in the area of compilers focusing on static and dynamic program analysis. He has published several papers in top conferences including FSE, ICSE and PLDI and received the Distinguished Paper Award in the International Conference on Software Engineering in 2008.

Feng is a PhD candidate under the supervision of Dr. Xiaodong Zhang. He is working in the area of computer systems focusing on flash memory storage. He is a co-author of "clock-pro," an influential algorithm which has been implemented, adopted and patched in several major operating systems and data processing systems, including Linux, NetBSD, OpenLDAP, and Apache Derby.

Shirish is a PhD candidate under the supervision of Dr. Srinivasan Parthasarathy. He is working in the area of datamining and databases. He has published several papers in top conferences such as ICDE, SIGIR and VLDB, presenting efficient algorithms to solve data processing problems in new hardware architecture, such as multi-core processors.

Congratulations to CSE Autumn and Winter Quarter Graduates!

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

Bachelor's CIS

Abdirahim Abdi
Ashley Amato
Michael Banaski
Bubakar Barrie
Stephen Edwards
Douglas Funk
John Gray
John Jackson
Spencer Kohan
Roman Lavochnik
Matthew Madaj
Daniel Martin
Evan Prince
Mateusz Rakowski
Seth Ruscak
Sewon Shin
Stephen Sizemore

Georgii Viznyuk
Christopher Yunker
Brittany Zwiebel

Master's

Tekin Bicer
Ralston Da Silva
Mahashweta Das
Youri Dimitrov
James Dinan
Santhosh Kalimuthu
Raffi Khatchadourian
Ketaki Koppal
Vijay Kumar
Ping Lai
John Loy
Wenjing Ma
Giridhar Murthy
Sudhir Patel

Bachelor's CSE

Anderson Bell
Christopher Birie
Joseph Blumenthal
Matthew Cherry
Patrick Collins
Philip Evers
Kevin Farst
Geoffrey Griffith
Muktar Guled
Charles Hellstrom
Maximilian Herkender
Kyle Hiltner
Shawn Holzworth
Brett Kizer
Terence Lee
Domenic Matestic
Daniel Miller
Suresh Murali
Guarev Rajan
Markus Rogosinsky
Matthew Saalfeld
Kevin Simmons
Adam Sternfeld
Phil Vallera

Yogesh Pendharkar
Preethi Raghavan
Manjunath Reddy
Neha Sahay
Darla Shockley
Ravishankar Subramanian
Akshay Suresh
Ying Tu
Varun Vijayvargiya
Timothy Weale
Kelly Yackovich
Erdem Yalcin

PhD's

Nawab Ali
Xiaole Bai
Mukundan Baskaran
Ai Chen
Qi Gao
Albert Hartono
Joshua Levine
Lifang Sang
Zhimin Yang



Tim Welsh

Director of Development

The Department of Computer Science and Engineering is pleased to welcome Tim Welsh as our new Director of Development. Tim is an alumnus of The Ohio State University College of Engineering and comes to this position after periodically teaching undergraduate and graduate seminars, running a small practice and consulting on business development.

Tim understands that our alumni are a vital part of our success. A strong connection with our alumni helps the department recruit the best students from all over the world, contribute to new developments in computing, and connect with leaders in the industry. Tim's primary focus will be to strengthen and maintain those relationships and continue to cultivate scholarships for our students.

"I have a deep passion for Ohio State, the future of our students, and the direction our leadership is heading in the college and the university" said Welsh. "As Director of Development I have the privilege to meet with people who share that passion and in turn support our students and strengthen our global community."

Tim will be traveling to see as many of our alumni as possible over the next several months. "Our goal is to build long term relationships with our alumni, friends, volunteers and industry leaders in support of the Department's mission, and objectives of our Chair, Xiaodong Zhang."

To contact Tim, call (614) 292-8893 or e-mail welsh.28@osu.edu.

You Can Help a CSE Student!

Since the first day of classes in 1874, Ohio State's core has been its students. They come from all backgrounds and are united by their thirst for knowledge, drive toward self-improvement, and desire to leave the world a little better than they found it.

These students are Buckeyes, and Ohio State has strived since its inception to stand with them.

Now, in the midst of these challenging economic times, the nation's largest university is rallying with renewed vigor behind its most important asset. Students are where Ohio State began, and students are the beloved cornerstone that keeps Ohio State moving ahead today and poised for eminence tomorrow.



From left, Kimberly Dinan, DVM '08, current PhD candidate James Dinan, Brutus and Joshua Levine, PhD '09



The Ohio State University

Introduced by President E. Gordon Gee in December 2008, Students First is a university-wide initiative designed to ensure continued access to education for Ohio State students. Since many families will meet financial hardships due to the current recessive economy, the university is committed to helping students enter Ohio State and stay enrolled once they arrive.

As part of the far-reaching commitment of the Students First initiative, a fundraising drive called Students First, Students Now has been implemented. Help Computer Science put Students First, Students Now - and donate today. For information about how to contribute, visit cse.ohio-state.edu/giving or call Tim Welsh at (614) 292-8893.

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 6 months. 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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Matthew '80 and Ann Desch
Robert Fisher '76
Susan Fitzsimons '71
Bruce Flinchbaugh '80 and Mary
Fontana '78
Richard Fox '92
Craig '75 and Marsha Friedli '79
Alan Goff '76
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Robert Horton '74
Richard Halverstadt '84
Naresh Iyer '01
Peter Hsu '77

Mattie Jacobson
Craig '86 and Marilyn Joseph
John '82 and Susan '81 Josephson
Ross Kayuha
Laurie Kirsch '76
William '70 and
Carolyn Kuehnle '71
Esther Leggett '45
Robert '72 and
Susan Leggett '76
William Lenzotti '85
I-En Liao '90
Matt Miller
Joe Mirka '86
James Murray '78
Todd Porter '05
Cecil C. Reames '76
Tracey Richardson '94
Neeraj Saraf '92
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Christian Thomas
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Bruce and Jane Weide
Raphael Wenger
Chris Woodruff '96
Seung Koo Yang '00
Tao-Heng Andy Yang '90
Xiaodong Zhang
Amar Zumkhawala '00
Stu Zweben

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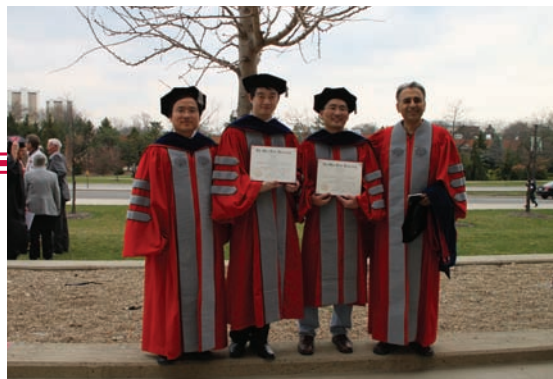
www.cse.ohio-state.edu/giving

or by mail with the attached envelope:

**OSU Department of Computer Science and Engineering,
395 Drees Labs., Columbus OH 43210**

For more information about various means of giving, contact:

Tim Welsh, Director of Development, at (614) 292-8893 or welsh.28@osu.edu.



From left, Professor Feng Qin, newly minted Dr. Qi Gao and Dr. Lifeng Sang and Professor Anish Arora.



DEPARTMENT OF
COMPUTER SCIENCE
AND ENGINEERING

THE OHIO STATE UNIVERSITY

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phone: 614-292-5813 fax: 614-292-2911

CSE Homecoming Lecture Series

The CSE Department would like to thank those OSU alumni who participated in our department's 2009 -2010 Homecoming Seminars.

•**Pavan Balaji**, PhD '06, Assistant Computer Scientist at Argonne National Laboratory and Research Fellow of the Computation, Institute at the University of Chicago.

Message Passing for a Million Processes

•**David Ebert**, PhD '91, Professor of Electrical and Computer Engineering, Purdue University

Visual Analytics: Powering Discovery, Decisions and Actions from Floods of Data

•**Chung-Ming Huang**, PhD '91, Distinguished Professor of Computer Science and Information Engineering; National Cheng Kung University of Taiwan

Multimedia Proxy Handoff for Wireless/Mobile Networks

•**Scott Pike**, PhD '04, Research Assistant Professor, Texas A&M University

Crash Fault Detection in Celebrating Environments

•**Nicoleta Roman**, PhD '05, Assistant Professor of Computer Science, Ohio State University Lima Campus

Binaural Sound Segregation in Multiscore and Reverberant Environments

We are currently developing our seminar series for 2010 – 2011. If you would be interested in giving a seminar to CSE students and faculty, please contact Xiaodong Zhang at zhang@cse.ohio-state.edu.



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