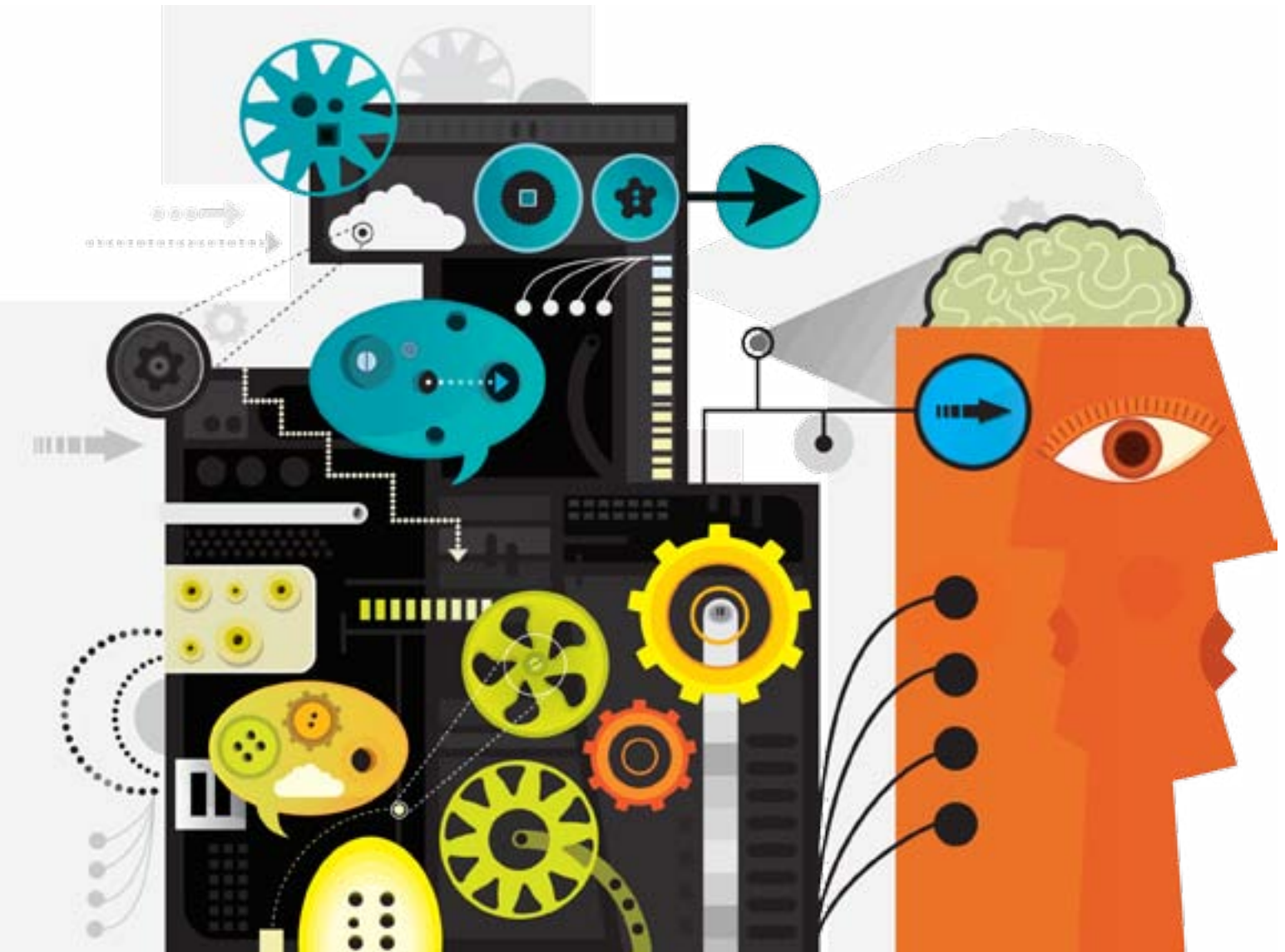




# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

**ANNUAL REPORT 2010 - 2011**



**ADVANCING TECHNOLOGY  
TO ADVANCE HUMAN SOCIETY**



# CONTENTS

➔	<b>MISSION STATEMENT</b>	<b>II</b>
➔	<b>CHAIR'S INTRODUCTION</b>	<b>III</b>
➔	<b>YEAR'S ACHIEVEMENTS IN REVIEW</b>	<b>1</b>
➔	ALUMNI, FACULTY & STUDENTS AWARDS	1
➔	ANNUAL DEPARTMENT AWARDS	9
➔	INDUSTRIAL ADVISORY BOARD	10
➔	<b>RESEARCH HIGHLIGHTS</b>	<b>11</b>
➔	<b>GRANTS</b>	<b>15</b>
➔	NEW AWARDS RECEIVED 2010 - 2011	15
➔	AWARDS PREVIOUSLY RECEIVED	17
➔	<b>10-11 PUBLICATIONS</b>	<b>23</b>
➔	ARTIFICIAL INTELLIGENCE	23
➔	GRAPHICS	24
➔	NETWORKING	25
➔	SOFTWARE ENGINEERING/PROGRAMMING LANGUAGES	27
➔	SYSTEMS	27
➔	<b>FACULTY SERVICE</b>	<b>31</b>
➔	<b>INVITED PRESENTATIONS</b>	<b>33</b>
➔	<b>STUDENTS</b>	<b>35</b>
➔	HISTORICAL VIEW	35
➔	GRADUATE PROGRAM	35
➔	DOCTORATES BESTOWED	36
➔	MASTERS DEGREES EARNED	38
➔	5TH ANNUAL GRADUATE STUDENT RESEARCH EXHIBIT	40
➔	UNDERGRADUATE PROGRAM	42
➔	BACHELOR DEGREES AWARDED	43
➔	<b>COURSE LISTING</b>	<b>47</b>
➔	<b>FACULTY</b>	<b>49</b>
➔	TENURED FACULTY	49
➔	CLINICAL FACULTY	56
➔	RESEARCH SCIENTIST	56
➔	POST-DOCTORATE RESEARCHERS	56
➔	NEW FACULTY MEMBERS ARRIVING AUTUMN 2011	57
➔	LECTURERS	58
➔	PART-TIME LECTURERS	58
➔	EMERITUS APPOINTMENTS	59
➔	ADJUNCT & COURTESY APPOINTMENTS	59
➔	ADMINISTRATIVE & COMPUTING STAFFS	59
➔	<b>MISCELLANEOUS PHOTOS OF THE YEAR</b>	<b>60</b>

# Mission Statement

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

Dear Colleagues, Alumni, Friends, and Parents,

Welcome to the 2010-2011 Department of Computer Science and Engineering annual report. You will read many stories of how CSE faculty, students and alumni have accomplished exceptional things and impacted the computer fields and Society as scholars, inventors, entrepreneurs, and academic and industrial leaders. A key solution to address the economic crisis of the country is to make strong efforts to maintain the world leadership of the U.S. in science and technology, in higher education, in medical research and practice, in entrepreneurships, and in the entertainment businesses. Information technology is the foundation of all these areas. Our faculty, students and alumni are working hard in various I.T. fields, all making positive impact on all areas of the society.

Here are several selected accomplishments presented in this annual report.

- *The CSE faculty and students set a record of receiving eight best paper awards in the past academic year in different computer science fields. (page 4)*
- *Our research expenditure continues to increase, which is 50% higher than that of 5 years ago. (page 15)*
- *We welcome four new assistant professors to join the department: Brian Kulis (machine learning), Arnab Nandi (databases), Kannan Srinivasan (networking), and Huamin Wang (graphics). (page 57)*
- *Several alumni have been recognized with various prestigious awards. (page 1)*
- *I would like to give my congratulations to Mikhail Belkin and Yusu Wang for their promotions to the rank of Associate Professor with tenure. (page 7)*

I hope you enjoy reading this report, and will communicate with you again with our new accomplishments and progress.

Sincerely yours,  
  
Xiaodong Zhang  
Department Chairperson  
Robert Critchfield Chair Professor



# YEAR'S ACHIEVEMENTS IN REVIEW

## ALUM SELECTED FOR BRILLIANCE

The natural consensus in CSE is that all department graduates are brilliant. Now *Popular Science* magazine has declared **Santosh Kumar** (Ph.D. '06) as one of its Brilliant 10, America's Young Geniuses. During a six-month process, *Popular Science* approaches hundreds of scientists, university department heads and journal editors asking for the names of those researchers who are working beyond the norm. They define brilliant as not just being smart. "Brilliance is marked by insight, creativity and tenacity. It's the confidence to eschew established wisdom in order to develop your own. It's the foolishness needed to set out for the edge of understanding and sail right past it."



Dr. Santosh Kumar is researching sensors with life improving abilities. Dr. Kumar does not want to do work that will only affect Society on the macro level but also the micro level. His AutoWitness program, working at a macro level, may give police a tool to capture thieves and reclaim property faster and more efficiently. Small sensors are attached to large, valuable items that emit a data pulse if they are removed from home. Police departments in Memphis and Jackson, Tennessee, are testing the units. At a more personal or micro degree, AutoSense is a system for humans to wear that monitors the activities and basic life signs. It notifies a doctor or therapist of significant changes in stress levels or, with addicts, the behavior is becoming self-destructive.

Dr. Kumar expressed his pleasure about *Popular Science*'s Brilliant 10 designation saying, "It is very kind of *Popular Science* to recognize the potential societal impact of our research on the AutoWitness and AutoSense systems. The mission is yet to be accomplished though. The real satisfaction will come when these projects are adopted widely and make a difference to real people for AutoWitness when it helps reduce burglary incidents in Memphis and elsewhere, and for AutoSense when it helps individuals reduce their daily stress level and help them abstain from addictive behavior."

As for the recognition, while I am named in the article, this selection recognizes the hard work of my students and postdocs and generous contributions of my esteemed collaborators that together has translated the vision of AutoWitness and AutoSense systems into reality that it is today."

Santosh Kumar is an Assistant Professor of Computer Science at the University of Memphis, where he received an Early Career Research Award from the College of Arts and Sciences in 2008. He received his Ph.D. in Computer Science and Engineering from the Ohio State University in 2006, where his dissertation work won the SBC Presidential Fellowship award. His adviser was Dr. Ten-Hwang Lai.

## ALUM NAMED IN 100 MOST CREATIVE LIST



For several years *Fast Company* magazine has named the 100 Most Creative People in Business. In 2011, **Sitaram Asur** (Ph.D., '09) made the list at #26. Past luminaries receiving this recognition include Ray Kurzweil, James Cameron, Oprah Winfrey, Jay-Z and many others.

*Fast Company* recognized Dr. Asur for the work he is currently doing with social media at HP Labs. He is deriving value information from streams on Twitter and Facebook; i.e., what movies will be box-office successes on any given weekend. It comes from an algorithm he developed with Bernardo Huberman. He enjoys

working with the new social media. He told the magazine, "I don't just sit in a lab closed away from the world. I like to be aware of what's happening around me."

As for winning the list placement, Sitaram says, "It feels absolutely wonderful. It is a great honor to be on this list with distinguished people from all over the world, many of whom I am a fan of."

Currently a researcher in the Social Computing Lab at HP Labs, he started there as a Postdoc as part of the



2009 NSF Computation Innovations Fellowship. At Ohio State, he was part of the Data Mining Research Lab, advised by Dr. Srinivasan Parthasarathy.

**ALUM ANSWERS PRESIDENT’S CALL**

The White House appointed **Matt Desch** (BS in CSE, ‘80) to the President’s National Security Telecommunications Advisory Committee (NSTAC).

Mr. Desch is the CEO of Iridium Communications Inc., an international satellite communications company offering voice and data communications coverage. This position is the most recent in a career that has always been in ascendancy. Before joining Iridium, Desch served as CEO of Telcordia Technologies, Inc., a supplier of software and services for the telecommunications industry. From 1987 to 2000, Desch worked for Nortel Networks, where among other roles he served as president of global service providers and was in charge of Nortel’s business in Europe and Asia.



This career began in Columbus doing software development with AT&T Bell Laboratories, which became Lucent Technologies, now Alcatel-Lucent. In addition to his B.S. in Computer Science from The Ohio State University, he earned an M.B.A. from the University of Chicago.

Matt is excited about his new role commenting, “The NSTAC committee was created by Ronald Reagan in response to the threat of nuclear war on the nation’s telecom infrastructure. It’s served four Presidents since then, and while nuclear war might be possible, the threats to our infrastructure are even more diverse today - including cyber attacks, natural disasters, and terrorism. I’m pleased to be working with this committee at this time - it’s also great recognition of the growing stature of Iridium and the importance of satellite communications as part of the overall telecommunications picture.”

2

**TWO CSE ALUMNI RECEIVED NSF CAREER AWARDS**

CSE graduates **Susan Hohenberger**, BS, '00, and **Hongwei Zhang**, Ph.D., '06 have received Career Awards from the National Science Foundation. The NSF CAREER grant is a highly competitive and prestigious program awarding assistant professors in U.S. universities based on their high-quality research and novel education initiatives.



Susan Hohenberger is an assistant professor of Computer Science at Johns Hopkins University. Her Career award for “Practical Cryptography for the Cloud” will support the development of cryptographic schemes for the cloud environment, including methods to protect the privacy and integrity of data for the growing number of consumers who utilize cloud services. Dr. Hohenberger received her Ph.D. and Masters degrees from Massachusetts Institute of Technology (MIT). As a undergraduate in CSE, Susan worked with Dr. Bruce Weide.



Wayne State University serves as Hongwei Zhang’s academic home where he is an assistant professor in the Department of Computer Science. His award for “Taming Uncertainties in Reliable, Real-Time Messaging for Wireless Networked Sensing and Contro” will support his two research projects: (1) to address the challenges of large interference range as well as anisotropic, and asymmetric wireless communication, and (2) to develop a lightweight approach to computing probabilistic path delays followed by a multi-timescale adaptation framework for real-time messaging. As

a Ph.D. student, Dr. Zhang was mentored by Professor Anish Arora. Hongwei received his Masters and undergraduate B.S. degrees from Chongqing University, China.

**TWO CSE ALUMS ELECTED TO IEEE FELLOWS**

**Guohong Cao**, Ph.D. '99 and **Tamer Ozs**u Ph.D. '83 join the elite group of CSE faculty and alums

who have achieved the rank of IEEE Fellow. The grade of Fellow recognizes unusual distinction in the profession and is conferred by the Board of Directors upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest.

Guohong Cao, a professor of Computer Science and Engineering at the Pennsylvania State University, became IEEE Fellow for his contributions to algorithm and protocol design for mobile ad hoc and sensor networks. Guohong received his Ph.D. in Computer and Information Science (CSE’s former name) in 1999 from the Ohio State University. He is has been on faculty at Penn State since then.



Tamer Ozs, a professor of Computer Science and University Research Chair at the University of Waterloo, became IEEE Fellow for his contributions to distributed data management and multimedia database systems. Tamer received his Ph.D. in Computer Science and Engineering (called Computer Information Sciences then) in 1983 from the Ohio State University. Tamer was the Director of the Cheriton School of Computer Science from January 2007 to June 2010. He is also a Fellow of ACM. He is the recipient of 2006 ACM SIGMOD Contributions Award, and the 2008 Distinguished Engineering Alumnus Award from the Ohio State University.

**CHAIR NAMED DISTINGUISHED ALUMNUS**



**Dr. Xiaodong Zhang**, Computer Science and Engineering Chair and holder of the Robert M. Critchfield Professorship in Engineering, has been named as an 2011 Distinguished Engineering Alumni from the University of Colorado, Boulder. Zhang, who attained his Ph.D. from Colorado in 1989, achieved the Distinguished status for his work in the categories of Research and Invention and Education.

Xiaodong Zhang comments on this award with gratitude, “University of Colorado at Boulder was my starting point of an American dream, where I had many beautiful memories besides receiving an excellent graduate education. In my first two years of study at Boulder, I commuted from an off-campus apartment 4 miles away to school

every day by bicycle. I had an enjoyable experience during spring, summer and autumn times in the foot of the Rocky Mountains, but there were some challenges during the snow storms in winters. I still vividly remember several unknown and goodwill Boulder citizens stopped their cars on the road and gave me and my bicycle rides back home, which has always inspired me to help others in their critical times.”

A multi-facet researcher, Dr. Zhang’s work crosses over two of CSE’s core areas, Systems and Networking. He is best known for his work in memory systems, which is both fundamental to system design and applicable to production implementation, directly impacting and contributing to the advancement of computer systems. He has co-authored several influential algorithms and their system implementations that have been widely adopted in main stream operating and database systems, and commercial processors. His recent work on designs and implementations of scalable distributed systems for big data analytics have been adopted by production systems in Facebook and Yahoo!

**OVERSEAS AWARD FOR CHAIR**

**Dr. Zhang** also received the Overseas Contribution Award from the China Computer Federation in the 2010 China National Computer Congress. This annual award is given to a computer scientist outside China, who has made a significant impact on the computing field and outstanding contributions to computing research and education in China. Xiaodong has been a visiting chaired professor in Tsinghua University, and served on the advisory board at the Institute of Computing Technology in the Chinese Academy of Sciences.

3



**FACULTY MEMBER SELECTED FOR EDUCATION SYMPOSIUM**

**Dr. Paul Sivilotti** was invited to participate in the 2010 Frontiers of Education Symposium. This symposium, only the second to be held, is offered by the National Academy of Engineering and is designed to provide young educators with “opportunities to share ideas, learn from research and best practices in education and return with a charter to bring about improvement in their home institution.”

Dr. Sivilotti presented a collection of learning activities designed around kinesthetic learning. As he explains, “At Ohio State, we’ve developed a series of kinesthetic learning activities to reinforce assertional thinking about distributed algorithms. These activities have been effective in graduate courses, undergraduate courses, and even in outreach events with middle school students. The activities have been designed over the course of many years, in collaboration with past graduate students including Scott Pike, Hillary Pike, Nigamanth Sridhar, Murat Demirbas, and Matt Lang. ... The NAE Frontiers symposium was a unique opportunity to share these innovations with the larger engineering education community. In speaking with various thought-leaders in engineering education, I learned how this kinesthetic style might be applied in engineering disciplines outside of computer science.”

**Two IBM Faculty Awards Received**

**Dr. Hakan Ferhatosmanoglu** and **Dr. Srinivasan Parthasarathy** received the 2010 IBM Faculty Awards. To be eligible for this award, an IBM staff member must nominate the faculty member. Generally, IBM Faculty Awards are intended to recognize outstanding achievement and encourage exploratory projects of interest to IBM. Equally important, because it is a highly competitive worldwide program, IBM means for them to:

- “Foster collaboration between researchers at leading universities worldwide and those in IBM research, development and services organizations; and
- Promote courseware and curriculum innovation to stimulate growth in disciplines and geographies that are strategic to IBM.”

Associate Professor Hakan Ferhatosmanoglu received the award in recognition of his recent work in data management systems. His work is primarily done through the Database Research Group. Studying mostly studies in environmental and biomedical sciences, the lab investigates a broad spectrum of database and data mining methods looking to achieve ease of multi-dimensional data exploration online.

IBM selected Professor Srinivasan Parthasarathy as reward for his work in high performance data mining. Within the area of data mining, the Data Mining Research Laboratory investigates; Structure Mining, the development of novel algorithms for frequent pattern mining particularly in the context of mining structured data (e.g. graphs, 3D structures, and XML data); Anomaly Detection, the design and development of novel anomaly detection algorithms; and Data Preprocessing, the development of novel data preprocessing strategies that address issues such as how to effectively use sampling in the context of data mining, how to handle missing data, and how to discretize continuous attributes in an effective manner.

**OCTET OF BEST PAPERS AT TOP CONFERENCES**

*2010 IEEE Signal Processing Society*

Drs. **Eric Fosler-Lussier** (left in pic) and **Jeremy Morris** (right) have been honored with a 2010 IEEE Signal Processing Society Best Paper Award for their 2008 paper, “Conditional Random Fields for Integrating Local Discriminative Classifiers,” published in the IEEE Transactions on Audio, Speech, and Language Processing. In this work, Morris and Fosler-Lussier explore the novel



use of the Conditional Random Field (CRF) paradigm in an Automatic Speech Recognition (ASR) system. CRFs are a statistical framework that allows for combination of correlated sources of evidence in a time sequence; the article examines how this framework can be used to incorporate short-term estimates of speech sounds in determining what was said in a speech utterance. These estimates can express probabilities over sound classes (e.g., is this snippet of sound a “t” or “ah”?) or phonological classes (e.g., is this snippet a vowel? a nasal consonant?). They compare phonetic recognition using CRFs to a standard Hidden Markov Model (HMM) ASR system, and show comparable or better performance in their system while minimizing the number of free parameters in the system.

Jeremy Morris is a Senior Lecturer in the Department of Computer Science and Engineering at the Ohio State University. He received his Ph.D. from the department in June 2010; his thesis examined several aspects of Conditional Random Fields for ASR systems. He also received the B.S. degree from Bowling Green State University in 1996.

Eric Fosler-Lussier is an Associate Professor of Computer Science and Engineering, with a courtesy appointment in Linguistics, at The Ohio State University. After receiving a B.A.S. (Computer and Cognitive Science) and B.A. (Linguistics) from the University of Pennsylvania in 1993, he received his Ph.D. in 1999 from the University of California, Berkeley, performing his dissertation research at the International Computer Science Institute under the tutelage of Prof. Nelson Morgan. He has also been a Member of Technical Staff at Bell Labs, Lucent Technologies, and a Visiting Researcher at Columbia University. In 2006, Prof. Fosler-Lussier was awarded an NSF CAREER award, and in 2010 was presented with a Lumley Research Award by the Ohio State College of Engineering. He has published over 90 papers in speech and language processing, is a member of the Association for Computational Linguistics, the International Speech Communication Association, and a senior member of the IEEE.

*17th International Symposium on Formal Method*

Ph.D. Student **Derek Bronish** was one of several authors on the paper, “The 1st Verified Software Competition: Experience Report” which earned the Best Paper nod at the 17th International Symposium on Formal Methods in Limerick, Ireland, June 20-24, 2011. This is the fifth best paper to be earned by CSE faculty and students in the 2010-2011 academic year.

This paper was a large group effort; 23 authors, including many distinguished scientists from both sides of the Atlantic. It summarized the experiences of a number of teams in solving a set of challenge problems for software verification at the 1st Verified Software Competition, held in August 2010 in Edinburgh at the 3rd International Conference on Verified Software: Theories, Tools and Experiments (VSTTE).

This was an exceptional opportunity for a graduate student and Derek was appreciative. “I’m honored to have had the opportunity to co-author a paper with so many distinguished researchers, I’m proud of our work on software verification exemplified in this paper, and I’m thankful to my advisor Dr. Weide and all of my colleagues in RSRG for the innumerable ways they’ve guided me as a graduate student.”

*6th International Symposium on Visual Computing*

**Karthik Sankaranarayanan** ( CSE Ph.D. Candidate) and **Jim Davis** (Associate Professor) received a Best Paper Award at the 6th International Symposium on Visual Computing (ISVC) 2010, for their paper, “Attention-based Target Localization using Multiple Instance Learning.” It explores the use of Multiple Instance Learning (MIL) to perform target localization from image sequences. The basis of this approach uses a softmax logistic regression MIL algorithm that automatically learns the model of a target that persists across input frames. This approach can allow commercial grade surveillance cameras to automatically localize targets in various scenes. The award was sponsored by Mitsubishi Electric Research Labs (MERL).



*Visual Computing pair: Jim Davis (left) and Karthik Sankaranarayanan.*



31st International Conference on Distributed Computing Systems

The Best Paper Award at the 31st International Conference on Distributed Computing Systems (ICDCS 11) went to **Rubao Lee** (postdoctoral fellow, CSE at Ohio State), **Tian Luo** (CSE Ph.D. student), **Yin Hua** (CSE Ph.D. student at Ohio State), **Xiaodong Zhang** (OSU-CSE Chairman), Fusheng Wang (research scientist at Emory University), and Yongqiang He (software engineer at Facebook) to their paper entitled “YSmart: Yet another SQL-to-MapReduce Translator.”

MapReduce has become a standard software framework for big data analytics in distributed systems, where system execution of SQL queries is a critical data processing task. An SQL-to-MapReduce translator automatically converts database queries to MapReduce jobs for their execution in distributed systems. Complex SQL query jobs generated by existing translators, such as the one in data warehouse Hive developed in Facebook, and in MapReduce programming environment of Pig developed by Yahoo!, are executed at unacceptable slow speed. The authors of the paper demonstrate that the poor performance of these translators is caused by the framework of one-operation-to-one-job mapping, which does not consider correlations of input data and input keys among the queries. The authors design and implement a correlation-aware SQL-to-MapReduce translator, called YSmart. The translator achieves superior performance compared with the existing translators in Hive and Pig. The translator has been patched in Hive for an adoption, and an independent version of YSmart will be released for public usage.

20th International ACM Symposium on High-Performance Parallel and Distributed Computing

A team of researchers under the mentorship of **Dr. Gagan Agrawal** received the best paper award at the 20th International ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC ’11). This award is for the paper titled: “Supporting GPU Sharing in Cloud Environments with a Transparent Runtime Consolidation Framework”, authored by **Vignesh Ravi**, Michela Becchi, **Gagan Agrawal**, and Srimat Chakradhar. Vignesh Ravi is a CSE graduate student (working under Agrawal), whereas Michela Becchi and Srimat Chakradhar are from University of Missouri and NEC research, respectively.

This paper represents more of the ongoing innovations related to GPU computing from Agrawal’s group. GPUs or Graphics Processing Units were originally designed for games and other graphics applications, but in the last 3-4 years, have been identified to be suitable for general purpose computations, essentially providing “supercomputing” at a very cheap price. This specific work from Agrawal’s group takes GPUs even a step further, as each GPU is now shown capable of scaling multiple general purpose computations at the same time. A software framework and mechanisms have been developed, which allow programs from independent users to transparently share a single GPU. The net result is significant advantage in cost-effectiveness and throughput of the device.

25th ACM International Conference on Supercomputing

The 25th ACM International Conference on Supercomputing (ICS 2011) presented the Best Paper Award to Feng Chen (Ph.D.’10, Intel Labs), David A. Koufaty (Intel Labs), and **Xiaodong Zhang** (OSU-CSE Chairman) for their paper entitled: “Hystor: Making the Best Use of the Solid State Drives in High Performance Storage System.”

In this paper, the authors present a unique and effective storage-based solution to maximize the SSD performance in a scalable and large storage system at low cost. Most existing solutions including commercial systems treat SSDs as buffer caches, which is easy to implement, but often not very cost- and space efficient in practice. The Hystor system presented in the paper has been implemented and tested as a prototype for a next generation storage solution at Intel Labs.

IEEE International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems

**Dr. Christopher Stewart** won the Best Paper Award at the IEEE International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2010). The paper entitled EntomoModel: Understanding and Avoiding Performance Anomaly Manifestations presents a rigorous study of real performance bugs taken from MYSQL, JBoss, and other popular software, finding interesting patterns. Prof. Stewart collaborated with colleagues Kai Shen (University of Rochester), Arun Iyengar (IBM T.J. Watson), and Jian Yin (Pacific Northwest National Laboratory). The acceptance rate for extended papers at MASCOTS 2010 was 16%.

Chris Stewart joined CSE in October 2009 as a member of the Systems area. His research interests cover systems support for sustainable datacenters, i.e., datacenters that can operate profitably and have a zero-carbon footprint, empirical studies about the performance, performance dependability, and energy consumption of emerging networked applications, and scalable, self-sustaining programs that encourage members of underrepresented groups (broadly construed) to consider research careers. Stewart received his PhD from the University of Rochester in 2008 where his adviser was Kai Shen. He earned his undergraduate degrees at Morehouse College in Atlanta, GA.

17th International IEEE Conference on High Performance Computing

Students **Xin Huo**, **Vignesh Ravi**, and **Wenjing Ma** with their advisor, **Gagan Agrawal**, garnered a best paper award at the 17th International IEEE Conference on High Performance Computing (HiPC 2010). The paper, “Approaches for Parallelizing Reductions on Modern GPUs,” is part of ongoing work in Agrawal’s group on understanding systematic mechanisms for porting applications with specific types of communication patterns on modern general-purpose computing on graphics processing units (GPUs). This particular work considers reduction computations arising from the data mining domain, and develops and evaluates several methods for parallelizing them on modern GPUs. Another piece of work from the same authors, which has focused on irregular reductions, was a finalist for the best paper award at International Conference on Supercomputing (ICS), May 2011.

A second year Ph.D. student, Xin Huo received a bachelor and a masters degree from Beijing Institute of Technology. His research interest is in High Performance Computing. Currently he is focusing on GPGPU.

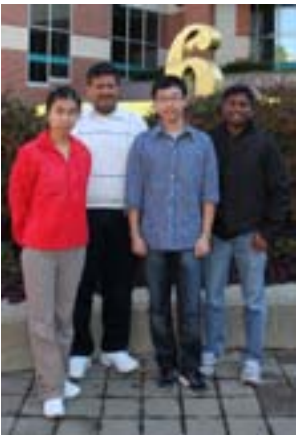
Vignesh Ravi, 4th year Ph.D. candidate, received his Bachelors degree in Computer Science from P.S.G College of Technology, Coimbatore, India. His research interests include Runtime Systems for Heterogeneous Clusters and GPU Virtualization in the cloud.

A 6th year candidate, Wenjing Ma focuses her research on GPGPU, high performance computing, parallel computing and compiling. She earned her Bachelor’s Degree in Computer Science and Technology from Nankai University, Tianjin, China.

Professor Gagan Agrawal leads the Data-intensive and High-performance Computing Lab. His recent research ventures have been into the areas of data mining algorithms, parallel data mining and OLAP algorithms, compiling scientific data intensive computations, compilation and application development for multithreaded architectures, and program analysis for object-oriented software. Dr. Agrawal received his Masters and Ph.D. degrees University of Maryland, College Park (1994 and 1996) and his undergraduate B.Tech. from the Indian Institute of Technology, Kanpur, India in 1991.

Two New Associate Professors in October 2011

Effective October 2011, **Mikhail “Misha” Belkin** and **Yusu Wang** will become Associate Professors. Dr. Belkin is a member of the Artificial Intelligence group specializing in designing and analyzing practical



Award winning team (l-r): Wenjing Ma, Gagan Agrawal, Xin Huo, and Vignesh Ravi.

algorithms for machine learning based on non-linear structure of high dimensional data, in particular manifold and spectral methods.

The Graphics Area is where Yusu Wang finds her home. Her research focuses on computational geometry and topology, shape analysis, geometric computing, and computational biology.

### **Khoury Wins TechTomorrow Scholarship**

TechColumbus chose **Marc Khoury**, CSE junior, to receive their TechTomorrow scholarship.

Marc Khoury, originally from Strongsville, Ohio, is a very active undergraduate. He exceeds in the classroom. His research is in computational geometry, particularly in Isosurfaces. Extra-curricularly, he works as a math tutor and has served on two committees: last year he was the student representative on CSE's semester task force, which designed the semester curriculum for the semester switch; and this year, undergraduate representative on the engineering undergraduate honors committee, which deals with the honors program and undergraduate research. He is also a member of the Association of Computing Machinery (ACM) programming contest team.



Marc Khoury (right) being congratulated for his Undergraduate Research Award by his research adviser, Dr. Rafe Wenger.

He began researching Isosurfaces with Rafe Wenger when he was a new freshman. This investigation delves into the representation of the boundaries of objects in three dimensional volumetric data sets such as the data sets produced by MRI or CT scanners. Marc co-authored a paper, "On the Fractal Dimension of Isosurfaces" with Dr. Wenger, which has just been presented at the 2010 IEEE Visualization Conference. The paper analyzes the complexity of isosurfaces and its relationship to noise in the data. The IEEE Visualization Conference is the leading conference in computer visualization and accepted only 25% of the 185 papers submitted.



Guests of the 2011 Awards Banquet: Benjamin Gilbert; Clint Foulk; Michael Compton; Christopher Mayer; Al Stutz; Jiedan Zhu; YanZhang He.



Awards were presented. Above, Lorraine Cherry of Raytheon presents a certificate of achievement to Andrew Thayer.

## **ANNUAL DEPARTMENT AWARDS**

For the past 15 years, CSE has celebrated the achievements of its members with an annual banquet. This year was no exception. More than 160 people attended to applaud the recipients who earned over \$17,000 in scholarships, as well as the staff and faculty recognitions.

### **SCHOLARSHIPS**

*Central Ohio Chapter of Association of Computing Machinery {ACM}*  
Ben Gilbert

*Crowe Horwath Inc.*  
Christopher Dean

*Ernest William Leggett, Jr. Scholarship*  
*The Leggett Family Award*  
Andrew Balderas  
Chirantan Ekbote  
Justin Harrison

*Matt J. Desch & Ann M. Murphy Award*  
Zachary Boerger  
Jacqueline Telljohann

*The O'Connell Family Award*  
Stephen Glancy  
Christopher Mayer  
Adam Zink

*Raytheon Corporation*  
Natalie O'Connel  
Andrew Thayer

*Department Founders Scholarship*  
Marc Khoury

*CSE Undergraduate Scholarships*  
Alexander Bunch  
Dillon Courts  
Michael Diekema  
Dorian Rahamim  
Daniel Saunders

### **FACULTY & STAFF AWARDS**

*The Department of Computer Science & Engineering Undergraduate Research Award*  
Marc Khoury

*Eleanor Quinlan Memorial Awards*  
Annatala Wolf

*B. Chandrasekaran & Sandra Mamrak Graduate Fellowship*  
Venu Sataluri

*Mike Liu Graduate Fellowship Award*  
Teng-Yok Lee

*Outstanding Service Award*  
Catrena Collins  
Bruce Weide

*Outstanding Teaching Award*  
J. Eric Fosler-Lussier  
Paul Sivilotti



Chair Xiaodong Zhang shares smiles with Vice Chair Bruce Weide who received an Outstanding Service Award.



# INDUSTRIAL ADVISORY BOARD

The CSE Industrial Advisory Board met at OSU on May 27th, 2011. Chairperson Xiaodong Zhang welcomed new member to the board, Ray Harishankar MS '90, IBM Fellow, Vice President of Technology and Innovation, Global Solutions and Asset Management, and Robert A. Eades, PhD, Lead for High Performance Computing, IBM Americas East Sector Program Manger, Blue Waters – Sustained Petascale Computing.

This year's meeting focused on the state of the department, improving undergraduate education and increasing university-industry collaboration. In addition, the group met with a group of current undergraduate and graduate students to answer questions and give career and research related advice.

Professor Zhang charged the group to develop relationships with donors for increased research funding and expansion as well as scholarship funds and student internship and job opportunities. In addition, they will communicate with the department regarding changes and new trends within the computing field and suggest adjustments in strategic planning to meet these shifts. The department thanks the board members for their diligent service and looks forward to fruitful collaboration in the future.

Members include:

**James Cates** (MS '71, OSU-CSE), President, LOBI Group, LLC; **Wayne Clark** (BS '75, OSU-CSE), Associate Research Director, Institute for Next Generation IT Systems (ITng); **David Cohen** (PhD '77, OSU-CSE), co-founder and president of sente.com, Inc.; **Matt Desch** (BS '80, OSU-CSE), is Chairman and CEO of Iridium Satellite LLC; **Robert Eades** (a parent representative of CSE students), Lead for High Performance Computing, IBM Americas East Sector Program Manger, Blue Waters – Sustained Petascale Computing; **Bruce Flinchbaugh** (PhD '80, OSU-CSE), TI Fellow and manager of Video & Image Processing R&D in the DSP R&D Center of Texas Instruments; **Ray Harishankar** (MS '90, OSU-CSE), IEEE, Fellow, Vice President of Technology and Innovation, Global Solutions and Asset Management; **Julie Hartigan** (MS '89, PhD '94, OSU-CSE) Chief Technology Officer of Federal Programs, Expert Systems; **Shivnandan (Shiv) Kaushik** (MS '91, PhD '95, OSU-CSE), Director of the Systems Software and a member of the Solutions Group, Intel; **Jai Menon** (MS, '78; PhD. '81, OSU-CSE) IEEE Fellow, Vice-President for Technical Strategy, IBM; **Doug Roble** (MS '87, PhD '93, OSU-CSE), Creative Director of Software, Digital Domain; and **Feng Zhao** (former CSE faculty member 1992-2000), Principal Researcher, Microsoft Research.



*In attendance at this years meeting, from left, Mike Fortin, Wayne Clark, Bruce Flinchbaugh, Julie Hartigan, Jai Menon, David Cohen, Ray Harishankar, Rob Eades and Xiaodong Zhang.*

# RESEARCH HIGHLIGHTS

## GENERAL PURPOSING GRAPHICAL PROCESSING UNITS

The main focus of **Gagan Agrawal**'s research has been improving programmer productivity and application throughput on parallel and distributed computing environments. Throughout his career, he has considered a number of different platforms, like the earlier distributed memory supercomputers (IBM SP-2 or Intel Paragon), clusters, grid and cloud environments, and multi-core machines.

Much of the recent work from Agrawal's group has targeted the use of Graphical Processing Units (GPUs) for general purpose applications. Though GPUs, as the name suggests, were designed for accelerating graphics operations, recent trends have made them attractive for general purpose applications as well. This is because of their very favorable price to performance ratio. Yet another factor is the power to performance ratio of these devices, this has lately become a crucial factor in building more and more powerful supercomputers.

Agrawal's work on GPUs continues to be aligned with the overall focus he has maintained throughout his career, which is improving programmer productivity and application throughput. In terms of the former, his research group has taken a 'communication pattern' driven approach, i.e. showing how one can automate the generation of efficient code by considering different application patterns. So far, their work has considered three different patterns, which are the generalized reductions, irregular computations, and stencil computations.

Generalized reductions arise in a variety of scientific and data-intensive applications. Prior to the availability of support for locking on GPUs, these applications could only be parallelized using full replication, i.e., by creating a copy of the reduction object for each thread. Agrawal's group introduced a novel hybrid scheme for parallelization of these applications. In this scheme, a group of threads use atomic operations to update one copy of the reduction object. Thus, this scheme chooses the tradeoff between the overheads of locking and replications. Using several applications, it has been demonstrated that the hybrid approach introduced clearly outperforms other approaches in several cases. A paper based on this work was recognized as the best paper at HiPC 2010.

A follow-up study considered irregular applications arising from unstructured grids.

There are at least two significant challenges associated with porting this class of applications on modern GPUs. The first is related to correct and efficient parallelization while using a large number of threads.

The second challenge is effective use of shared memory on GPUs. Since data accesses cannot be determined statically, runtime partitioning methods are needed for effectively using the shared memory. Agrawal's group has proposed a novel execution methodology that can address the above two challenges. They have also developed optimized runtime modules to support this execution methodology. A paper based on this work was one of three finalists for the best paper award at ICS 2011.

Recent work on improving reliability of GPU programs has been in collaboration with Dr. Feng Qin. Like any multithreaded environment, data races on GPUs can severely affect the program reliability. Thus, tool support for detecting race conditions can significantly benefit GPU application developers. Qin and Agrawal, working with their students, have proposed GRACE (Gpu RACE detection), a new mechanism for detecting races in GPU programs that combines static analysis with a carefully designed dynamic checker for logging and analyzing information at runtime. Their design utilizes GPUs memory hierarchy to log runtime data accesses efficiently. They also reduce the runtime overhead by using static analysis to reduce the number of statements that need to be instrumented.

Another direction has been improving application throughput. This is particularly driven by the observation that GPU instances are now being offered by cloud providers. Agrawal's group and collaborators have developed framework to enable applications executing within virtual machines to

transparently share one or more GPUs. The contributions are twofold: extending an open source GPU virtualization software to include efficient GPU sharing, and proposing solutions to the conceptual problem of GPU kernel consolidation. In particular, a method has been developed for computing the affinity score between two or more kernels, which provides an indication of potential performance improvements upon kernel consolidation. This work resulted in best paper award from High Performance Distributed Computing (HPDC) 2011.

Finally, in collaboration with Pacific National Lab, a new approach for autotuning, referred to as parameterized micro-benchmarking, is also proposed. It is an alternative to the two existing classes of approaches to auto-tuning, which are the analytical model-based and empirical search-based methods. In the newly proposed approach, different expressions in the application, different possible implementations of each expression, and the key architectural features, are used to derive a simple micro-benchmark and a small parameter space. This allows one to learn the most significant features of the architecture that can impact the choice of implementation for each kernel within the application.

This work has been used to optimize a quantum chemistry application at Pacific National Lab, NWChem.

CHANGES IN FOCUS

12

The early research of **Dr. Raghu Machiraju** focused on the analysis of spatio-temporal data from the physical sciences especially those from computational fluid dynamics. Dr. Machiraju still works on problems of feature detection especially on the vexing problem of detecting vortices in complex flow data. This datasets depict the flow of fluid (water or air) around objects with complex geometries. His initial doctoral work focused on rigorous signal-theoretic characterization of various steps employed in volume rendering algorithms. Machiraju’s interest in fluid flow began during the initial years of his academic career at the NSF Engineering Research Center, Mississippi State University.

However, interactions with various collaborators at Ohio State University have expanded his research into new territories, unforeseen in his earlier career. Machiraju has worked with physicists on computational molecular dynamics that examines the formation of lattice structures in semiconductors. He has worked with electrical engineers on the modeling of electromagnetic waves (including optical range) through thick tissue.

When Drs. Michael Knopp and Joel Saltz joined The Ohio State University Medical Center, Raghu found some partners. He began to focus on medical image analysis and imaging. His initial focus was on the processing of MRI images to extract white matter tracts (for Dr. Knopp) and the analysis of histology images (Dr. Saltz) of mouse placenta.

Biology Immersion – Mechanisms of Disease

One of the most significant changes in his research direction occurred during his year 2006-2007 sabbatical year. He spent that sabbatical year at NIH, General Electric Global Research, and Harvard Medical School.

After the sabbatical he focused on learning and working more on problems of biology. Dr. Machiraju says, “While I find the long-standing problems of medical and biological image analysis intellectually stimulating, they are also very challenging and demanding. Most importantly, I find the ensuing work redeeming and socially relevant.”

His current research in biological image analysis focuses on providing computational support for various

topics-of-interest in the biological sciences. He has been fortunate to work very closely with Prof. Kun Huang, Biomedical informatics, The Ohio State University Medical Center. Dr. Huang is the director of Biomedical Informatics Shared Resource (BISR), Comprehensive Cancer Center (CCC)

A main problem of interest in biology is the association of genotypes to phenotypes. Changes in the genome results in a plethora of phenomes. Imaging as currently practiced allows for the characterization of phenotypes. Sequencing provides yet another characterization. Thus, mutations of a gene can result in different phenotypes.

While working with Saltz, Dr. Machiraju, his fellow collaborators and students undertook a problem of interest for the Leone Lab at the Cancer Center. Dr. Gustavo Leone and his laboratory had shown that inhibition of the Retinoblastoma gene (Rb) results in malformed placenta in female mouse, which leads to fetal death. Through the use of advanced imaging techniques, Machiraju’s group showed how infiltrations in a specific layer of the placenta reduces the surface area required for adequate transport of nutrients of mother to child. This was their first foray into all things biological and formed an essential portion of the dissertation of Kishore Mosaliganti

Later, the team worked on the characterization of the tumor microenvironment. It has been shown again by the Leone and Ostrowski laboratories that the deletion of PTEN and P53 genes in stromal fibroblasts (a specific cell) surrounding mammary ductal structures composed mainly of epithelial cells. Through imaging, statistical analysis and machine learning their results actually showed that many of the cell types in the microenvironment surrounding a mammary duct undergoes changes in morphology in addition to various genetic changes . This work required the team to create statistical models of nuclear shape in both normal and mutant microenvironments. They especially focused on the changes that are likely to occur during tumor initiation. This subtle change is hard to detect and is an important contribution described in the dissertation work of graduate student Shantanu Singh. The researchers continue to verify their findings using transgenic mice that fluoresce in a confocal or multi-photon microscope.

This work allowed Marchiraju and his team to collaborate with other groups. With Drs. Chandan Sen and Sashwati Roy (both of the Davis Heart & Lung Research Institute) they are examining the microenvironment in the normal and ischemic wound (depleted oxygen). It has been often observed that endothelium (cells found in vasculature) in ischemic wounds is often malformed and leads to poor vascularization and hence poor outcome of wound healing.

Additionally, the Marchiraju group is working with Dr. Clark Anderson to understand the dynamics of the immunological protein, IgG, transport in the placenta. Once again imaging is being used in addition to methods of machine learning. The goal is to study an ensemble of cells and different patterns.

Additionally, they are interacting with Drs. Nic Moldavan (OSUMC) and Rich Hart (Biomedical engineering) to delineate collagen from images. The goal is to study cell signaling aided by collagen.

All Things Clinical Radiological

Over the last four years, Dr. Machiraju has also collaborated with Dr. Istavan Morocz of Harvard Medical School towards the analysis of spatiotemporal fMRI (functional MRI) data obtained from studies concerning dyscalculia. An essential aspect of his work has been the use of machine learning techniques towards the visualization and analysis of complex data. They adopted a principled approach to the analysis and visualization of complex fMRI data and provided support to fast image acquisition protocols and various experiments in neuroscience. Graduate student Firdaus Janoosio completed his doctoral dissertation on this topic and is credited with the development of several robust models for fMRI signal analysis.

Additionally, the Machiraju group also developed a slew of methods to extract white matter tracts from diffusion weighted MR images. This allows the gleaning of the connectivity architecture method. Their collaborators at NIH (Drs. Peter Bassar and Carlo Pierpaoli) are pioneers in the development of this modality. Additionally, many of the analysis algorithms developed by CSE Student Okan Irfanoglu are

13



used at the Wright Center of Innovation for Imaging (WCI) headed by Dr. Michael Knopp and elsewhere. Dr. Steffen Sammett previously of WCI and now at University of Chicago was an important collaborator on this project.

Biology is Different

It is reductionist in nature and very different from computer science where abstraction plays a more larger role. There is a need for encyclopedic understanding of processes and factors in biology. Another challenge is the variability that exists at all levels. Although there is more use of computational methods, biology is certainly an observational science and is very much hypothesis driven. The latter aspect is often foreign to many computing researchers. Tools are built to explore and interact with data. Although the scientific method is taught to all in school, it is something that computer scientists are not extremely aware of.

Student Mentorship and Training

When interacting with scientists, students in Computer science rarely interact at a deep scientific level. They collect the data, process it, and then provide them results. This was often the situation when Dr. Machiraju’s team worked with other sciences. However, such interaction does not help to provide viable results for biologists. The need for validation and provability is paramount For instance, cell nuclei can be delineated and segmented from confocal images. There are many algorithms that can be used to complete this task. A typical biologist would like to be very certain that the cell was correctly segmented and its type quite accurately determined. Thus to be successful, it is not enough to build representations of the uncorrupted signal. All confounds should be included and all outliers should be dealt with. Robust analysis requires a good understanding of the biological structures, the necessary instrumentation, etc. That requires that the student is embedded in the biology laboratory, works closely with his/her peers in the biology lab, knows how instruments corrupt the basic signal and can at least understand the implications of his work. Several of Dr. Machiraju’s students know how to operate scanners/microscopes, know the subtleties of the processes (staining), and are at home while reading leading biology/radiological/ neuroscientific journals.

This sort of embedded training has paid off for Machiraju’s students. The recent graduates from this group have been well placed. Over the last four years Dr. Machiraju has placed two students at Harvard Medical School (Kishore Mosaliganti, Firdaus Janoos), a student at MIT/Harvard Broad Institute (Shantanu Singh), and finally another student at NIH (Okan Irfanoglu). Additionally, one of his graduate student, Sundaresan Raman, was selected to be a 2010 Pelotonia Graduate Fellow. Sundar is one of the few students from the College of Engineering selected for this honor by the Comprehensive Cancer Center. Moving Forward

It is all genetics now. Through the involvement of Prof. Huang, the Machiraju group is including more genetic focus. Analysis of phenotypes only makes sense if they are associated with genotypes. The new batch of students Dr. Raghu Machiraju will advise are being asked to include this focus. Dr. Machiraju recently recruited a Pelotonia postdoctoral candidate, Thierry Pecot who will primarily focus on data analysis from sequencing experiments pertaining to stromal alterations in the mammary gland. He is being co-mentored by Drs. Machiraju, Huang and Leone. It is likely this new focus will lead to even more expanded opportunities in the near future for Dr. Machiraju and his group.



GRANTS

NEW AWARDS RECEIVED JULY 1, 2010 THRU JUNE 30, 2011

PI: Anish Arora

CATR Task 0006  
Air Force Research Laboratory (AFRL)  
11/16/10 – 11/19/12 \$75,000

PI: James W. Davis

- IRWIN Research in Wireless  
Los Alamos National Labs  
\$58,003 7/1/10 – 6/30/11
- Center for Automatic Target Recognition Research  
CATR Task 0006  
Air Force Research Laboratory (AFRL)  
\$43,000 11/16/10 – 11/19/12
- Center for Automatic Target Recognition Research  
CATR Task 0002  
Air Force Research Laboratory (AFRL)  
\$44,000 5/1/10 – 9/30/12
- Center for Automatic Target Recognition Research (task 4)  
Air Force Research Laboratory (AFRL)  
\$100,000 7/1/10 – 9/30/10

PI: Tamal Dey

AF: Small: Analyzing Spaces and Scalar Fields via Point Clouds  
Co-PI: Yusu Wang  
National Science Foundation (NSF)  
\$499,761 6/1/11 – 5/31/14

PI: Raghu Machiraju

- G&V: Medium: Collaborative Research: Large Data Visualization Using an Interactive Machine Learning Framework  
Co-PI: Han-Wei Shen  
National Science Foundation (NSF)  
\$542,002 6/1/11 – 5/31/14
- A Comprehensive Workflow for Large Histology Segmentation and Visualization  
Co-PIs: Kun Huang (OSU-CSE Biomedical Informatics) and Lisa Lee  
National Library of Medicine  
\$150,000 6/25/10 – 6/24/11

- CCTS NCTMP Pilot  
Co-PI: Rebecca Jackson (Professor, OSU- College of Medicine)  
National Center for Research Resources (OSU CCTS)  
\$149,424 7/1/10 – 6/30/11
- A Comprehensive Workflow for Robust Characterization of Microstructure for Cancer Studies  
Co-PI: Kun Huang  
Aquilent, Inc. (National Library of Medicine subaward)  
\$150,000 4/1/11 – 9/23/11

PI: D. K. Panda

- World-Class Science Through World Leadership in HPC  
University of Texas at Austin (National Science Foundation (NSF) subaward)  
\$114,248 10/1/10 – 9/30/12
- Performance Evaluation of Obsidian Longbow Routers with Encryption for Parallel File Systems  
AVETEC  
\$79,059 6/10/10 – 3/31/11
- Study of WAN-level Storage and Distributed Computing with Obsidian Longbow Routers with Encryption  
AVETEC  
\$55,389 6/1/10 – 6/30/11
- Scalability and Fault-tolerance Properties of InfiniBand Subnet Management  
Co-PI: Sayantan Sur  
Sandia Labs  
\$115,885 5/10/10 – 9/30/11
- HPC Application Energy Profiling for Energy Optimization Tools  
RNET Technologies (Department of Energy (DOE) STTR)  
\$33,000 6/19/10 – 3/18/11
- Green Storage for HPC with Solid State Disk Technologies  
RNET Technologies (Department of Energy (DOE) STTR)  
\$33,000 6/19/10 – 3/18/11

- ➡ *Collaborative Research: Dynamic Staging Architecture for Accelerating I/O Pipelines*  
National Science Foundation (NSF)  
\$ 90,000      5/1/10 – 4/30/13
- ➡ *Research on High Performance and Scalable MPI over InfiniBand.*  
Mellanox Technologies, Inc:  
\$117,890      4/4/10-3/31/11

**PI: Rajiv Ramnath**

- ➡ *Capstone Partnerships*  
Capstone Partners  
\$3,000      1/1/11 – 12/31/11
- ➡ *Accessible Mobile Web Browser*  
PI: Carolyn Marie Sommerich (Assoc. Professor, OSU-Integrated Systems Engineering)  
Co-PI: **Rajiv Ramnath**  
Ohio Rehabilitation Services Commission  
\$64,443      12/20/10 – 9/30/11
- ➡ *Open Source Talking eBook Reader*  
PI: Carolyn Marie Sommerich (Assoc. Professor, OSU-Integrated Systems Engineering)  
Co-PI: **Rajiv Ramnath**  
Ohio Rehabilitation Services Commission  
\$64,443      12/20/10 – 9/30/11

**PI: Atanas Rountev**

- ➡ *SHF: Small: Algorithms for Dynamic Analysis of Run-time Bloat*  
National Science Foundation (NSF)  
\$356,531      9/15/10 – 8/31/13

**PI: P. Sadayappan**

- ➡ *A Polyhedral Transformation Framework for Compiler Optimization*  
Co-PI: **Atanas Rountev**  
Department of Energy (DOE)  
\$399,842      9/1/10 – 8/31/13
- ➡ *A Fault-Oblivious Extreme Scale Execution Environment*  
Department of Energy (DOE)  
\$469,254      9/1/10 – 8/31/13
- ➡ *Accelerating Parallel Numerical Libraries to Petascale and Beyond*  
RNET Technologies (Department of Energy (DOE) STTR)  
\$245,000      8/15/10 – 8/15/12

**PI: Han-Wei Shen**

- ➡ *GV: Small: Collaborative Research: An Information Theoretic Framework for Large-scale Data Analysis and Visualization*  
National Science Foundation (NSF)  
\$292,147      9/1/10 – 8/31/13
- ➡ *IRWIN Research*  
Los Alamos National Labs  
\$90,000 7/1/10 – 6/30/11
- ➡ *Very Large 3D Flow Field Visual Analysis*  
Department of Energy (DOE)  
\$461,074      10/28/10 – 9/30/11
- ➡ *An Information Framework for Enabling Extreme-scale Science Discovery*  
Department of Energy (DOE)  
\$462,095      9/1/10 – 8/31/13

**PI: Ness B. Shroff**

- ➡ *NeTS: Medium: Collaborative Research: Mobile content sharing: Networks: Theory to Implementation*  
Co-PI: **Dong Xuan**  
National Science Foundation (NSF)  
\$628,946      7/1/11 – 6/30/15

**PI: LeonWang**

- ➡ *An Auditory Scene Analysis Approach to Speech Segregation*  
Kuzer Co. (AFOSR STTR)  
\$40,000      7/1/10 – 3/31/11

**PI: Yusu Wang**

- ➡ *AF: EAGER: Collaborative Research: Integration of Computational Geometry and Statistical Learning for Modern Data Analysis*  
Co-PI: **Mikhail Belkin**  
National Science Foundation (NSF)  
\$196,000      09/01/10 – 08/31/12

**GRANTS INITIATED BEFORE JULY 1, 2009**

**Gagan Agrawal**

- ➡ *Data Intensive Computing Solutions for Neuroimage Analysis*  
Co-PI: **Raghu Machiraju**  
National Science Foundation  
\$480,000      9/15/09 – 8/31/12
- ➡ *A Language Independent Framework for Compiling Data-Intensive Applications on Highly Parallel Systems*  
National Science Foundation (NSF)  
\$510,000      9/1/08 – 08/31/11

**Anish Arora**

- ➡ *Genifying and Federating Autonomous Kansei Wireless Sensor Networks*  
Co-PI: **Rajiv Ramnath**  
BBNT Solutions, LLC  
\$500,000      9/1/08 – 8/31/11
- ➡ *IRWIN Research in Wireless*  
Los Alamos National Labs  
\$203,151      2/6/09 – 6/30/11
- ➡ *Localization and System Services for Spatiotemporal Actions in Cyber-Physical Systems*  
National Science Foundation  
143,686.78      9/15/09 – 8/31/12

**Mikhail Belkin**

- ➡ *CAREER: Geometry and High-dimensional Inference*  
National Science Foundation (NSF)  
\$498,972      10/01/07 – 12/31/12
- ➡ *Travel Grant for 2009 Chicago Summer School/ Workshop on Computational Learning*  
National Science Foundation (NSF)  
\$20,000.00      2009 - 2010
- ➡ *Networks of Memories*  
Simon Dennis (OSU-Dept. of Psychology)  
Co-PI: **Mikhail Belkin**  
Air Force Office of Scientific Research (AFOSR)  
\$498,972.00      2009 - 2012.
- ➡ *Network of Memories*  
Simon Dennis (OSU-Dept. of Psychology)  
Co-PI: **Mikhail Belkin**  
Air Force Office of Scientific Research (AFOSR)  
\$478,426      4/1/09 – 3/31/12

**James W. Davis**

- ➡ *IRWIN Research in Wireless*  
Los Alamos National Labs  
\$57,339      10/1/09 – 9/30/10
- ➡ *Center for Automatic Target Recognition Research (task 4)*  
Air Force Research Laboratory (AFRL)  
\$53,000      1/1/10 – 9/30/10
- ➡ *Center for Automatic Target Recognition Research (task 4)*  
Air Force Research Laboratory (AFRL)  
\$930,070      5/1/08 – 9/30/10
- ➡ *IRWIN Research in Wireless*  
Los Alamos National Labs  
\$170,392      2/6/09 – 6/30/11
- ➡ *Wright Center of Innovation, Institute for the Development and Commercialization of Advanced Sensor Technology (IDCAST)*  
PI: Randolph Moses (OSU- Dept. of Electrical & Computer Engineering)  
Co-PI: **James W. Davis**, John Volakis (OSU- Dept. of Electrical & Computer Engineering)  
Ohio Department of Development  
(University of Dayton sub-award)  
\$190,000      2/26/07 – 2/25/11

**Tamal Dey**

- ➡ *MCS: Reconstructing and Inferring Topology and Geometry From Point to Point Cloud Data*  
Co-PI: Dan Burghlea (OSU-Dept. of Mathematics)  
National Science Foundation (NSF)  
\$462,000      9/1/09 – 8/31/12
- ➡ *Inferring Topology and Geometry for Dynamic Shapes*  
National Science Foundation (NSF)  
\$220,000      9/1/08 – 8/31/11
- ➡ *Nonsmoothness in Meshing and Reconstruction*  
National Science Foundation (NSF)  
\$429,402      10/01/06 – 09/30/10



Hakan Ferhatosmanoglu

- ➔ *Similarity-Based Indexing and Integration of Protein Sequence and Structure Databases DBI*  
Co-PI: Yusu Wang, Li  
National Science Foundation (NSF)  
\$498,117      8/15/08 – 7/31/11
- ➔ *CAREER: Exploration of Dynamic Sequences in Scientific Databases*  
National Science Foundation (NSF):  
\$455,000      8/1/06 – 8/31/11

Eric Fosler-Lussier

- ➔ *Explicit Articulatory Models of Spoken Language, with Application to Automatic Speech Recognition*  
National Science Foundation (NSF)  
\$334,469      7/1/09 – 6/30/12
- ➔ *CAREER: Breaking the Phonetic Code: Novel Acoustic-Lexical Modeling Techniques for Robust Automatic Speech Recognition*  
National Science Foundation (NSF)  
\$502,952      12/15/06 – 11/30/11
- ➔ *Sing Machine Learning to Model the Interplay of Production Dynamics And Perception Dynamics in Phonological Acquisition*  
National Science Foundation (NSF)  
\$273,284      1/15/08 – 12/31/10
- ➔ *Establishing and Breaking Conceptual Pacts with Dialog Partners*  
National Science Foundation Human-Robot Interaction (HRI)  
(Northeastern University sub-award)  
\$149,084      1/28/08 – 9/30/10

David Lee

- ➔ *Internet Attack Traceback-Cross-Validation and Pebble-Trace*  
Air Force Office of Scientific Research (AFOSR)  
\$500,000      4/1/09 – 11/30/12
- ➔ *CPATH T: NEWPATH: Nurturing, Through Entrepreneurship, IT World Leaders*  
Co-PI: Stephen Camp (OSU-COB), Eylem Ekici (OSU-ECE), Walleed Muhanna (OSU-COB), **Rajiv Ramnath, Han-Wei Shen, Neelam Soundarajan, Bruce Weide, Dong Xuan**  
National Science Foundation (NSF)  
\$606,822      7/1/07 – 6/30/12

Raghu Machiraju

- ➔ *Modeling and Rendering of Urban Environments*  
Lawrence Livermore National Lab  
\$43,050      01/04/10 - 9/30/10
- ➔ *Interrogating Epigenetic Changes in Cancer Genomes*  
PI: Tim Huang (OSU- Dept. of Molecular Virology, Immunology & Medical Genetics – Human Cancer Genetics)  
Co-PIs: Kun Huang (OSU- Dept. of Biomedical Informatics), **Raghu Machiraju**, Lin, Wang, Yan  
National Cancer Institute  
\$1,596,781      5/1/10 – 2/28/11

D. K. Panda

- ➔ *Coordinated Fault Tolerance for High Performance Computing*  
Dept. of Energy (DoE)  
\$1,000,000      9/15/06 – 9/15/11
- ➔ *Programming Models for Scalable Parallel Computing*  
Dept. of Energy (DoE)  
\$1,000,000      9/15/06 – 09/15/11
- ➔ *Creating Petascale File Systems Using Application-Aware Network Offloading*  
Dept. of Energy Small Business Technology Transfer (DoE: STTR) Phase II (with RNET Technologies)  
\$275,000      9/15/09 – 05/15/11
- ➔ *Applicability of Object-based Storage Devices in Parallel File Systems*  
National Science Foundation (NSF)  
\$520,000      09/01/06 – 08/31/10
- ➔ *Designing QoS-Aware MPI and File Systems Protocols for InfiniBand Clusters*  
National Science Foundation (NSF)  
\$491,570      09/01/09 – 08/31/12
- ➔ *Topology-Aware MPI Collectives and Scheduling for Petascale Systems with InfiniBand*  
National Science Foundation (NSF)  
\$920,000      09/15/06 – 08/14/11
- ➔ *Extending One-Sided Communication in MPI Programming Model for Next-Generation Ultra-Scale HEC*  
National Science Foundation (NSF)  
\$399,000      9/1/08 – 8/31/10

- ➔ *High-end Computing and Networking Research Testbed for Next Generation Data Driven, Interactive Applications*  
Co-PIs: **Gagan Agrawal, P. Sadayappan**, Joel H. Saltz (Emory University), **Han-Wei Shen**  
National Science Foundation (NSF)  
\$1,529,997      9/15/04 – 8/31/10
- ➔ *Collaborative Research: Dynamic Staging Architecture for Accelerating I/O Pipelines*  
National Science Foundation (NSF):  
\$90,000 5/1/10 – 4/30/13

Srinivasan Parthasarathy

- ➔ *Global Graphs: A Middleware for Data Intensive Computing*  
Co-PI: **P. Sadayappan**  
National Science Foundation (NSF)  
\$499,997      9/1/09 – 8/31/12

Feng Qin

- ➔ *CAREER: Building Immunity to Memory Management Bugs During Production Runs*  
National Science Foundation (NSF):  
\$420,000      3/1/10 – 2/28/15

Jay Ramanathan

- Co-PI: – **Rajiv Ramnath**  
CETI IUCRC Memberships  
\$281,904.31      10/1/06 – 4/30/11
- ➔ *eGOV Server Migration/Hosting, Content Management, Security and BMP*  
Co-PI: – **Rajiv Ramnath**  
City of Columbus:  
\$80,000 12/06/07 – 4/30/11
- ➔ *Center for Experimental Research in Computer Systems- Research Site*  
Co-PI: **Rajiv Ramnath**  
National Science Foundation (NSF)  
\$140,000      5/1/08 – 4/30/11

Rajiv Ramnath

- ➔ *Curriculum for Accelerated Services Engineering (CASE)*  
Co-PIs: **Jay Ramanathan, Neelam Soundarajan**, Jerome D’Agostino (OSU-CoEHE, Quantitative Research, Evaluation and Measurement)  
National Science Foundation (NSF)  
\$149,981      9/1/09 – 2/28/11

- ➔ *Pandemic Influenza Program Initiative B - Project 7: Evaluating Feasibility of the Distribution and Dispensing of Antiviral Drugs to Self-Isolated or Self-Quarantined Persons as Part of a Community Containment Strategy in Ohio*  
PI: Anand Desai (OSU-John Glenn School of Public Affairs)  
Co-PI: **Rajiv Ramnath**  
Cuyahoga County Board of Health:  
\$10,000 8/10/08 – 8/9/09
- ➔ *Pandemic Influenza Program Initiative B-project 6 program: Addressing Vulnerabilities in Populations*  
PI: Anand Desai (OSU-John Glenn School of Public Affairs)  
Co-PI: **Rajiv Ramnath**  
Summit County Health District  
\$30,000 8/10/08 – 8/9/09
- ➔ *NW Ohio REMS Project*  
PI: Anand Desai (OSU-John Glenn School of Public Affairs)  
Co-PI: **Rajiv Ramnath**  
The Hospital Council of Northwest Ohio  
\$20,000 12/01/08 – 8/9/09
- ➔ *Improving American Competitiveness through Workforce Education in Cyberinfrastructure Applications*  
Steven Gordon (Ohio Supercomputer Center OSC)  
Co-PI: Cathleen Carey (OSU-Ohio Learning Network), Jose Castro (OSU-IWSE) Steven Gordon (OSC) Ashok Krishnamurthy (OSC), **Rajiv Ramnath**  
National Science Foundation (NSF)  
\$999,942      4/1/08 – 3/31/11

Atanas Rountev

- ➔ *CAREER: Dataflow Analysis for Modern Software Systems*  
National Science Foundation (NSF):  
\$407,000      9/15/06 – 8/14/11

P. Sadayappan

- ➔ *A Platform-Aware Compilation Environment*  
Co-PI: **Atanas Rountev**  
Defense Advanced Research Projects Agency (DARPA)  
(Rice University Sub-award)  
\$630,438      4/1/09 – 3/31/11

- ➔ *Programming Models for Scalable Parallel Computing*  
Dept. of Energy (DoE)  
\$500,000     9/15/06 – 8/31/11
- ➔ *Scalable Fault Tolerant Runtime Technology for Petascale Computers*  
Dept. of Energy (DoE)  
\$375,820     8/1/08 – 7/31/11
- ➔ *Collaborative Research: CPA-CPL-T: An Effective Automatic Parallelization Framework for Multi-Core Architectures*  
Co-PI: **Atanas Rountev**  
National Science Foundation (NSF)  
\$500,000     8/1/08 – 7/31/11
- ➔ *Collaborative Research: An Environment for High-Productivity High-Performancy Computing using GPUs/accelerators*  
National Science Foundation (NSF):  
\$468,492     9/15/09 – 8/31/12
- ➔ *Customizable Domain-specific Computing*  
National Science Foundation (NSF):  
\$749,998     9/1/09 – 8/31/10
- ➔ *Collaborative Research: Petascale Simulations of Quantum Systems by Stochastic Methods*  
National Science Foundation (NSF):  
\$639,952     9/1/09 – 8/31/12
- ➔ *Enhancements to Disk Resident Arrays Library*  
Pacific Northwest National Lab  
\$427,014     2/3/04 – 9/30/10

Han-Wei Shen

- ➔ *SciDAC Institute for Ultrascale Visualization*  
Dept. of Energy (DoE)  
\$750,000     9/26/07-8/31/11
- ➔ *Validation/Dissemination Virtual Temporal Bone Dissection*  
PI: Don Stredney (Ohio Supercomputer Center)  
Co-PIs: **Han-Wei Shen**, Bradley Clymer (OSU- Dept. of Electrical & Computer Engineering), Ashok Krishnamurthy (Ohio Supercomputer Center), Petra Schmalbrock (OSU – College of Medicine - Dept. of Radiology), Janet Weisenberger (OSU - Dept. of Speech and Hearing Science)  
Research Institute at Nationwide Children’s Hospital  
\$1,496,987     7/1/04 - 6/30/11

Ness Shroff

- ➔ *Stochastic Control of Multi-Scale Networks: Modeling, Analysis and Algorithms*  
Army Research Office  
\$6,456,625     5/1/08 – 5/28/11
- ➔ *Design Of Urban Sensor Networks*  
Multidisciplinary University Research Initiative (MURI - DoD) (Pennsylvania State University Sub-award)  
\$300,000     6/15/07 – 11/14/10
- ➔ *FIND: Collaborative Research: Towards an Analytical Foundation for Network Architectures*  
National Science Foundation (NSF)  
\$200,000     9/1/07 – 8/31/11
- ➔ *NeTS-NECO: A New Resource Management Paradigm for Sensor Networks with Energy Replenishment*  
Co-PI: **Prasun Sinha**, Can Emre Koksall (OSU- Dept. of Electrical & Computer Engineering)  
National Science Foundation (NSF)  
\$346,426     9/1/08 – 8/31/12
- ➔ *Nets-NOSS: Robust Sensor Network Architecture Through Neighborhood Monitoring and Isolation*  
National Science Foundation (NSF)  
\$350,000     07/01/07 – 08/31/10
- ➔ *Workshop on Future Wireless Communication Networks*  
National Science Foundation (NSF)  
\$145,000     10/01/09 – 9/30/10
- ➔ *NeTS-Medium: Collaborative Research: Unifying Network Coding and Cross-Layer Optimization for Wireless Mesh Networks: From Theory to Distributed Algorithms to Implementation*  
National Science Foundation (NSF):  
\$350,000     09/01/09 – 08/31/13
- ➔ *CT-ISG: Collaborative Research: Router Models and Downscaling Tools for Scalable Security Experiments*  
National Science Foundation (NSF):  
\$125,000     10/1/08 – 9/30/11
- ➔ *Nets-NBD: A High-Performance Control Plane for Mesh Networks: Theory and Implementation*  
National Science Foundation (NSF):  
\$553,417     9/1/06 – 8/31/10

Prasun Sinha

- ➔ *CAREER: On-the-fly Protocols for Data Dissemination in Wireless Mesh Networks*  
National Science Foundation (NSF):  
\$412,000     1/15/06 – 12/31/11
- ➔ *OSS: Doing More with Less: Tracking Movements Using a Sparse Sensor Network*  
National Science Foundation (NSF):  
\$216,017     9/1/07 – 8/31/11
- ➔ *NeTS-NOSS: Collaborative Research: Energy-Efficient Distributed Sensor Network Control: Theory to Implementation*  
Co-PI: **Ness Shroff**  
National Science Foundation (NSF):  
\$491,661     9/1/07 – 8/31/10

DeLiang Wang

- ➔ *Sequential Organization and Room Reverberation in Speech Segregation*  
Air Force Office of Scientific Research (AFOSR)  
\$874,369     2/1/08 – 11/30/11
- ➔ *Integrating Monaural CASA and Binaural Localization for Robust Speech Separation*  
Oticon  
\$180,000     7/1/08 – 6/30/11
- ➔ *Robust Speaker Recognition Using Auditory-Based Features And Computational Auditory Scene Analysis*  
Research Associates for Defense Conversion Inc. (RADC)  
\$300,000     2/20/09 – 2/19/11
- ➔ *Study of Speech and Nonspeech Separation in Aging*  
Veteran’s Affairs  
\$600,000     7/1/06 – 09/31/10
- ➔ *Biologically-Inspired Target Recognition Methods for Multispectral/Hyperspectral and Multiplatform Image Analysis*  
PI: Rongxin Li (OSU- Dept. of Civil and Environmental Engineering and Geodetic Science)  
Co-PI: **DeLiang Wang**  
National Geospatial Intelligence Agency  
\$450,000     8/15/07 – 8/14/10

Yusu Wang

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

Bruce Weide

- ➔ *CPA-SEL: Collaborative Research: Continuing Progress Toward Verified Software*  
Co-PI: Harvey Friedman (OSU - Dept. of Mathematics)  
National Science Foundation (NSF)  
\$232,591     9/1/08 – 8/31/10
- ➔ *CPS: Medium: Autonomous Driving in Mixed-traffic Urban Environments*  
PI: Ümit Özgüner (OSU- Dept. of Electrical & Computer Engineering)  
Co-PI: **Bruce Weide**, **Paul Sivilotti**, Ashok Krishnamurthy (OSU- Dept. of Electrical & Computer Engineering), Füsün Özgüner (OSU- Dept. of Electrical & Computer Engineering)  
National Science Foundation (NSF):  
\$1,296,683     9/1/09 – 8/31/12
- ➔ *Collaborative Research: Logical Support for Formal Verification*  
Co-PI: Harvey Friedman (OSU - Dept. of Mathematics)  
National Science Foundation (NSF)  
\$75,000 9/1/07 – 8/31/10
- ➔ *Automated Support for Developing Logical Reasoning Skills in Discrete Mathematics Courses*  
Co-PIs: Harvey Friedman (OSU- Dept. of Mathematics), Pearl  
National Science Foundation (NSF):  
\$199,775     3/1/10 – 2/29/12

Dong Xuan

- ➔ *Defending Against Physical Attacks in Sensor Networks*  
Defending Against Physical Attacks in Sensor Networks  
Co-PI: Anish Arora and Ten-Hwang Lai  
Army Research Office  
\$280,000     3/15/07-12/31/10
- ➔ *CAREER: Algorithm Design for Optimization Problems in Network Over-Provisioning*  
National Science Foundation (NSF)  
\$400,060     12/15/05 – 11/30/10



→ *NeTS: Small: Connected Coverage of Wireless Sensor Networks in Theoretical and Practical Settings*

Co-PI: **Ten-Hwang (Steve) Lai**  
National Science Foundation (NSF):  
\$400,000 9/1/09 – 8/31/12

#### **Xiaodong Zhang**

→ *Algorithms Design and Systems Implementation to Improve Buffer Management for Fast I/O Data Accesses*

National Science Foundation (NSF)  
\$275,000 7/1/07 – 5/31/11

→ *Effective Resource Sharing and Coordination Inside Multicore Processors for High Throughput Computing*

National Science Foundation (NSF)  
\$330,000 9/1/08 – 8/31/11

→ *EAPNET: NOSS: Self-Adaptable All Terrain Sensor Networks*

National Science Foundation (NSF)  
\$330,000 9/1/07 – 8/31/11

→ *Basic Research for Developing SSD-Based Caching and Hybrid Storage Systems*

National Science Foundation (NSF):  
\$400,000 8/1/09 – 7/31/12

→ *Travel Support for the 29th IEEE International Conference on Distributed Computing Systems*

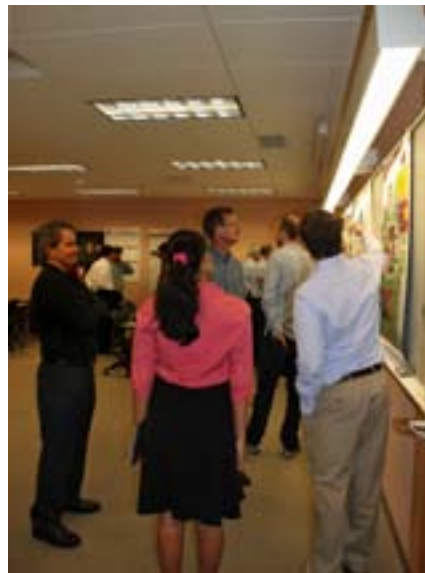
National Science Foundation (NSF):  
\$10,000 9/1/09 – 8/31/10

→ *Travel Support for the 30th IEEE International Conference on Distributed Computing Systems*

National Science Foundation (NSF):  
\$10,000 6/1/10 – 5/31/11



In San Francisco, Dr. Ming-Tsan "Mike" Liu with his family personifies the famous "O\*H\*T\*O."



Left, Ben Schroeder presents highlights of his research to (l-r) David Cohen, Wayne Clark and Michael Fortin, members of the Industrial Advisory Board. Members met with 10 students, both undergraduate and graduate, for discussion of the student research being done in CSE (above).



## 10-11 PUBLICATIONS

### AI

**M. Belkin** and K. Sinha. "Polynomial Learning of Distribution Families." In the *Proceedings of the 51st Annual IEEE Symposium on Foundations of Computer Science (FOCS 2010)*. Las Vegas, USA. October 2010. 10 pages.

K. Sankaranarayanan and **J. Davis**. "Attention-based Target Localization using Multiple Instance Learning." In the *Proceedings of the International Symposium on Visual Computing (ISVC'10)*. November 29 - Dec. 1, 2010. Las Vegas, Nevada, USA. [Best Paper Award]

K. Streib and **J. Davis**. "Extracting Pathlets From Weak Tracking Data." In the *Proceedings of the IEEE Conference on Advanced Video and Signal Based Surveillance*. Boston, Massachusetts, USA. August 2010. pp. 353 - 360

K. Sankaranarayanan and **J. Davis**. "Learning Directed Intention-driven Activities using Co-Clustering." In the *Proceedings of the IEEE Conference on Advanced Video and Signal Based Surveillance (AVSS 2010)*. Boston, Massachusetts, USA. August 2010. pp. 400 - 407

K. Sankaranarayanan and **J. Davis**. "Object Association Across PTZ Cameras using Logistic MIL." In the *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2011)*. Colorado Spring, Colorado, USA. June 2011.

M. Keck and **J. Davis**. "Recovery and Reasoning about Occlusions in 3D using Few Cameras with Applications to 3D Tracking." *International Journal of Computer Vision*. 2011.

K. Streib and **J. Davis**. "Using Ripley's K-function to Improve Graph-Based Clustering Techniques." In the *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2011)*. Colorado Spring, Colorado, USA. June 2011.

**E. Fosler-Lussier**. "Linguistic Categories for Speech Recognition" (revised). In *Speech and Audio Signal Processing: Processing and Perception of Speech and Music*. 2nd ed. Edited by Nelsom Morgan, Ben Gold, and Dan Ellis. New York: John Wiley & Sons. 2011.

T. Jan, W. Wang, **D.L. Wang**. "A Multistage Approach to Blind Separation of Convolutional Speech Mixtures." *Speech Communication*. Vol. 53. March 2011. pp. 524-539.

G. Hu and **D.L. Wang**. "A Tandem Algorithm for Pitch Estimation and Voiced Speech Segregation." *IEEE Transactions on Audio, Speech, and Language Processing*. Vol. 18. November 2010. pp. 2067-2079.

Z. Jin and **D.L. Wang**. "HMM-based Multipitch Tracking For Noisy And Reverberant Speech." *IEEE Transactions on Audio, Speech, and Language Processing*. Vol. 19. May 2011. pp. 1091-1102.

A. Narayanan and **D.L. Wang**. "Robust Speech Recognition from Binary Masks." *Journal of the Acoustical Society of America Express Letters*. Vol. 128. August 2010. pp. EL217-EL222.

M.G. Quiles, **D.L. Wang**, L. Zhao, R.A.F. Romero, and D.-S. Huang. "Selecting Salient Objects In Real Scenes: An Oscillatory Correlation Model." *Neural Networks*. Vol. 24. January 2011. pp. 54-64.

J. Woodruff and **D.L. Wang**. "Sequential Organization of Speech in Reverberant Environments By Integrating Monaural Grouping and Binaural Localization." *IEEE Transactions on Audio, Speech, and Language Processing*. Vol. 18. November 2010. pp. 1856-1866.



GRAPHICS

M. Boggus and **R. Crawfis**. “Distance Field Illumination: a Rendering Method to Aid in Navigation of Virtual Environments.” In the *Proceedings of the 6th International Symposium on Visual Communication*. November 29 – December 1, 2010. Las Vegas, Nevada, USA. pp. 501-510.

M. Boggus and **R. Crawfis**. 2010. “Prismfields: A Framework for Interactive Modeling of Three Dimensional Caves.” In the *Proceedings of the 6th International Symposium on Visual Communication (VINCI 10)*. November 29 – December 1, 200. Las Vegas, Nevada, USA. pp. 213-221.

**T. K. Dey**, R. Dyer, and L. Wang. “Localized Cocone Surface Reconstruction.” In the *Proceedings of the Solid Modeling International (SMI 11)*. June 22-24, 2011. Herzliya, Israel.

**T. K. Dey**, J. A. Levine, and A. Slatton. “Localized Delaunay Refinement for Sampling and Meshing. In the *Proceedings of the Eurographics Symposium on Geometry Processing (SGP 10)*. July 5-7, 2010. Lyon, France. pp. 1723-1732.

**T. K. Dey**, A. Hirani, and B. Krishnamoorthy. “Optimal Homologous Cycles, Total Unimodularity, and Linear Programming.” *SIAM Journal Computing*. June 2011.

**T. K. Dey**, C. Luo, P. Ranjan, I. Safa, and **Y. Wang**. “Persistent Heat Signature for Pose-Oblivious Matching of Incomplete Models.” In the *Proceedings of the Eurographics Symposium on Geometry Processing*. July 5-7, 2010. Lyon, France. pp. 1545-1554.

**T. K. Dey**, K. Li, C. Luo, P. Ranjan, I. Safa, and **Y. Wang**. “Persistent Heat Signature for Pose-Oblivious Matching of Incomplete Models.” *Computer Graphics Forum*. Vol. 29, no. 5. June 2011. pp. 1545-1554.

**T. K. Dey** and **Y. Wang**. “Reeb Graphs: Approximation and Persistence.” In the *Proceedings of the Annual Symposium on Computational Geometry (SoCG)*. June 2011. Snowbird, Utah, USA.

O. Busaryev, **T. K. Dey**, and **Y. Wang**. “Tracking a Generator by Persistence.” *Discrete Mathematics, Algorithms and Applications*. Vol. 2, no. 4. December 2010. pp. 539-552.

T.-Y. Lee, O. Mishchenko, **H.-W. Shen**, and **R. Crawfis**. “View Point Evaluation and Streamline Filtering for Flow Visualization.” In the *Proceedings of the IEEE Pacific Visualization Symposium 2011* (PacificVis 2011). March 1-4, 2011. Hong Kong. pp. 83-90.

F. Janoos, **R. Machiraju**, S. Sammet, M.V. Knopp and I.A. Morocz. “Unsupervised Learning of Brain States from fMRI Data.” In the *Proceedings of the 13th International Conference on Medical Image Computing and Computer Assisted Intervention Conference, 2010* (MICCAI). Vol. 6362. Beijing, PRC: Springer Verlag. September 2010. pp. 201-208.

B. Schroeder, M. Ainger and **R. Parent**. “A Physically Based Sound Space for Procedural Agents.” In the *Proceedings of the International Conference on New Interfaces for Musical Expression (NIME)* 2011. Oslo, Norway. May 2011.

B. Schroeder, M. Ainger, and **R. Parent**. “An Audiovision Workspace for Physcial Models”. In the *Proceedings of the Sound and Music Computing Conference*. Barcelona, Spain. July2010.

D. Cao and **R. Parent**. “Electrostatic Dynamics Interaction for Cloth. In the *Proceedings of the 3rd ACM SIGGRAPH Conference and Exhibition on Computer Graphics and Interactive Techniques in Asia*. December 2010. Seoul, South Korea.

A. Deshpande and **L. Rademacher**. “Efficient Volume Sampling for Row/Column Subset Selection.” In the *Proceedings of the 51st Annual IEEE Symposium on Foundations of Computer Science (FOCS 2010)*. October 23-26, 2010. Las Vegas, Nevada, USA.

Y. Xu, **J. Ramanathan**, **R. Ramnath**, N. Singh, and S. Deshpande. “Reuse by Placement: A Paradigm for Cross-Domain Software Reuse with High Level of Granularity.” In the *Proceedings of the 12th International Conference on Software Reuse (ICSR12)*. June 13 – 16, 2011. Pohang, Korea.

T. Peterka, R. Ross, B. Nouanesengsy, T.-Y. Lee, **H.-W. Shen**, W. Kendall, and J. Huang. “A Study of Parallel Particle Tracing for Steady-State and Time-Varying Flow Fields.” In the *Proceedings of the 25th IEEE International Parallel & Distributed Processing Symposium*. May 16-20, 2011. Anchorage, Alaska, USA.

L. Xu,T.-Y. Lee and **H.-W. Shen**. “An Information Theoretic Framework for Flow Visualization.” *IEEE Transactions on Visualization and Computer Graphics*. Vol. 6, no. 16. October 2010. pp. 1216-1224.

T. Kerwin, G. Wiet, D. Stredney, and **H.-W. Shen**. “Automatic Scoring of Virtual Mastoidectomies Using Examples.” *International Journal of Computer Assisted Radiology and Surgery*. 2011.

C. Wang and **H.-W. Shen**. 2011. “Information Theory in Scientific Visualization.” *Entropy*. Vol. 1, no. 13. pp. 254-273.

H.-H. Hsieh, C.-C. Chang, W.-K. Tai, and **H.-W. Shen**. “Novel Geometrical Voxelization Approach with Application to Streamline.” *Journal of Computer Science and Technology*. 2011. Vol. 5, no. 25. pp. 895-904.

B. Nouanesengsy, J. Ahrens, J. Woodring, and **H.-W. Shen**. “Revisiting Parallel Rendering for Shared Memory Machines.” In the *Proceedings of the 11th Eurographics Symposium on Parallel Graphics and Visualization*. April 10 – 11. Llandudno, Wales

T.-Y. Lee, O. Mishchenko, and **H.-W. Shen**. “View Point Evaluation and Streamline Filtering for Flow Visualization.” In the *Proceedings of the 4th IEEE Pacific Visualization Symposium* (PacificVis 2011). March 1-4, 2011. Hong Kong. pp. 83-90.

NETWORKING

J. Li and **A. Arora**. “Chameleon: On the Energy Efficiency of Exploiting Frequencies in Duty-Cycled Wireless Sensor Networks.” In the *Proceedings of the 7th International ICST Conference on Broadband Communications, Networks, and Systems* (BROADNETS 2010). October 25-27, 2010. Athens, Greece.

H. Zhang, L. Sang, and **A. Arora**. Comparison of Data-Driven Link Estimation Methods in Low-Power Wireless Networks. *IEEE Transactions on Mobile Computing*. Vol. 11, no. 9. November 2010. pp. 1634-1648.

S. Kumar, **T. H. Lai**, M. E. Posner, and **P. Sinha**. “Maximizing the Lifetime of a Barrier of Wireless Sensors.” *IEEE Transactions on Mobile Computing* (TMC). Vol. 9, issue 8. August 2010. pp 1161 – 1172.

Y. Wu, Y. Wu, S. Fahmy, and **N. B. Shroff**. “Constructing Maximum Lifetime Data Gathering Forests in Sensor Networks,” *IEEE/ACM Transactions on Networking* vol. 18, no. 5. Oct. 2010. pp. 1571 - 1584.

G. Gupta and **N. B. Shroff**. “Delay Analysis and Optimality of Scheduling Policies for Multi-Hop Wireless Networks,” *IEEE/ACM Transactions on Networking*, vol. 19, no. 1. Feb. 2011. pp. 129 – 141.

J. Tan, Y. Yang, **N. B. Shroff** and H. El Gamal. “Delay Asymptotics with Retransmissions and Fixed Rate Codes over Erasure Channels.” In the *Proceedings of the IEEE International Conference on Computer Communications* (INFOCOM). April 10-15, 2011. Shanghai, China.

B. Ji, C. Joo, and **N. B. Shroff**, “Delay-Based Back-Pressure Scheduling in Multi-Hop Wireless Networks,” In the *Proceedings of the IEEE International Conference on Computer Communications* (INFOCOM). April 10-15, 2011. Shanghai, China.

S. Hariharan and **N. B. Shroff**. “On Optimal Energy Efficient Convergecasting in Unreliable Sensor Networks with Applications to Target Tracking.” In the *Proceedings of the ACM the Twelfth ACM International Symposium on Mobile Ad Hoc Networking and Computing* (Mobihoc 2011). May 2011. Paris, France.

J. Kim, X. Lin, and **N. B. Shroff**. “Optimal Anycast Technique for Delay-Sensitive Energy-Constrained Asynchronous Sensor Networks” *IEEE/ACM Transactions on Networking*. Vol. 19, no. 2. April 2011. pp. 484 – 497.

C. C. Wang and **N. B. Shroff**. “Pairwise Intersession Network Coding on Directed Networks.” *IEEE Transactions on Information Theory*, Vol. 56, No. 8, Aug. 2010, pp. 3879 - 3900.

R.-S. Liu, K.-W. Fan, Z. Zheng and **P. Sinha**. “Perpetual and Fair Data Collection for Environmental Energy Harvesting Sensor Networks.” *IEEE/ACM Transactions on Networking* (TON), Vol. 19, Issue 3.

S. Chen, **P. Sinha**, **N. Shroff**, and C. Joo “Finite-Horizon Energy Allocation and Routing Scheme in Rechargeable Sensor Networks.” In the *Proceedings of the 30th IEEE International Conference on Computer Communications* (IEEE INFOCOM 2011). Apr. 10-15, 2011. Shanghai, China.

W.Yu, X. Wang, P. Calyam, **D. Xuan** and W. Zhao. “Camouflaging Worm: Modeling and Detection.” *IEEE Transactions on Dependable and Secure Computing* (TDSC). Vol. 8, no. 3. March 2011. pp. 377-390.

Z. Yu, J. Teng, X. Bai, **D. Xuan** and W. Jia. “Connected Coverage in Wireless Networks with Directional Antennas.” In the *Proceedings of the IEEE International Conference on Computer Communications* (INFOCOM). April 10-15, 2011. Shanghai, China

F. P. Tso, L. Cui, L. Zhang, W. Jia, Di Yao, J. Teng and **D. Xuan**. “DragonNet: A Robust Mobile Internet Service System for Long Distance Trains.” In the *Proceedings of the IEEE International Conference on Computer Communications* (INFOCOM). April 10-15, 2011. Shanghai, China

J. Teng, B. Zhang, X. Li, X. Bai and **D. Xuan**. “E-Shadow: Lubricating Social Interaction using Mobile Phones.” In the *Proceedings of the IEEE International Conference on Distributed Computing Systems* (ICDCS). June 21-24, 2011. Minneapolis, Minnesota, USA.

F. P. Tso, J. Teng, W. Jia and **D. Xuan**. “Mobility: A Double-Edged Sword for HSPA Networks.” In the *Proceedings of the ACM International Symposium on Mobile Ad Hoc Networking and Computing* (MobiHoc). September 20-24, 2010. Chicago, Illinois, USA.

W. Gu, Z. Yang, **D. Xuan**, W. Jia and C. Que. “Null Data Frame: A Double-edged Sword.” *IEEE Transactions on Distributed and Parallel Systems* (TPDS). Vol. 14, no. 7. July 2010. pp. 897-910.

X. Bai, Z. Yun, **D. Xuan**, B. Chen and W. Zhao. “Optimal Multiple-Coverage of Sensor Networks.” In the *Proceedings of the IEEE International Conference on Computer Communications* (INFOCOM). April 10-15, 2011. Shanghai, China

C. Zhang, X. Bai, J. Teng, **D. Xuan**, W. Jia. “Constructing Low-Connectivity And Full-Coverage Three Dimensional Sensor Networks.” *IEEE Journal on Selected Areas in Communications* (JSAC). Vol. 28, no. 7. September 2010. pp. 984-993.

## SE/PROGRAMMING LANGUAGES

V. Srivastava, **M. D. Bond**, K. S. McKinley, and V. Shmatikov. “A Security Policy Oracle: Detecting Security Holes using Multiple API Implementations.” In the *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation* (PLDI’11). June 4-5, 2011. San Jose, California, USA.

G. Xu, **M. D. Bond**, **F. Qin**, and **A. Rountev**. “LeakChaser: Helping Programmers Narrow Down Causes of Memory Leaks.” In the *Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation* (PLDI’11). June 4-5, 2011. San Jose, California, USA.

M. Sitaraman, B. Adcock, J. Avigad, D. Bronish, **P. Bucci**, D. Frazier, H. M. Friedman, H. Harton, **W. Heym**, J. Kirschenbaum, J. Kron, H. Smith, and **B. W. Weide**. “Building a Push-Button RESOLVE Verifier: Progress and Challenges.” *Formal Aspects of Computing 2010*. Volume 23 / 2011. <http://www.springerlink.com/content/378t66h5j46662p7/>

## SYSTEMS

T. Liu and **G. Agrawal**. “Active Learning Based Frequent Itemset Mining Over the Deep Web.” In the *Proceedings of International Conference on Data Engineering* (ICDE), April 2011.

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X. Huo, V. T. Ravi, and **G. Agrawal**. “Approached for Parallelizing Reductions on Modern GPUs” In the *Proceedings of the conference on High Performance Computing* (HiPC), December 2010. (Best Paper Award).

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**FACULTY SERVICE**

**JOURNAL EDITORSHIP, EDITORIAL BOARDS  
& MAJOR CONFERENCE POSITIONS**

**Gagan Agrawal**

- International Journal of Next Generation Computing (IJNGC),
- IEEE Transactions on Parallel and Distributed Systems (TPDS),

**Anish Arora**

- Real Time Systems. Editor, New Generation Computing, Springer-Verlag.

**Mikhail Belkin**

- Journal of Machine Learning Research.

**Roger Crawfis**

- International Symposium on Visual Computing.

**James W. Davis**

- Machine Vision and Applications.

**Tamal Dey**

- Graphical Models.
- Journal of Computational Geometry
- Discrete & Computational Geometry.

**Eric Fosler-Lussier**

- ACM Transactions on Speech and Language Processing
- Journal of Experimental Linguistics.
- ˆ Area chair, Human Language Technologies Conference: North American Association for Computational Linguistics Meeting (NAACL-HLT).

**Ten-Hwang Lai**

- International Journal of Ad Hoc and Ubiquitous Computing
- International Journal of Sensor Networks; Editorial Board, ACM/Springer Wireless Networks.
- ˆ General Chair, International Conference on Parallel Processing 2010

**Raghu Machiraju**

- IEEE Transactions of Visualization and Graphics
- Proceedings of IEEE Visualization 2010. IEEE Transactions on Visualization and Graphics,
- ˆ General Chair, Symposium on Visualization of Biological Data (BioVis), IEEE VisWeek;

ˆ Paper Co-Chair, IEEE Visualization Conference

**DK Panda**

- IEEE Transactions On Computers;
- Special issue of Journal of Parallel and Distributed Computing.

**Srinivasan Parthasarathy**

- Journal of Parallel and Distributed Computing (JPDC).
- ACM Transactions on Knowledge Discovery and Data Mining
- SIGKDD Newsletter
- IEEE Transactions and Knowledge and Data Engineering
- Statistical Analysis and Data Mining Journal: A Journal of the American Statistical Association
- Distributed and Parallel Databases: An International Journal
- International Journal of Data Mining and Bioinformatics
- IEEE Intelligent Systems
- Data Mining and Knowledge Discovery Journal

**Rick Parent**

- Journal of the Visual Computer

**Rajiv Ramnath**

- I/S: A Journal of Law and Policy for the Information Society

**Atanas Rountev**

- International Journal of Information and Software Technology.

**P. Sadayappan**

- Board Member, External Advisory Board,



Fundamental and Computational Sciences Directorate, Pacific Northwest National Laboratory. Committee Chair, External Advisory Board, Extreme Scale Computing Initiative, Pacific Northwest Committee Member, National Laboratory. Scientific Advisory Committee, PetaQCD Project (France).

Han-Wei Shen

- Journal of Visualization
- Journal of Computer Science and Technology
- IEEE Transactions on Visualization and Computer Graphics

Prasun Sinha

- IEEE Transactions on Mobile Computing (TMC).
- IEEE Transactions on Wireless Communications (TWC)

DeLiang Wang

- Editor-in-Chief, Neural Networks
- Neurocomputing.
- Neural Computing & Applications.
- Cognitive Neurodynamics.
- EURASIP Journal on Audio, Speech, & Music Processing.
- Neural Networks.

Yusu Wang

- Journal of Computational Geometry.

Dong Xuan

- IEEE Transactions on Distributed and Parallel Systems (TPDS)
- Journal of Ad Hoc & Sensor Wireless Networks

Xiaodong Zhang

- IEEE Mico
- Journal of Parallel and Distributed Computing
- Executive Editor-in-Chief, Journal of Computer Science and Technology



Jim Davis in Denver, Colorado with past and current students. Left to right, Kevin Streib (current Ph.D. student); Vinay Sharma (2008, now at Texas Instruments); Karthik Sankaranarayanan (current Ph.D. student); Jim Davis; Ambrish Tyagi (2008, now at Omron Scientific Technologies); and Mark Keck (2009, now at BAE)

INVITED PRESENTATIONS

DISTINGUISHED GUEST LECTURER

Douglas O’Shaughnessy INRS-EMT, University of Quebec, Montreal  
Modern Methods of Automatic Speech Recognition (ASR): How and Why

GROUP TALK: SYSTEMS

Feng Chen Intel Laboratories, Hillsboro, Oregon  
Hystor: Making the Best Usage of Solid State Drives in High Performance Storage Systems

Mary Hall School of Computing, University of Utah  
Compiler-Based Autotuning for Productivity and High Performance

GUEST SPEAKER

Geoff Webb Centre for Research in Intelligent Systems, Monash University  
Learning Without Search

Lorenzo Rosasco IIT-MIT lab, Center for Biological and Computational Learning, Massachusetts Institute of Technology

Spectral Methods for Learning High Dimensional Data

Alper Yilmaz Civil, Environmental Engineering & Geodetic Science, The Ohio State University  
3D Shape Recovery by Exploiting Planar Topology in Projective Space

Philipos C. Loizou Dept. of Electrical Engineering, University of Texas at Dallas  
Time-Frequency Masks and Speech Intelligibility

Santosh Kumar Dept. of Computer Science, The University of Memphis  
Addressing Stress and Addictive Behavior in the Natural Environment Using AutoSense

Sonia Fahmy Dept. of Computer Science, Purdue University  
Scalable Network Monitoring: When to Measure and When to Infer?

Navin Goyal Algorithms Group, Microsoft Research India  
Deterministic Algorithm for the Lovasz Local Lemma

Brian Kulis EECS Department and ICSI, University of California, Berkeley  
Learning for Search and Adaptation in Large-scale Data

Huamin Wang Computer Science Div., Dept. of EECS, University of California, Berkeley  
Data-Driven Approaches for Physically Based Animation and Visualization

Imre Risi Kondor Center for the Mathematics of Information, Caltech  
Non-Commutative Harmonic Analysis in Machine Learning

Marcos Vaz Salles Department of Computer Science, Cornell University  
A Database Approach to Programming Large-Scale Behavioral Simulations

Li-Yi Wei Microsoft Research  
Computing Natural Repetitions

Wolfgang Gatterbauer Dept. of Computer Science, University of Washington  
Community Databases: Managing Data Contributed by the Masses

John H.L. Hansen Erik Jonsson School of Engineering & Computer, University of Texas at Dallas  
Who Said What When and How?: “Advances in Phonological Feature based Speech Recognition & Whisper based Speaker ID”



**Ryan Adams** Department of Computer Science, University of Toronto  
*Understanding the World with Infinite Models and Finite Computation*

**Arnab Nandi** Electrical Engineering and Computer Science, University of Michigan  
*Extrinsic Signals in Structured Search*

**Amit Deshpande** Algorithms Group, Microsoft Research, India  
*Approximability of Subspace Approximation*

**Claire Monteleoni** Center for Computational Learning Systems, Columbia University  
*Machine Learning Algorithms for Real Data Sources, with Applications to Climate Science*

**Leah Findlater** AIM Research Group Information School, University of Washington  
*Personalized Adaptation to Accommodate Diverse User Needs*

**Daisy Zhe Wang** Dept. of Computer Science, University of California, Berkeley  
*Extracting and Querying Probabilistic Information in BayesStore*

**Lei Ying** Dept. of Electrical and Computer Engineering, Iowa State University  
*Network Optimization, Control and Inference*

**Kannan Srinivasan** Dept. of Computer Science and Engineering, University of Texas at Austin  
*Wireless Full-Duplex: Breaking a Conventional Wisdom*

**Minlan Yu** Dept. of Computer Science, Princeton University  
*Scalable Management of Enterprise and Data Center Networks*

**Ethan Katz-Bassett** Dept. of Computer Science and Engineering, University of Washington  
*Improving Internet Performance and Availability with Reverse Traceroute*

**Ron Brightwell** Scalable System Software Department, Sandia National Laboratory  
*High-Performance Networking Challenges for Exascale Systems*

**Sanjeev Khanna** Dept. of Computer and Information Science, University of Pennsylvania  
*Perfect Matchings in Regular Bipartite Graphs*

**Milind Kulkarni** School of Electrical and Computer Engineering, Purdue University  
*Finding and Exploiting Parallelism in Irregular Applications*

**Jeff Zhuang** Technical Staff, Motorola Mobility  
*Mobile Broadband and Multimode Device - LTE and Its Evolution*

**Gora C Nandi** Carnegie Mellon University - Visiting Scholar,  
Indian Institute of Information Technology  
*Biped Locomotion: Challenges and Applications*

*Looking north on the Olentangy River.  
Photo from Ohio State "Image of Day"  
selections.*



# STUDENTS

## Historical View

	AU 2000	AU 2001	AU 2002	AU 2003	AU 2004	AU 2005	AU 2006	AU 2007	AU 2008	AU 2009	AU 2010
Faculty	29	30	29	31	31	32	33	35	35	35	36
Course Enrollment/ Autumn Qtr.	3,977	4,103	4,076	3,650	3,125	3,187	3,238	3,386	3,702	3,943	4,075
	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Students Taught	14,278	14,006	13,878	12,208	10,623	10,844	10,641	11,185	12,209	12,689	13,744



*Thanks to Raghunath Rajachandrasekar for sharing this wonderful panorama photo of the Spring 2011 Commencement.*

## GRADUATE PROGRAM

35

The Department of Computer Science and Engineering Graduate Program remains in-demand. The increase in graduate students and, especially supported students, generates an exciting and driven environment.

	AU 2000	AU 2001	AU 2002	AU 2003	AU 2004	AU 2005	AU 2006	AU 2007	AU 2008	AU 2009	AU 2010
Graduate Students Enrolled	157	159	164	174	169	188	184	235	239	303	304
	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Graduate Student Applications	940	1,542	1,508	712	589	694	619	705	677	817	1,031
Graduate Students Supported	130	175	156	149	158	163	135	135	132	182	218
M.S. Degrees Awarded	36	19	30	31	27	21	33	37	39	64	40
Ph.D. Degrees Awarded	8	4	7	7	11	18	17	32	26	19	20
Ph.D. Degrees (cumulative)	314	318	325	332	343	361	378	410	436	455	475

DOCTORATES BESTOWED		
Name Dissertation Title Advisor Vita	Post -Graduation Destination	
	Home	
➔	<b>Bruce M. Adcock</b> <i>Working Towards the Verified Software Process</i> Dr. Bruce Weide B.S., Lafayette College; M.S., The Ohio State University	Google, Mountainview, California, USA   Latham, New York, USA
➔	<b>Feng Chen</b> <i>On Performance Optimization and System Design of Flash Memory Based Solid State Drives in Storage Hierarchy</i> Dr. Xiaodong Zhang B. Eng., Masters, Zhenjiang University, Gongshu, Hangzhou, China; M.S., The Ohio State University	Intel Labs, Hillsboro, Oregon, USA   Yanzhou, Jiangsu, China
➔	<b>Lei Ding</b> <i>From Pixels to People: Graph Based Methods for Grouping Problems in Computer Vision</i> Dr.Mikhail Belkin and Dr. Alper Yilmaz, Dept of Civil, Environmental Engineering & Geodetic Science  B.S.Cptr.Sci.&Eng., Zhejiang University; M.S., The Ohio State University	Columbia University, New York City, New York, USA   Maanshan, China
➔	<b>Xiaoning Ding</b> <i>Advancement of Operating System to Manage Critical Resources in Increasingly Complex Computer Architecture</i> Dr. Xiaodong Zhang B.Eng., Masters, Northwestern Polytechnical University, Xi'an Shaanxi, China; M.S., The Ohio State University	Intel Labs, Pittsburgh, Pennsylvania, USA   Columbus , Ohio, USA
➔	<b>Brent K. Haley</b> <i>A Motion Capture Based Performance Animation System and Compression Scheme for Streaming 3D Animation Data</i> Dr. Raghu Machiraju B. S., University of California, Davis	   Bass Lake, California, USA
➔	<b>Okan Mustafa Irfanoglu</b> <i>Robust Variability Analysis Using Diffusion Tensor Imaging</i> Dr. Raghu Machiraju B.S., M.S., Bogazici University	National Institutes of Health, Bethesda, Maryland, USA   Istanbul, Turkey
➔	<b>Firdaus Husain Janoos</b> <i>Spatio-Temporal Representations and Analysis of Brain Function from fMRI</i> Dr. Raghu Machiraju B.Eng., University of Pune; M.S., The Ohio State University	Harvard Medical Center, Cambridge, Massachusetts, USA   Pune, India
➔	<b>Zhaozhang Jin</b> <i>Monaural Speech Segregation in Reverberant Environments</i> Dr. DeLiang Wang B.Elec. Eng., Shanghai Jiao Tong University, Shanghai, China; M.S., The Ohio State University	Infinium Capital Management, Chicago, Illinois, USA   Shanghai, China
➔	<b>Thomas F. Kerwin</b> <i>Enhancements in Volumetric Surgical Simulation</i> Dr. Han-Wei Shen B.S., The Ohio State University	Ohio Supercomputer Center (OSC), Columbus, Ohio, USA   Columbus, Ohio, USA
➔	<b>Raffi Takvor Khatchadourian</b> <i>Techniques for Automated Software Evolution</i> Dr. Neelam Soundarajan B.S.Cptr.Info.Scr., Monmouth College; M.S., The Ohio State University	Apple, Inc., Cupertina, California, USA   Edison, New Jersey, USA

➔	<b>Jason P. Kirschenbaum</b> <i>Investigations in Automating Software Verification</i> Dr. Bruce Weide B. S., M.S., The Ohio State University	Intel, Inc., Austin, Texas, USA   Shaker Heights, Ohio, USA
➔	<b>Vijay Kumar</b> <i>Specification, Configuration and Execution of Data-intensive Scientific Applications</i> Dr. P. Sadayappan B.Eng., M.S., Birla Institute fo Technology and Science; M.S., The Ohio State University	HP Labs, Palo Alto, California, USA   Bangalor, India
➔	<b>Darrell Brian Larkins</b> <i>Efficient Run-Time Support for Global View Programming of Linked Data Structures on Distributed Memory Parallel Systems</i> Dr. P. Sadayappan B.S.Cptr.Info.Sci., M.S., The Ohio State University	Coastal Carolina University, Conway, South Carolina, USA   Columbus , Ohio, USA
➔	<b>Kuiyu Li</b> <i>Computing Homological Features for Shapes</i> Dr. Tamal Dey B.Eng., Shandong University, Jinan City, Shandong, China; Masters, Chinese Academy of Sciences, Beijing China; M.S., The Ohio State University	Texas A&M University, College Station, Texas, USA   Columbus , Ohio, USA
➔	<b>Wenjing Ma</b> <i>Automatic Transformation and Optimization of Applications on GPUS and GPU Clusters</i> Dr. Gagan Agrawal B.E., Nankai University, Tianjin, China.	Pacific Northwest National Lab, Richland, Washington, USA   
➔	<b>Shantanu Singh</b> <i>Quantitative Phenotyping in Tissue Microenvironments</i> Dr. Raghu Machiraju B.Engr., Visveswaraiah Technological University; M.S., The Ohio State University	Borad Institue of MIT, Cambridge, Massachusetts, USA   Bangalore, India
➔	<b>Kaushik Sinha</b> <i>New Directions in Gaussian Mixture Learning and Semi-Supervise Learning</i> Dr. Mikhail Belkin B.Tech., Kakatiya University; M.Tech., Indian Institute of Technology, Kanpur; M.S., The Ohio State University	University of California, San Diego, California, USA   Columbus, Ohio, USA
➔	<b>Mukundan Sridharan</b> <i>Design of Mobile and Static Sensor Fabrics</i> Dr. Anish Arora B.Engr., University of Madras; M.S., The Ohio State University	OARnet, Columbus, Ohio, USA   Chennai, India
➔	<b>Fan Wang</b> <i>SEEDEEP: A System for Exploring and Querying Deep Web data Sources</i> Dr. Gagan Agrawal B.Eng., Beijing University of Technology, Beijing, China; M.S., The Ohio State University	Microsoft, Redmond, Washington, USA   Beijing, China
➔	<b>Timothy F. Weale</b> <i>Term Relatedness from Wiki-Based Resources Using Sourced PageRank</i> Dr. Eric Fosler-Lussier B.S., University of Dayton; M.S., The Ohio State University	Department of Defense, Bethesda, Maryland, USA   Columbus, Ohio, USA



MASTERS DEGREESE EARNED

- Name

Home

Vita
- Abhijat Agarwal

Meerut, UP, India

Bachelor’s, Amity University
- Artika Agarwal

Columbus, Ohio USA

Bachelor’s, Uttar Pradesh Technical University
- Meshal Musaed Almashan

Faiha, Kuwait

Civil.Engr., Kuwait Univesity
- Erdeniz Ozgun Bas

Columbus, Ohio, USA

B.A., Ege University
- Anand Joseph Bernard Selvaraj

Madurai, Tamil Nadu, India

B.Eng., Anna University
- Vivek Bharathan

Chennai, Tamil Nadu, India

B.Eng., University of Madras
- Di Cao

Shanghai, China

B.S., Fudan University, Shanghai, China
- Karthiyayini Chinnaswamy

Coimbatore, India

B.Eng., Anna University, Chennai, India
- Chaitanya Shrikant Chitale

Columbus, Ohio, USA

B.Tech., Visvesvaraya National Institute of Technology, Nagpur, Maharashtra, India
- Roshni Datta

Hooghly, India

B.Techn., West Bengal University of Technology
- Satyajeet Sanjay Deshpande

Mumbai, India

B.S.Comm., Master’s., University of Mumbai
- Shubhanan Deshpande

Pune, India

B.Eng., University of Pune
- Shweta Ravindra Deshpande

Pune, India

B.Eng., University of Pune
- Sheetal P. Ghadse

Nagpur, India

B.Eng., M.B.A., Nagpur University

- Kyle Gillingham

Westerville, Ohio, USA

B.S.Cptr.Sci.Eng., The Ohio State University
- Boxuan Gu

Nanjing, China

Bachelor’s Mech.Eng., Southeast University; M.S. University of Kentucky
- Ashwin Gururaghavendran

Coimbatore, India

Bachelor’s, Anna Univeristy
- William Hartmann

Cincinnati, Ohio, USA

B.S., Northern Kentucky University, Newport, Kentucky, USA
- Rajiv Kakarlapudi

Hyderbad, India

B.Tech., Jawaharlal Nehru Technological University, Hyderbad, India
- Neelima Karanam

Hyderabad, India

B.Tech., Jawaharlal Nehru
- Neeraj Lal

New Delhi, India

B.Tech., Guru Gobind Singh Indraprastha University
- Razvan Lupusoru

North Canton, Ohio, USA

B.S.Cptr.Sci.Eng., The Ohio State University
- Chao Ma

Beijing, China

B.Engr., Huazhong University of Science and Technology
- Yeshwant Sai Madanagopal

Chennai, Tamil Nadu, India

B.Eng., Anna University, Chennai, India
- Amit Modi

Jaipur, India

Bachelor’s, Bharati Vidyapeeth University
- Iyyappa Thir Murugandi

Columbus, Ohio, USA

B.Eng., Madurai Kamaraj Univeristy, Madurai, Tamil Nadu, India
- Andrew Pamu

Hyderabad, India

B.Eng., Osmania University

- Rohit Patali

Thane, India

Bachelor’s, University of Mumbai
- Dheeraj Pulluri

Hyderabdad, India

B.Eng., Osmania University
- Sundaresan Raman

Chennai, India

B.Eng., Birla Institute of Technology and Science
- Mitchell Richeson

Greenwood, Indiana, Ohio

B.S.Cptr.Sci.Eng., The Ohio State University
- Karthik Sankaranarayanan

Pune, India

B.Eng., University of Pune
- Yuri Rajendra Shelke

Amravati, India

B.Eng., Amravati Univeristy, Amravati, India
- Apeksha Shrinath Shetty

Mumbai, India

B.Eng., University of Mumbai, Mumbai, India
- Anand Sreenivasan

Nashik, India

Bachelor’s, University of Pune
- Cenny Taslim

Jakarta, Indonesia

B.S.Ind.Sys.Eng., M.S. Ind.Sys.Eng., Ph.D. Ind.Sys. Eng.
- Yisong Wang

Columbus, Ohio, USA

B.S., Beijing University of Posts and Telecommunications
- Andrew Weinmann

Cleveland, Ohio, USA

Bachelor’s, Youngstown State University
- Kevin Wells

McMurray, Pennsylvania, USA

B.S.Elect.Cptr.Eng, The Ohio State University
- Huaijian Zhang

Yangzhou, China

B.S., University of Science and Technology of China



Above, newly hooded Dr. Bruce Adcock with his young son, Rayhan.

Below Raffi Khatchadourian leans on the Golden Six in the Garden of Constants.

FIFTH ANNUAL GRADUATE STUDENT RESEARCH EXHIBIT

Student	Advisor	Poster title
Abhijat Agarwal	Srinivasan Parthasarathy	Kriging Based Predictor for Spatiotemporal Weather Data
Arindam Bhattacharya	Rephael Wenger	Sharp Marching Cubes
Matt Boggus	Roger Crawfis	Modeling of Three Dimensional Caves for Computer Games
Joe Bolinger	Jay Ramanathan	Blacktie: Injecting Elements of Formality into Enterprise Social Software
Derek Bronish	Bruce Weide	Issues in Modular Verification for a Component-Based Functional Programming Language
Zhezhe Chen	Feng Qin	Flowchecker: Detecting Bugs in MPI Libraries Via Message
Joshua Eckroth	John Josephson	Abductive Reasoning with Abductive Meta-Reasoning
Jonathan Eisenmann	Rick Parent	Evolving Gestural Controllers for Cartoon Animation
William Hartmann	Eric Fosler-Lussier	Investigations into the Incorporation of the Ideal Binary Mask in Asr
Ke Hu	DeLiang Wang	An Approach to Sequential Grouping in CoChannel Speech
Yin Huai	Xiaodong Zhang	DOT: A Matrix Model For Analyzing, Optimizing and Deployingbig Data Analytics in Distributed Systems
Yin Huai	Xiaodong Zhang	RCFile: A Fast and Space-Efficient Data Placement Structure in Mapreduce-Based Warehouse Systems
Jipeng Huang	Michael Bond	Dynamic Program Analysis for Reliable Concurrent Software
Anthony Judkins	Chris Stewart	A Web Platform for Teaching Cloud Management
Thomas Kerwin	Han-Wei Shen	Automatic Scoring and Interactive Analysis of Multivolume Medical Datasets
Raffi Khatchadourian	Neelam Soundarajan	Fraglight: Shedding Light on Broken Pointcuts in Evolving Aspect-Oriented Software
Jason Kirschenbaum	Bruce Weide	Investigations Into Automating Software Verification
Tian Luo	Xiaodong Zhang	Cattl: a Content-Aware Flash Translation Layer Enhancing The Lifespan Of Flash Memory Based Solid State Drives
Tian Luo	Xiaodong Zhang	YSmart: Yet Another SQL-to-MapReduce Translator

Student	Advisor	Poster title
Wenjing Ma	Gagan Agrawal	Code Generation and Optimization for GPUs
Timothy Miller	Radu Teodorescu	Steamroller: Flattening Out the Effects of Process Variation Using Clock Dividers and Dual Voltage Rails
Preethi Raghavan	Chris Brew	Information Extraction from Clinical Narratives
Issam Safa	Yusu Wang	Feature-Aware Streamline Generation of Planar Vector Field Via Topological Methods
Karthik Sankaranarayanan	James Davis	PTZ Camera Modeling And Panoramic View Generation Via Focal Plane Mapping
Venu Satuluri	Srinivasan Parthasarathy	Symmetrizations for Clustering Directed Graphs
Benjamin Schroeder	Richard Parent	A Comparison of Several Musical String Implementations
Mukundan Sridharan	Anish Arora	Reliable Energy Efficient Predictive Routing For Delay Tolerant Networks
Enhua Tan	Xiaodong Zhang	Online Spam Detection In Social Networks
Jin Teng	Dong Xuan	E-Shadow: Lubricating Social Interaction Using Mobile Phones
Kaibo Wang	Xiaodong Zhang	SRM-buffer: An Os Buffer Management Technique to Prevent Last Level Cache from Thrashing in Multicores
Kaibo Wang	Xiaodong Zhang	ULCC: A User-Level Facility for Optimizing Shared Cache Performance On Multicores
John Woodruff	DeLiang Wang	Directionality-based Speech Enhancement for Hearing Aids
Xintian Yang	Srinivasan Parthasarathy	Fast Sparse Matrix-Vector Multiplication on GPUs: Implications for Graph Mining
Cheng Zhang	Rick Parent	An Enhancement of High-Speed Motion Illustration Based on the Principles of Motion Perception
Boying Zhang	Dong Xuan	P3-Coupon: A Probabilistic System for Prompt and Privacy-Preserving Electronic Coupon Distribution



UNDERGRADUATE PROGRAM

“Keeping up with demand” is generally an inventory industry problem. But currently it is a challenge being faced by CSE as we experience another growth year.

Undergraduate students joining the Department of Computer Science and Engineering have three options for their education: a Bachelors of Science from the College of Engineering and a Bachelors of Science or a Bachelors of Arts from the College of Natural & Mathematical Sciences. Each gives the student flexibility in how they wish to work with computers and opens up options for post graduation careers.

The Department is also responsible for many service courses for students in multiple majors across the University. CSE 101 is accepted for all OSU majors as a General Education Course. For the Construction Systems Management majors from the Department of Food, Agriculture and Biological Engineering, Computer-Assisted Problem Solving for Construction Management (#105)is taught where students learn how to use productivity software, especially spreadsheets and databases, to solve problems for construction management; relative/absolute cell referencing, logic, functions, relational databases, querying, project integration. Meanwhile, all Fisher College of Business students take CSE’s Computer Assisted Problem Solving for Business (#200), as well as these courses for the Information Systems specialization: Data Structures for Information Systems (#214), and Business Programming with File Processing (#314).

CSE students have multiple language options. CSE teaches C, C++, LISP, PERL, and Java.

For more information on individual classes please see the CSE website. (www.cse.ohio-state.edu)

UNDERGRADUATE ACADEMIC ADVISING OFFICE

The Undergraduate Academic Advising Office is always a very busy place and it is becoming increasingly so. As The Ohio State University moves its academic calendar from quarters to semesters in Summer 2012 and the pivotal position of Undergraduate Academic Advisor becomes essential for every undergraduate student. The Advisors will be working with numerous committees as CSE restructures its programs for the new calendar.

Very knowledgeable staff assist students in attaining their educational and career goals.

**Peg Steele**, Coordinator of Academic Advisement. Ms. Steele is active at the local and national levels of academic advising. The National Academic Advising Association awarded her the 2009 NACADA Service to Commission Award for her work on the Engineering & Science Advising Commission. In 2004, NACADA named Ms. Steele “Outstanding Advisor” and twice she received the same recognition from the local OSU chapter. She will be serving on the Board of Directors for the next two years for the National Academic Advising Association.

**Nikki Strader**, Academic Advisor & Staff Assistant. From 2006 through 2008, Nikki served as the President of the Academic Advising Association of Ohio State (ACADAOS), and in May 2007, was named one of two Outstanding Advisors at Ohio State by ACADAOS. She is the primary contact for all freshman pre-CSE students.

**Mary Jo Deerwester**, Academic Advisor & Staff Assistant. Mary Jo is new the Department in the 2010 Academic year, but is not stranger to The Ohio State University. She graduated from OSU in 1971 with a Bachelor of Science degree in Education. (Major: English; Minor: Psychology) She followed that in 1983 with a Master’s Degree in Guidance and Counseling. Mary Jo previously worked as an Academic Advisor at Columbus State Community College and as an Academic Advisor/Staff Assistant for the OSU College of Engineering.

**Keith Chima**, Graduate Advising Assistant. He is working on his Master’s degree in Computer Science & Engineering, with a focus on software engineering, and he intends to graduate after Autumn quarter 2011.

BACHELOR DEGREES AWARDED

Colleges of the Arts and Sciences

- Michael Anderson (BS)  
Columbus, Ohio, USA
- Cody Baith (BS)  
Magna Cum Laude  
Lexington, Ohio, USA
- Ryan Blatz (BS)  
Kettering, Ohio, USA
- Brian Bolte (BS)  
Cincinnati, Ohio, USA
- David Brasser (BS)  
Columbus, Ohio, USA
- Jessica Brohard (BS)  
Westerville, Ohio, USA
- Daniel Carpenter (BA)  
Brookville, Ohio, USA
- Travis Casper (BS)  
Copley, Ohio, USA
- Jamie Colley (BS)  
Summa Cum Laude, with Honors in Arts and Sciences  
Hilliard, Ohio USA
- Mary Copas (BA)  
St. Clairsville, Ohio, USA
- Daniel Corson (BS)  
Upper Arlington, Ohio, USA
- Meghan Day (BA)  
Cum Laude, with Honors in the Arts and Sciences  
Blacksburg, Virginia, USA
- John Doolittle (BS)  
Magna Clum Laude  
with Honors in the Arts and Sciences  
Bellbrook, Ohio, USA
- Matthew Dunson, (BS)  
Columbus, Ohio, USA
- Ryan Eiger (BA)  
Columbus, Ohio, USA
- Carlos Escobedo (BA)  
Delaware, Ohio, USA
- Noah Firestone (BS)  
Westerville, Ohio, USA
- Skyler Fox (BS)  
Shelby, Ohio, USA

- Laura Houseley (BS)  
Magna Cum Laude, with Honors in the Arts and Sciences  
Avon Lake, Ohio, USA
- Megan Johns (BA)  
Cum Laude  
with honor in the Arts and Sciences  
Columbus, Ohio, USA
- Alexander Kostanski (BS)  
Columbus, Ohio, USA
- Kirk Lammers (BA)  
Port Clinton, Ohio, USA
- David Landreman (BS)  
Columbus, Ohio, USA
- Jeffrey Lembeck (BS)  
Yakima, Washington, USA
- Jason Link (BS)  
Magna Cum Laude  
Ostrander, Ohio, USA
- Michael Lukach (BS)  
Columbus, Ohio, USA
- Gregory Maag (BS)  
Ottawa, Ohio, USA
- Max Manofsky (BS)  
Columbus, Ohio, USA
- Edward Modecki-Mellettt (BS)  
Cum Laude  
Columbus, Ohio, USA
- Adam Morello (BS)  
Cortland, Ohio, USA
- Joseph Mudge (BS)  
Hilliard, Ohio, USA
- Patrick Mulac (BS)  
Cum Laude, with Honors in the Arts and Sciences  
Brecksville, Ohio, USA
- Jonathan Musser (BS)  
Marietta, Georgia, USA
- Steven Myers (BS)  
Lexington, Kentucky, USA
- Donald Olszewski, II (BS)  
Pittsburgh, Pennsylvania, USA
- Michael Pettiford (BS)  
Dublin, Ohio, USA
- Benjamin Priest (BS)  
Cum Laude, with Honors in the Arts and Sciences  
Dayton, Ohio, USA

- ✦ [Michael Ray, Jr. \(BS\)](#)  
Parkersburg, Ohio, USA
- ✦ [Nicholas Rickards \(BS\)](#)  
Springfield, Ohio, USA
- ✦ [Jhovary Ruiz \(BS\)](#)  
Cleveland, Ohio, USA
- ✦ [Colin Seymour \(BS\)](#)  
Sunbury, Ohio, USA
- ✦ [Kerry Shupert \(BS\)](#)  
Seaman, Ohio, USA
- ✦ [Igo Sirotin \(BS\)](#)  
Dublin, Ohio, USA
- ✦ [Gordon Sjostrom \(BS\)](#)  
*Magna Cum Laude, with Honors in the Arts and Sciences*  
Worthington, Ohio, USA
- ✦ [Richard Smith \(BA\)](#)  
Malvern, Ohio, USA
- ✦ [Daniel Snodgrass \(BA\)](#)  
Andover, Ohio, USA
- ✦ [Mukul Soundarajan \(BS\)](#)  
Dublin, Ohio, USA
- ✦ [Daniel Spagnuolo \(BS\)](#)  
Pickerington, Ohio, USA
- ✦ [Benjamin Stahl \(BS\)](#)  
*With Honors in the Arts and Sciences*  
Pandora, Ohio, USA
- ✦ [Kermit Stearns, III \(BS\)](#)  
Cincinnati, Ohio, USA
- ✦ [Mark Vance \(BS\)](#)  
Columbus, Ohio, USA
- ✦ [Hoa Trong Vu \(BS\)](#)  
*Magna Cum Laude*  
Hochiminh City, Vietnam
- ✦ [Brandon Wallace \(BA\)](#)  
Hilliard, Ohio, USA
- ✦ [Joseph White \(BS\)](#)  
Newark, Ohio, USA
- ✦ [Nicholas Whitt \(BA\)](#)  
Fairfield, Ohio, USA
- ✦ [Andrew Wunderle \(BS\)](#)  
North Olmsted, Ohio, USA
- ✦ [Matthew Zachrich \(BS\)](#)  
*Magna Cum Laude*  
Defiance, Ohio, USA

*College of Engineering  
(all degrees are Bachelors of Science)*

- ✦ [Ross Amore](#)  
*Magna Cum Laude*  
Washington Courthouse, Ohio, USA
- ✦ [Darik Andersen](#)  
Kirkman, Iowa, USA
- ✦ [Brian Arand](#)  
*Summa Cum Laude*  
West Chester, Ohio, USA
- ✦ [Andrew Arnold](#)  
North Canton, Ohio, USA
- ✦ [Silas Baronda](#)  
London, Ohio, USA
- ✦ [Joseph Belisle](#)  
*Magna Cum Laude*  
Newark, Ohio, USA
- ✦ [Shaun Brady](#)  
Lima, Ohio, USA
- ✦ [David Brickey](#)  
*Magna Cum Laude*  
Bexley, Ohio, USA
- ✦ [Kevin Brohaugh](#)  
*Summa cum Laude*  
Cincinnati, Ohio, USA
- ✦ [Matthew Bromley](#)  
Broadview Heights, Ohio, USA
- ✦ [Tam Minh Bui](#)  
Columbus, Ohio, USA
- ✦ [Kyle Casper](#)  
Galloway, Ohio, USA
- ✦ [Zhitu Chen](#)  
*Summa cum Laude*  
Guangzhou, China
- ✦ [Zhanpeng Cheng](#)  
*Summa Cum Laude*  
Fairfield, Ohio, USA
- ✦ [Alex Clifford](#)  
Englewood, Ohio, USA
- ✦ [Gustav Coliadis](#)  
Canfield, Ohio, USA
- ✦ [Braden Couch](#)  
Perrysburg, Ohio, USA

- ✦ [Angela Deady](#)  
*Magna Cum Laude*  
Reynoldsburg, Ohio, USA
- ✦ [Bradley Dement](#)  
Hudson, Ohio, USA
- ✦ [Sean Dunn](#)  
Stow, Ohio, USA
- ✦ [Benjamin Ebel](#)  
Canton, Ohio, USA
- ✦ [Esteban Escobar](#)  
Rancagua, Chile
- ✦ [Bryce Fisher](#)  
Mansfield, Ohio, USA
- ✦ [Devon Garrett](#)  
Dayton, Ohio, USA
- ✦ [Eric George](#)  
*Summa Cum Laude*  
Liberty Township, Ohio, USA
- ✦ [Jason Hall](#)  
Hilliard, Ohio, USA
- ✦ [Brandon Halloran](#)  
Olmstead Falls, Ohio, USA
- ✦ [Brianna Hemeyer](#)  
*Cum Laude*  
Bellevue, Ohio, USA
- ✦ [Matthew Hibbard](#)  
Southbury, Connecticut, USA
- ✦ [Daren Hrelic](#)  
Bridgewater, Connecticut, USA
- ✦ [Liang Qing Hu](#)  
Kai Ping, China
- ✦ [Zul Fahmi Jemaat](#)  
Jasin, Malaysia
- ✦ [Grand Johnson](#)  
Sidney, Ohio, USA
- ✦ [Samuel Jones](#)  
Ravenna, Ohio, USA
- ✦ [Sterling Keaton, III](#)  
Euclid, Ohio, USA
- ✦ [Stephen Kemery](#)  
*Cum Laude*  
Hilliard, Ohio, USA
- ✦ [Matthew Kern](#)  
Mentor, Ohio, USA

- ✦ [Viktor Kitsis](#)  
Cleveland, Ohio, USA
- ✦ [Matthew Kolesaric](#)  
Westerville, Ohio, USA
- ✦ [Gregory Landrum](#)  
Fairfield, Ohio, USA
- ✦ [Jeremy Lange](#)  
Marysville, Ohio, USA
- ✦ [Jacob Ledel](#)  
Rocky River, Ohio, USA
- ✦ [Junghun Lee](#)  
Seoul, Korea
- ✦ [Evan Liang](#)  
West Chester, Ohio, USA
- ✦ [Eugene Livshin](#)  
Solon, Ohio, USA
- ✦ [Andrew Loosli](#)  
Lakewood, Ohio, USA
- ✦ [Michael Lucia](#)  
Mildord, Ohio, USA
- ✦ [Razvan Lupusoru](#)  
*Summa Cum Laude  
with Honors in Engineering*  
North Canton, Ohio, USA
- ✦ [Taylor Mackinder](#)  
Jackson, Michigan, USA
- ✦ [Christopher Magnacca](#)  
Columbus, Ohio, USA
- ✦ [Stephen Mayo](#)  
Dublin, Ohio, USA
- ✦ [Ryan McDonald](#)  
Copley, Ohio, USA
- ✦ [Mitch McIlrath](#)  
*Cum Laude*  
Milan, Ohio, USA
- ✦ [Dylan Miller](#)  
Columbus, Ohio, USA
- ✦ [Ian Miller](#)  
Hilliard, Ohio, USA
- ✦ [Abdul Mod-Rokbi](#)  
Kuala Lumpur, Malaysia
- ✦ [William Mohr](#)  
Scotia, New York, USA

- ★ [Legrand Mondseir](#)  
Columbus, Ohio, USA
- ★ [Marc Mustric](#)  
Worthington, Ohio, USA
- ★ [Adam Nerderman](#)  
Kirtland, Ohio, USA
- ★ [Nicholas Obee](#)  
Toledo, Ohio, USA
- ★ [Kelun Ouyang](#)  
Dublin, Ohio, USA
- ★ [Andrew Petit](#)  
Westerville, Ohio, USA
- ★ [Maksim Pritsker](#)  
*Magna Cum Laude*  
Westerville, Ohio, USA
- ★ [Michael Pulakos](#)  
Canfield, Ohio, USA
- ★ [Anson Quach](#)  
Columbus, Ohio, USA
- ★ [Charles Reader, Jr.](#)  
Columbus, Ohio, USA
- ★ [Jeffrey Ringle](#)  
Hilliard, Ohio, USA
- ★ [Alex Rodriguez](#)  
Mentor, Ohio, USA
- ★ [Nelly Ruehl](#)  
Hilliard, Ohio, USA
- ★ [Anthony Schneider](#)  
Alliance, Ohio, USA
- ★ [David Schraitle](#)  
Richfield, Ohio, USA
- ★ [Jason Schultz](#)  
Cleveland Heights, Ohio, USA
- ★ [Bradley Seelig](#)  
Mason, Ohio, USA
- ★ [Michael Shah](#)  
Medina, Ohio, USA
- ★ [Trebor B. Shankle](#)  
*Magna Cum Laude*  
Crestline, Ohio, USA
- ★ [Patrick Shuff](#)  
Jackson Center, Ohio, USA
- ★ [Parmeet Singh](#)  
*Magna Cum Laude*

- Columbus, Ohio, USA
- ★ [Owen Smith](#)  
Williamston, Michigan, USA
  - ★ [Robert Snider](#)  
*Cum Laude*  
Olmsted Township, Ohio, USA
  - ★ [Jesse M. Stark](#)  
*Cum Laude*  
Dayton, Ohio, USA
  - ★ [Andrew M. Stock](#)  
*Cum Laude*  
*with Honors in Engineering*  
Columbus, Ohio, USA
  - ★ [David Straily](#)  
Dublin, Ohio, USA
  - ★ [Adrian H. Tan](#)  
Hilliard, Ohio, USA
  - ★ [Wei-Cheng Tang](#)  
Cincinnati, Ohio, USA
  - ★ [Darwin M. Thomas](#)  
New Castle, Pennsylvania, USA
  - ★ [Mahesh Thundathil](#)  
Hamilton, Ohio, USA
  - ★ [Renee Tischler](#)  
*Cum Laude*  
Parma, Ohio, USA
  - ★ [James Trowbridge](#)  
Oakton, Virginia, USA
  - ★ [Rebecca Vallera](#)  
Marietta, Ohio, USA
  - ★ [Devin Weise](#)  
*Cum Laude*  
Mason, Ohio, USA
  - ★ [Weston Wieser](#)  
*Cum Laude*  
Chesterfield, Missouri, USA
  - ★ [Ronald Winkler](#)  
Mason, Ohio, USA
  - ★ [Andrew Yates](#)  
Waterville, Ohio, USA
  - ★ [Daniel Ziemba](#)  
St. Clairsville, Ohio, USA

# COURSE LISTING FOR ACADEMIC YEAR 2010-2011

# & NAME OF COURSE	CREDIT HOURS		# & NAME OF COURSE	CREDIT HOURS	
101	Computer-Assisted Problem Solving	4	668	Applied Component-Based Programming for Engineers and Scientists	3
102	Introduction to the Internet and the World-Wide Web	3	670	Introduction to Database Systems I	3
105	Computer-Assisted Problem Solving for Construction Management	4	671	Introduction to Database Systems II	3
200	Computer Assisted Problem Solving for Business	5	674	Introduction to Data Mining	3
201	Elementary Computer Programming	4	675.01	Introduction to Computer Architecture	3
202	Introduction to Programming and Algorithms for Engineers and Scientists	4	675.02	Introduction to Computer Architecture	4
203	Computational Thinking in Context: Interactive Animations and Games	4	676	Microcomputer Systems	3
204	Computational Thinking in Context: Digital Images and Sound	4	677	Introduction to Computer Networking	3
205	Computational Thinking in Context: Science and Engineering	4	678	Internetworking	3
214	Data Structures for Information Systems	4	679	Introduction to Multimedia Networking	3
221	Software Development Using Components	4	680	Introduction to Analysis of Algorithms and Data Structures	3
222	Development of Software Components	4	681	Introduction to Computer Graphics	4
230	Introduction to C++ Programming	4	682	Computer Animation	4
314	Business Programming with File Processing	4	683	Computer Animation - Algorithms and Techniques	4
321	Case Studies in Component-Based Software	4	693	Individual Studies	1
360	Introduction to Computer Systems	4	699	Undergraduate Research in Computer Science and Engineering	
421	Software Development in Java	3	721	Introduction to Parallel Computing	4
459.11	Programming Languages for Programmers: The UNIX Programming Environment	1	723	Introduction to Cryptography	3
459.21	Programming Languages for Programmers: Programming in C	1	725	Computability and Unsolvability	3
459.22	Programming Languages for Programmers: Programming in C++	1	727	Computational Complexity	3
459.23	Programming Languages for Programmers: Programming in JAVA	1	730	Survey of Artificial Intelligence II: Advanced Topics	3
459.24	Programming Languages for Programmers: Programming in C#	1	731	Knowledge-Based Systems	4
459.31	Programming Languages for Programmers: Programming in LISP	1	732	Computational Linguistics	4
459.51	Programming Languages for Programmers: Programming in Perl	1	733	Foundations of Spoken Language Processing	3
489	Professional Practice in Industry	2	735	Methods of Pattern Recognition	3
493	Individual Studies	1	737	Proseminar in Cognitive Science	2
502	Object-Oriented Programming for Engineers and Scientists	3	739	Knowledge-Based Systems in Engineering	3
541	Elementary Numerical Methods	3	741	Comparative Operating Systems	3
551	Introduction to Information Security	3	755	Programming Languages	3
560	Systems Software Design, Development, and Documentation	5	756	Compiler Design and Implementation	4
581	Interactive Computer Graphics	4	757	Software Engineering	3
601	Social and Ethical Issues in Computing	1	758	Software Engineering Project	4
612	Introduction to Cognitive Science	3	760	Operating Systems	3
616	Object-Oriented Systems Analysis	4	762	Web-Services-Based Distributed Systems Project	4
621	Introduction to High-Performance Computing	3	763	Introduction to Distributed Computing	3
625	Introduction to Automata and Formal Languages	3	767	Applied Use-Case-Driven Object-Oriented Analysis and Design for Engineers and Scientists	3
630	Survey of Artificial Intelligence I: Basic Techniques	3	768	Applied Component-Based Programming for Engineers and Scientists	3
634	Computer Vision for Human-Computer Interaction	3	769	Applied Enterprise Distributed Computing for Engineers and Scientists	3
651	Network Security	3	770	Database System Implementation	3
652	Applied Information Security Project	4	772	Information System Project	4
655	Introduction to the Principles of Programming Languages	4	775	Computer Architecture	3
660	Introduction to Operating Systems	3	778	Computer-Aided Design and Analysis of VLSI Circuits	4
662	Operating Systems Laboratory	3	779	Introduction to Neural Networks	3
			780	Analysis of Algorithms	3
			781	Introduction to 3D Image Generation	4
			782	Advanced 3D Image Generation	3
			783H	Honors Research	1
			784	Geometric Modeling	3
			786	Game Design and Development Project	4
			788	Intermediate Studies in Computer and Information Science	1-5
				788.01 Computational Complexity	
				788.02 Information Systems and Database Systems	



788.03 Symbolic Computation	
788.04 Artificial Intelligence	
788.06 Operating Systems and Systems Programming	
788.07 Programming Languages	
788.08 Computer Organization	
788.09 Numerical Analysis	
788.10 Human-Computer Interaction	
788.11 Parallel and Distributed Computing	
788.12 Software Engineering	
788.14 Computer Graphics	
793 Individual Studies	0
794/790 Advanced Algorithms	3
861 Computer Communication Networks I	3
862 Computer Communication Networks II	3
875 A dvanced Computer Architecture	3
885 Seminar on Research Topics in Computer and Information Science	1
888 Advanced Studies in Computer and Information Science	1-5
888.01 Computational Complexity	
888.02 Information Systems and Database Systems	
888.03 Symbolic Computation	
888.04 Artificial Intelligence	
888.06 Operating Systems and Systems Programming	
888.07 Programming Languages	
888.08 Computer Organization	
888.09 Numerical Analysis	
888.10 Human-Computer Interaction	
888.11 Parallel and Distributed Computing	
888.12 Software Engineering	
888.14 Computer Graphics	
891.01 Interdisciplinary Seminar on Biomedical Images	1
999 Research	1



*Jeremy Morris teaching class.*

*CSE hosted several members of the Delaware County Senior Center, led by director, Sandy Miller. It was the final event in a day of activities for the group in which the day's theme was computers and communication.*

*Undergraduate Amanda Kauppila (standing right) gave them a presentation on how the Internet works and samples of some information available in cyberspace. Amanda volunteered for the project in part because of high school service work in senior center as well as her work prior to becoming a CSE major; she worked as a nurse's aide in a nursing home.*

*"I enjoy working with older citizens. They are interesting and always have the best stories to tell. This group especially had great questions. It was a lot of fun."*

*And from the smile on the seniors' faces, they enjoyed the visit as well.*





# FACULTY

## TENURE TRACK FACULTY

### **GAGAN AGRAWAL** *Full Professor*

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

Department Research Area: SYSTEMS

Interests: System Software for Parallel and Distributed Environments; Compiler and Runtime Support for Data Intensive Computing, Middleware for Grid and Cloud Environments, Data Integration and Deep web mining.



### **ANISH ARORA** *Full Professor*

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

Department Research Area: NETWORKING

Interests: Wireless Sensor Networks; Fault-tolerant, Secure And Timely Computing; Distributed Systems and Networks; Cyberphysical Systems; Component-Based Design; Formal Methods; Concurrency Semantics.



### **MIKHAIL BELKIN** *Associate Professor*

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

Department Research Area: ARTIFICIAL INTELLIGENCE

Interests: Machine Learning And Statistical Analysis Of Natural Data; Manifold And Spectral Methods For Machine Learning; Algorithms For Semi-Supervised Learning And Clustering; Understanding The Value Of Unlabeled Data In Pattern Recognition; Theoretical analysis of algorithms, particularly in high dimension; Connections to Human Cognition



### **MICHAEL BOND** *Assistant Professor*

B.S., Computer Science, University of Illinois at Urbana-Champaign, 2002; M.C.S., Computer Science, University of Illinois at Urbana-Champaign, 2003; Ph.D., Computer Sciences, The University of Texas at Austin, 2008

Department Research Area: SOFTWARE ENGINEERING

Interests: Research Interests: Developing program analyses and software systems that make complex, concurrent software reliable, scalable, and secure. Programming languages, software systems, runtime systems, program analysis, compilers, security.



### **CHRISTOPHER BREW** *Associate Professor*

Associate Professor of Linguistics and Cognitive Science

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

Department Research Area: ARTIFICIAL INTELLIGENCE

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





**ROGER CRAWFIS** *Associate Professor*

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

Department Research Area: GRAPHICS

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



**JAMES W. DAVIS** *Associate Professor*

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

Department Research Area: ARTIFICIAL INTELLIGENCE

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



**TAMAL K. DEY** *Full Professor*

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

Department Research Area: GRAPHICS

Interests: Computational Geometry; Computational Topology; Geometric Modeling; Meshing; Data Analysis.



**HAKAN FERHATOSMANOGLU** *Associate Professor*

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

Department Research Area: SYSTEMS

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



**ERIC FOSLER-LUSSIER** *Associate Professor*

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

Department Research Area: ARTIFICIAL INTELLIGENCE

Interests: Automatic Speech Recognition; Computational Linguistics; Machine Learning

**TEN-HWANG (STEVE) LAI** *Full Professor*

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

Department Research Area: NETWORKING

Interests: Cryptography; Network Security; and Parallel and Distributed Computing.



**DAVID LEE** *Full Professor*

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

Department Research Area: NETWORKING

Interests: Communications and Network Protocol Security and Reliability



**RAGHU MACHIRAJU** *Associate Professor*

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

Department Research Area: GRAPHICS

Interests: Interests: Scientific and Medical Visualization; Imaging; Computational Biology



**DHABALESWAR K. (DK) PANDA** *Full Professor*

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

Department Research Area: SYSTEMS

Interests: Parallel Computer Architecture; High Performance Networking; Network-Based Computing; Cluster Computing; High Performance File/Storage Systems; Lan-Wan Interfacing and Communication; and Resource Management.



**RICHARD E. PARENT** *Full Professor*

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

Department Research Area: GRAPHICS

Interests: Computer Graphics; Computer Animation; Modeling and Animating Human Figure; Tracking Human Figures in Video; Perception of Synthetic Imagery.





**SRINIVASAN PARTHASARATHY** *Full Professor*

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

Department Research Area: SYSTEMS

Interests: Data Mining; Database Systems; Network Analysis; Bioinformatics; High Performance Computing Systems.



**FENG QIN** *Assistant Professor*

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

Department Research Area: SYSTEMS

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



**LUIS RADEMACHER** *Assistant Professor*

Bachelor in Engineering Sciences, Mathematics, Universidad de Chile; Santiago, Chile, 2002; Mathematical Engineering Title (Masters Equivalent) Universidad de Chile. Santiago, Chile, 2002; Ph.D., Applied Mathematics, Massachusetts Institute of Technology, 2007.

Department Research Area: THEORETICAL COMPUTER SCIENCE

Interests: Algorithmic convex geometry; random structures; computational complexity; matrix approximation; game theory; mathematical economics; optimization.



**NICOLETA ROMAN** *Assistant Professor, Lima Campus*

B.S., Computer Science, University of Bucharest, Romania, 1996; M.S., Computer Science, University of Bucharest, Romania, 1997; Ph.D., Computer Science and Engineering, The Ohio State University, Columbus, Ohio, 2005.

Department Research Area: ARTIFICIAL INTELLIGENCE

Research interests: Computational Auditory Scene Analysis; Binaural sound localization and separation; Automatic Speech Recognition; Machine Learning.



**ATANAS (NASKO) ROUNTEV** *Associate Professor*

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

Department Research Area: SOFTWARE ENGINEERING

Interests: Static and Dynamic Program Analysis; Programming Languages and Compilers; Software Understanding and Evolution; Software Testing; High-Performance Computing

**PONNUSWAMY (SADAY) SADAYAPPAN** *Full Professor*

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

Department Research Area: SYSTEMS

Interests: Compiler/Runtime Systems For High-Performance Computing; Performance Optimization; High-Productivity, High-Performance Scientific Computing.



**HAN-WEI SHEN** *Associate Professor*

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

Department Research Area: GRAPHICS

Interests: Computer Graphics; Information Visualization; Parallel Visualization Scientific Visualization; Visual Analytics.



**NESS B. SHROFF** *Ohio Eminent Scholar of Networking and Communications  
Endowed Chaired Professor*

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

Department Research Area: NETWORKING

Interests: Interests: Wireless Networks; Next Generation Internet; Sensor Networks; Cloud Computing; Network Optimization; Network Design and Dimensioning; Network Security; Information Theoretic Security; Queueing Theory; Dynamic Control; Network Coding; Scaling Laws; Distributed Algorithms; Complexity and Approximability; Game Theory; Pricing.



**PRASUN SINHA** *Associate Professor*

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

Department Research Area: NETWORKING

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



**PAUL A.G. SIVILOTTI** *Associate Professor*

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

Department Research Area: SOFTWARE ENGINEERING

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







**NEELAM SOUNDARAJAN** *Associate Professor*  
B.S., Physics, Bombay University, India, 1970; M.S., Physics, Bombay University, India, 1972; Ph.D., Computer Science, Bombay University, India, 1978.  
Department Research Area: SOFTWARE ENGINEERING  
Interests: Software Engineering; Reasoning about Program Behavior; Specification; Verification; Testing; Issues in Engineering Education.



**CHRISTOPHER STEWART** *Assistant Professor*  
B.S., Computer Science, Morehouse College, 2003; M.S., Computer Science, University of Rochester, 2005; Ph.D., Computer Science, University of Rochester, 2008  
Department Research Area: SYSTEMS  
Interests: Operating Systems; Distributed Systems; Performance Management; and Power Management.



**KENNETH J. SUPOWIT** *Associate Professor*  
A.B., Linguistics, Cornell University, 1978; Ph.D., Computer Science, University of Illinois, 1981.  
Department Research Area: SOFTWARE ENGINEERING  
Interests: Combinational Algorithms



**RADU TEODORESCU** *Assistant Professor*  
Dipl. Eng. in Computer Science, Technical University of Cluj-Napoca, Romania, 2002; M.S., Computer Science, University of Illinois at Urbana-Champaign, 2005; Ph.D., Computer Science, University of Illinois at Urbana-Champaign, 2008.  
Department Research Area: SYSTEMS  
Interests: Computer Architecture, Multicore and Parallel Architectures; Support for Software Debugging; Nanoscale Technology; Scaling, Reliability, Variability and Power Management.



**DELIANG (LEON) WANG** *Full Professor*  
B.S., Computer Science, Beijing University, 1983; M.S., Computer Science, Beijing University, 1986; Ph.D., Computer Science, University of Southern California, Los Angeles, 1991.  
Department Research Area: ARTIFICIAL INTELLIGENCE  
Interests: Machine Perception and Neurodynamics

**YUSU WANG** *Associate Professor*  
B.S., Computer Science, Tsinghua University (P. R. China), 1998; M.S., Computer Science, Duke University, 2000; Ph.D., Computer Science, Duke University, 2004.  
Department Research Area: GRAPHICS  
Interests: Computational Geometry, Algorithms, Computational Biology, Computational Topology, Graphics, Modeling, And Visualization.



**BRUCE W. WEIDE** *Full Professor and Associate Chairperson*  
B.S.E.E., Electrical Engineering, University of Toledo, 1974; Ph.D., Carnegie Mellon University, 1978.  
Department Research Area: SOFTWARE ENGINEERING  
Interests: Component-Based Software; Verified Software.



**REPHAEL WENGER** *Associate Professor*  
B.S.E., Computer Science, Princeton University, 1984; Ph.D., Computer Science, McGill University, 1988.  
Department Research Area: COMPUTER GRAPHICS  
Interests: Computational Geometry; Computer Visualization; Isosurface Reconstruction; and Image Processing.



**DONG XUAN** *Associate Professor*  
B.S., Electronic Engineering, Shanghai Jiao Tong University, China, 1990; M.S., Electronic Engineering, Shanghai Jiao Tong University, 1993; Ph.D., Computer Engineering, Texas A&M University, 2001.  
Department Research Area: NETWORKING  
Interests: Distributed Computing, Computer Networks and Cyber Space Security



**XIAODONG ZHANG** *Chairperson of Computer Science & Engineering Robert M. Critchfield Professor*  
B.S., Electrical Engineering, Beijing University of Technology, 1982; M.S., Computer Science, University of Colorado at Boulder, 1985; Ph.D., Computer Science, University of Colorado at Boulder, 1989.  
Department Research Area: SYSTEMS  
Interests: Distributed and High Performance Systems



CLINICAL FACULTY



**JAY RAMANATHAN** *Research Associate Professor*  
*Director of Research of Center for Experimental Research in Computer Systems*  
B.S. , Computer Science, Purdue University, 1970; M.S. in Computer Science, Purdue University, 1972; Ph.D. Computer Science, Rice University, 1977.  
Research Interests: Analysis and Engineering of the Complex Adaptive Environments to achieve overall objectives, performance and Business-IT alignment. Related applications include Serious Gaming and technology-mediated collaborative platforms. Tools and methods of interest include knowledge mining, complexity theory, autonomic computing; technologies such as OWL, Middleware, Workflow, Mobile Computing, and Web Services.



**RAJIV RAMNATH** *Associate Professor of Practice*  
*Director, Collaborative for Enterprise Transformation and Innovation (C.E.T.I.)*  
B.Tech., Indian Institute of Technology, New Delhi, India, 1981; M.S., Computer & Information Science, The Ohio State University, 1983; Ph.D., Computer & Information Science, The Ohio State University, 1988  
Research Interests: Foundations of Adaptive Complex Enterprises, Enterprise Architecture and Engineering, Business-IT Alignment, Workflow and Work-Management Systems Enterprise Software Engineering and Computer Science Education, Wireless Sensor Network and Pervasive Computing Enterprise Applications, e-Government.

NEW FACULTY MEMBERS ARRIVING AUTUMN 2011

BRIAN KULIS

B.A., Computer Science and Mathematics, Cornell University; Ph.D., Computer Science University of Texas at Austin, 2008.  
Research Interests: Machine learning, data mining, large-scale data analysis, numerical optimization, applications to computer vision and other domains.



ARNAB NANDI

Bachelors in Information Science, University of Delhi, India, 2005; M.S., University of Michigan, Ann Arbor, 2007; Ph.D., University of Michigan, Ann Arbor, 2011.  
Research Interests: structured search and large-scale data analysis Efficient interaction with databases and the management of large, diverse data collections..



KANNAN SRINIVASAN

B.S., Electronics & Communications Engineering, University of Madras, Chennai, India. 2000; M.S., Electrical & Computer Engineering, Oklahoma State University, 2002; Ph.D., Electrical Engineering, Stanford University, Stanford, CA, USA, 2010  
Research Interests: Wireless Networking, Low Power Wireless Systems, Communication Systems, Smartgrids and Wireless Security.



HUAMIN WANG

B.Eng., Computer Science and Engineering, Zhejiang University Hangzhou, China, 2002  
M.S., Computer Science, Stanford University Stanford, CA, USA, 2004; Ph.D. in Computer Science Georgia Institute of Technology Atlanta, GA, USA, 2009  
Computer Graphics, GPU programming for high-performance graphics and general-purpose computation, Computer Vision, feature tracking, optical flow, 3D reconstruction, finite element method, numerical integration, model reduction, motion control and design, efficient data structures.



RESEARCH SCIENTIST



**WILLIAM M. LEAL** *Research Scientist*  
B.A. Mathematics, University of California, Berkeley, 1969; M.S. Computer Science, University of South Alabama, Mobile, 1994; M.S. Computer Science, The Ohio State University, 2001; Ph.D., Computer Science, The Ohio State University, 2001.  
Research Interests:  
Wireless Sensor Networks, Dynamic Resource Management, Compositional Stabilization

POST-DOCTORATE RESEARCHERS

Xiaole Bai  
Xavier Besseron  
Engin Demir  
James Scott Dinan  
Ramsay Heddle Dyer  
Rubao Li

Emilio Pasquale Mancini  
Sonya Marcarelli  
Jeremy John Morris  
Theodore Paul Pavlic  
Louis Noel Pouchet  
Jerome Vienne  
Hao Wang

LECTURERS



**GOJKO BABIC**  
B.S., Electric Engineering, University of Sarajevo, 1972; M.S., Computer Science, Florida Institute of Technology, 1975; Ph.D., Computer Science, The Ohio State University, 1978.  
Research Interests: Computer Networking and Security.



**BETTINA BAIR**  
B.S., Business Administration, University of Phoenix, 1987; M.B.A., University of Denver, 1992.  
Research Interests: Women in Computing; Effects of Technology on Business and Culture; and Computer Education



**PAOLO BUCCI**  
Laurea in Scienze Dell’ Informazione, Universita’ Degli Studi di Milano, Italy, 1986; M.S., Computer & Information Science, The Ohio State University, 1989; Ph.D., Computer & Information Science, The Ohio State University, 1997.  
Research Interests: Software Engineering; Computer Science Education



**DEBBY GROSS**  
B.S., Chemical Engineering, Massachusetts Institute of Technology, 1977; M.B.A., University of Chicago, 1979.  
Research Interests: Business Technology and Applications.



**WAYNE HEYM**  
B.Phil., Miami University, 1978; M.S., Cornell University, 1980; M.S., Computer & Information Science, The Ohio State University, 1989; Ph.D., Computer & Information Science, The Ohio State University, 1995.  
Research Interests: Software Engineering and Computing Education



**NAEEM SHAREEF**  
B.S., Applied Mathematics & Computer Science, Carnegie Mellon University, 1990; M.S., Computer & Information Science, The Ohio State University, 1992; Ph.D., Computer Science & Engineering, The Ohio State University, 2005.  
Research Interests: Computer Graphics and Artificial Intelligence

PART-TIME LECTURERS

Bruce Adcock	Charles Giles	Michelle Mallon
Thomas Bihari	Steve Gomori	Robert Mathis
Moez Chaabouni	John Heimaster	Jeremy Morris
Doreen Close	Robert Joseph	Judita Preissova
Michael Compton	Perumal Krishnasamy	Steven Romig
Matt Curtin	Igor Malkiman	Al Stutz
		Annatala Wolf

EMERITUS APPOINTMENTS

*Professor Emeritus*  
**BALAKRISHNAN CHANDRASEKARAN**

**CHARLES A. CSURI**  
**MING-TSAN (MIKE) LIU**

**SANDY MAMRAK**  
**MERVIN E. MULLER**

**STUART ZWEBEN**

*Associate Professor Emeritus*  
**CLINTON R. FOULK**

**DOUGLAS S. KERR**

**WILLIAM F. OGDEN**  
**ANTHONY E. PETRARCA**

ADMINISTRATIVE STAFF

Carrie Stern: Grants Administrator.  
Catrena Collins: Human Resources Officer  
Tamera Cramer: Public Relations Coordinator.  
Tom Fletcher: Office Support Associate  
Don Havard: Fiscal Officer  
Z. Lynn Lyons: Graduate Admissions and Graduate Studies Coordinator.  
Kitty Reeves: Academic Program Administrator

COMPUTING SERVICES STAFF

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

ADJUNCT FACULTY

**KIKUO FUJIMURA**

COURTESY APPOINTMENTS

<b>WAYNE CARLSON</b>	<b>CHAIR, INDUSTRIAL DESIGN</b>
<b>HARVEY M. FRIEDMAN</b>	<b>MATHEMATICS</b>
<b>KUN HUANG</b>	<b>BIOMEDICAL INFORMATICS</b>
<b>FURRUKH KHAN</b>	<b>ELECTRICAL AND COMPUTERENGINEERING</b>
<b>MICHAEL KNOPP</b>	<b>CHAIR, RADIOLOGY</b>
<b>ALBERT M. LAI</b>	<b>BIOMEDICAL INFORMATICS</b>
<b>VIRGINIA NIVAR</b>	<b>DAVIS HEART &amp; LUNG RESEARCH INSTITUTE</b>
<b>ALAN SAALFELD</b>	<b>GEODETIC SCIENCE</b>
<b>CATHY HONGHUI XIA</b>	<b>INTEGRATED SYSTEMS ENGINEERING</b>
<b>TAO SHI</b>	<b>STATISTICS</b>
<b>ALPER YILMAZ</b>	<b>CIVIL, ENVIRONMENTAL ENGINEERING &amp; GEODETIC SCIENCE</b>



Retirement came to another long-term CSE member - staffer Tom Fletcher called it a day after 34 years. In his position of Office Assistant, he could often make many people's work day better or worse. He was liked by all; colleagues, such as Neelam Soundarajan (below, left) considered him friend. In honor of his perseverance dealing with the daily equipment frustrations, a special cake was ordered (right). Both current and former staff members returned for his send-off, like Marty Marlatt (left, below right) who retired 4 years ago. With Marty is current staffer Carrie Stein.



At the Spring CETI-CSE 758 Poster session, Interim Dean Greg Washington discusses with student Antonio Ubach the application Antonio's team designed, iGreenSpot Mobile. This application is a support for the [columbusgreenspot.org](http://columbusgreenspot.org) website, a local entity striving to "promote a cleaner, healthier, more sustainable city to the citizens of Columbus in the hopes they partake in making their homes, businesses, and other community groups and organizations more environmentally responsible."

September 2010, New grad students at the Department orientation.







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