Production Note: Sustainability is the simple idea that, as human beings, we place a high value on our own quality of life and that of future generations. To be sustainable, our actions must reflect what is important to us – qualities such as clean air, clean water, health, security and prosperity.

To support ASU President Crow’s Sustainability Initiative, starting this year we are producing a more “sustainable” Annual Report. The paper we are using is highly recycled, compared to both foreign and domestic grades (50 percent overall, 25 percent post-consumer), and the mill at which it is produced is a “clean mill” with a sustainability charter.

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For more information, please visit: sci.asu.edu
The Biomedical Informatics Department is located in the newly built Arizona Biomedical Collaborative Building in downtown Phoenix. The building contains six faculty labs, a state of the art MedPresence room, three fully mediated conference rooms, and faculty and administrative offices. The building is shared with the University of Arizona College of Medicine-Phoenix.
Dear Colleagues,

It is a delight to share the exciting developments in our new School of Computing and Informatics (SCI) in the Ira A. Fulton School of Engineering at Arizona State University (ASU). Our school exemplifies the spirit of transdisciplinary research and education that permeates ASU under the dynamic leadership of our president Michael Crow. SCI not only attempts to seize the interdisciplinary opportunities inside and outside ASU but is more importantly positioning itself to play a significant role in defining a transdisciplinary future for computing. SCI builds on a robust Computer Science and Engineering (CSE) department, a national caliber Biomedical Informatics (BMI) Department and new Informatics programs.

The Biomedical Informatics Department is in partnership with the University of Arizona College of Medicine-Phoenix (UACOM), and actively collaborates with Mayo Clinic, Translational Genomics Institute (TGen), Barrow Neurological Institute (BNI), Banner Health and the Biodesign Institute.

BMI is fortunate to have world class leaders in biomedical informatics join the department. The new Chair of the BMI Department, Dr. Robert Greenes joins us from Harvard University. Our Vice Chair, Dr. Vimla Patel and Dr. Edward Shortliffe (founding Dean of UACOM-Phoenix) joined us from Columbia University. Both Dr. Greenes and Dr. Shortliffe are members of the Institute of Medicine of the National Academy of Sciences. In addition, two junior faculty, Dr. Valentin Dinu from Yale and Dr. Trevor Cohen from Columbia University have joined us this Fall. We also have a number of adjunct clinical faculty from Mayo, BNI and Banner.

Dr. Pat Langley joined us last Fall from Stanford and leads our interdisciplinary informatics programs in collaboration with various internal and external partners. These include, the Arts, Media and Engineering program, School of Human Evolution and Social Change, School of Sustainability, Department of Psychology and the School of Earth and Space Exploration.

SCI has made significant progress in research in the past year, reflected by the 33% growth in research expenditures as well as the significant increase in the volume of proposals. We have more than doubled the number of publications in high quality peer reviewed journals, conferences and books over the past five years. The new Science Foundation Arizona research awards and fellowships have augmented our research capacity and also helped increase top quality graduate students enrolling in our programs.

CSE department continues to advance with significant accomplishments by faculty and students. A sampling is presented below.

- Two of our faculty received the CAREER awards (total of three over the past 2 years): Dr. Peter Wonka for his work on constrained procedural urban modeling and Dr. Hasan Davulcu for his work on advancing knowledge in Web services science.
- Three faculty serve as Editor-in-Chief of Journal of Computer Aided Geometric Design, Journal of Combinatorial Design and IEEE Multimedia. A number of faculty serve as editors of professional journals and transactions. In addition, several faculty continue to organize prestigious conferences in their research areas.
- Two of our faculty have launched start-up companies and several of our faculty are involved in intellectual property disclosures and patent applications.
- National Security Agency recently awarded the status of the Center for Information Assurance Education.
- We also introduced new graduate concentrations in information assurance and biomedical informatics. These augment our existing concentrations in software engineering and the Arts, Media and Engineering program.

We expanded into the new Arizona Biomedical Collaborative building, the first ASU program co-located with the UACOM. The BMI Masters program was launched this Fall and we are currently developing the Ph.D. program for Fall 2008. We have also created a new undergraduate informatics certificate available for students throughout the University. We launched a distance learning program in Software Engineering for Target Technologies Inc. and are expanding our on-line and distance program offerings.

SCI students also continue to excel as we support them through academic initiatives and career services. Our student achievements include best paper award at an international conference, first place at the ACM Student Research Competition and being part of the winning team at the ASU Academic Bowl. Our bi-annual job fair attracted more than 16 major industry partners and over 200 students each semester, including Google and Microsoft. Our K-12 outreach included teaching a course at the Chandler High School co-sponsored by Intel. Our recruitment activities included summer camps in gaming and robotics.

We look forward to continuing to accelerate our trajectory of rapid progress while focusing on excellence in all aspects of academic endeavor and contributing to the vision for a New American University at ASU. I invite you to visit us in the valley of the sun and also to check us out at http://sci.asu.edu.

Sethuraman Panchanathan
Director, School of Computing and Informatics
Year In Review

CAREER Award Recipients
New Faculty
SCI Symposium
BMI Graduate Program
Faculty Awards and Honors
Distinguished Lectures
Community Outreach
Events
Hasan Davulcu

Hasan Davulcu, an assistant professor in the School of Computing and Informatics, received a National Science Foundation (NSF) Career Award on March 1, 2007. The award, recognizing young scientists and engineers who show leadership potential in significant research areas, comes with a $413,112 grant over five years for Davulcu’s efforts to advance knowledge in Web services science in his proposal titled, “A Logic-Based Dynamic Policy Model for Adaptive Workflow Management.”

“Webservices composition must be goal driven,” says Davulcu. “Web service workflows must remain healthy throughout operations, even under attacks and failures.”

Davulcu is excited about what this award will do for his research and students. “This award enables me to work with my students and partners on interesting and challenging Web services integration problems,” Davulcu says. “I hope that our research will have a practical impact and it will inspire my students to do great things. I am grateful for the high-quality and supportive research environment provided by the School of Computing and Informatics at Arizona State University.”

Peter Wonka

Peter Wonka, an assistant professor in the School of Computing and Informatics, received the National Science Foundation (NSF) Early Career Award on Feb. 23, 2007.

With this five-year, $400,000 grant, Wonka and his research team will work on a project entitled, “CAREER: Constrained Procedural Urban Modeling.” According to Wonka, their research “will target the creation of three-dimensional urban models and benefit applications such as urban planning, virtual heritage, simulation, training, movie production and computer games.”

After two years as a post-doctorate researcher at the Georgia Institute of Technology, Wonka joined the School of Computing and Informatics as a CSE faculty in 2004. He earned his Ph.D. from the Vienna University of Technology in 2001. Wonka’s principal areas of teaching and research include various topics in computer graphics, particularly real-time rendering and procedural modeling, visualization and applications of visualization and graphics. While at Georgia Tech, he was twice awarded the Erwin Schroedinger Fellowship for postdoctoral work. Wonka’s research is facilitated through the Partnership for Research in Spatial Modeling (PRISM) lab.
New Faculty

Robert A. Greenes
Chair
Department of Biomedical Informatics
Ph.D. - Harvard University 1970
MD - Harvard Medical School 1966
Email: robert.greenes@asu.edu

Research/Areas of Expertise
- Modeling of clinical decision making knowledge representation
- Knowledge management
- Clinical decision support
- Personal biosensors
- Human-computer interaction
- Group collaborative work

Robert Greenes joined ASU in 2007. Previously, he spent many years at Harvard, in the field of BMI, first at Massachusetts General Hospital, then at Brigham and Women’s Hospital, where he established the Decision Systems Group in 1980, and developed it into a leading BMI research and development program. Greenes was professor of radiology and of health sciences and technology at Harvard Medical School. He was also professor of health policy and management at Harvard School of Public Health. For over 20 years, he has directed the Biomedical Informatics Research Training program, with support from the National Library of Medicine and other sources, with co-directors now representing 10 hospital and university-based informatics groups throughout the Boston area.

Vimla L. Patel
Vice Chair
Department of Biomedical Informatics
Ph.D., D.Sc. - McGill University 1981
Email: vimla@asu.edu

Research/Areas of Expertise
- Medical cognition
- Medical decision-making and reasoning
- Patient safety and medical errors
- Socio-cognitive studies of human-computer interaction
- Cognitive assessment of learning and instruction

Vimla Patel was appointed to ASU’s BMI program in 2007, moving from Columbia University. She has also served on the faculty at McGill University. As a leader in adapting methods and theories from cognitive science and in innovating new approaches that provide scientific foundation for medical education, her research includes role of cognition in designing a safer clinical workplace. Her studies focus on complexity of the distributed cognitive system that underlies critical care decisions and on the impact of technology on human cognition and performance.

New Lecturer Faculty
Department of Computer Science and Engineering

Ashish Amresh

Janaka Balasooriya

Kevin Burger
Edward H. Shortliffe
Professor
Department of Biomedical Informatics

Ph.D. - Stanford University 1975
MD - Stanford University School of Medicine 1976
Email: ted.shortliffe@arizona.edu

Research/Areas of Expertise
- Clinical decision-support systems
- Collaborative technologies
- Role of internet in health care
- Informatics research policy

Ted Shortliffe has been cross appointed in BMI since 2007, when he moved from Columbia University to become the founding dean of the Phoenix campus of the University of Arizona College of Medicine. He has also served on the medical faculty at the Stanford University School of Medicine. A leader in the field of biomedical informatics throughout his career, he is also the author of the major textbook in the field and a member of the Institute of Medicine of the National Academy of Sciences. Shortliffe has been closely involved with medical education and biomedical informatics graduate training. His research interests include the broad range of issues related to integrated decision-support systems, their effective implementation and the role of the Internet in health care.

Trevor Cohen
Assistant Professor
Department of Biomedical Informatics

Ph.D. - Columbia University 2007
Email: trevor.cohen@asu.edu

Research/Areas of Expertise
- Latent semantic analysis
- Comprehension and medical expertise
- Distributed cognition and medical error

Trevor Cohen joined ASU in 2007, after completing his doctoral studies at Columbia University’s Department of Biomedical Informatics. Previously he has worked as a physician in South Africa. Cohen’s research focus is at the intersection between statistical models of language and cognitive models of medical expertise. In particular, he is interested in the simulation of aspects of expert comprehension to support applications in clinical and consumer health informatics. Additionally, he has an interest in the distributed cognitive processes that underlie medical error in the critical care domain, with a focus on error detection and prevention within this complex work environment.

Valentin Dinu
Assistant Professor
Department of Biomedical Informatics

Ph.D. - Yale University 2007
Email: valentin.dinu@asu.edu

Research/Areas of Expertise
- Biomedical informatics
- Translational research
- Integrative disease association analysis
- Genome wide association studies
- Entity-attribute-value database modeling

Valentin Dinu joined ASU in 2007. He holds a Ph.D. in computational biology and bioinformatics from Yale University and an AB in mathematics and physics from Harvard University. He also worked in industry as a quantitative financial modeler, software engineer and consultant. Dinu’s research interests are the assessment, improvement and development of computational approaches, software applications and databases that will facilitate the management, integration and analysis of diverse sources of biomedical information. Some of Dinu’s teaching and research areas include: 1) the use of biological domain knowledge to supplement statistical analysis and data mining methods to identify genes and pathways associated with disease, and 2) the exploration of database modeling approaches for managing large and heterogeneous data sets from both clinical and biosciences domains.
Sethuraman “Panch” Panchanathan, the director of SCI, joined ASU President Michael Crow on Sept. 29, 2006 in hosting a symposium and ceremonies to officially launch the School of Computing and Informatics, which is now part of the university’s Ira A. Fulton School of Engineering.

Featured speakers at the symposium included computing and informatics experts from around the world and Arizona State University, including Dr. Genevieve Bell, Dr. Raj Reddy, Dr. Michael Fourman, Dr. Michael Kahn and Dr. George Poste.

“The creation of the School of Computing and Informatics is a major step for ASU’s evolution in this critically important arena of innovation,” Crow said at the launch. “It’s a response to the increasingly important role that the acquisition, evaluation and utilization of massive amounts of data play in many aspects of modern life.”

The Fulton School’s Department of Computer Science and Engineering has been incorporated into the new school, along with the Center for Health Information and Research and the recently created Department of Biomedical Informatics in collaboration with the University of Arizona.

Panchanathan sees informatics having transformative effects on everything from business, technology, science and education to arts, culture and entertainment. The rapidly emerging field far transcends computer literacy.

“Computer literacy is about knowing how you get a computer to do the things you want it to do,” he said. Informatics literacy is about knowing how to use what computers can do to more efficiently locate, access, manage, store and effectively utilize data. Informaticians also understand how to better interpret, analyze, model and present that data.

“This is the perfect time to launch the School of Computing and Informatics,” said Paul Johnson, executive dean of Fulton engineering school. “We have an enthusiastic leader, a strong base in computer science to build from, significant investments from the state in the bioinformatics program, a new building in the downtown medical campus and a wide-open frontier of new computing and informatics challenges to address.

“Panch’s vision for the integration of computer science and informatics with other disciplines has excited and attracted partners from inside and outside of ASU. There is a large demand for informatics-related training across a wide range of disciplines, and we are already seeing success with the funding of transdisciplinary research grants,” Johnson said.

The trend is further signaled by the institutions that have signed on to collaborate with the School of Computing and Informatics, including Mayo Clinic, Barrow Neurological Institute, the Translational Genomics Research Institute (TGen) and Banner Health.

Within ASU, SCI is pursuing informatics education and research in partnership with the Arts, Media and Engineering program, the School of Human Evolution and Social Change, the School of Life Sciences, the Department of Mathematics and Statistics, the Department of Psychology, the Biodesign Institute, the Global Institute for Sustainability, W.P. Carey School of Business, the College of Nursing and Healthcare Innovation, the School of Earth and Space Exploration, the Center for Law, Science and Technology and the College of Liberal Arts and Sciences.
BMI launches new graduate program

The 13 inaugural students of Arizona State University’s Department of Biomedical Informatics, in partnership with the University of Arizona, embarked on their journey towards a master’s of science degree on August 20, 2007.

In keeping with the mission of the School of Computing and Informatics, the BMI department supports a partnership between academic researchers, clinical practitioners and regional healthcare providers to advance research and education in the science and practice of biomedical informatics. Their aim is to prepare individuals to make major contributions to the creation and evaluation of computational and informatics tools and their application to biomedical or clinical research, health care practice and administration, public health and the education of health professionals and patients.

For clinicians who wish to broaden their skills and improve their career prospects, BMI provides a state-of-the-art education in the theory and practice of electronic medical recordkeeping, clinical decision-making and the management of information systems in healthcare. Unlike competitive alternatives, BMI courses will be delivered within the context of a fully integrated medical curriculum.

For scientists and engineers, BMI offers leading-edge courses and research opportunities to enable them to occupy leadership roles in designing and implementing the next generation of systems to support biotechnology, pharmaceutical development, integrative biology and translational research.

BMI is co-located on ASU’s Tempe and Phoenix campuses. Classes are held in the Arizona Biomedical Collaborative Building, a recently completed, state-of-the-art structure in downtown Phoenix.

“The ultimate goal [of biomedical informatics] is to improve patient care and human health by streamlining the process of applying the knowledge gained from basic biomedical and informatics research to clinical use in a cost-effective manner, with patient safety as the priority.”

Vimal Patel
Vice Chair, Department of Biomedical Informatics
The **Center for Health Information & Research (CHIR)** has been designated an official ASU research center by the Arizona Board of Regents. The center has a multidisciplinary emphasis that includes the study of health care, occupational illness and injury and the economics of health care. The approval of CHIR as a university-sanctioned research center acknowledges the societal benefits that stem from the use of CHIR’s empirical data.

A journal article co-written by Computer Science and Engineering faculty and a recent graduate received recognition for being the most frequently read article of Science Direct’s “Top 25 Hottest Articles.” Professor **W.T. Tsai**, Senior Research Scientist and Lecturer **Yinong Chen** and recent Ph.D. graduate Chun Fan collaborated on the piece entitled, “A service-oriented modeling and simulation framework for rapid development of distributed application,” with Dr. Raymond Paul, the technical director for command and control policy with the U.S. Department of Defense.

**Kanav Kahol**, an assistant research professor, and **Sethuraman Panchanathan**, received the “Association of Surgical Education Best Paper Award” during the Surgical Education Week Conference that took place in Washington, D.C. from April 10-14. The paper, entitled, “The effect of fatigue on cognitive and psychomotor skills of surgical residents” was a collaborative effort between Kahol, Panchanathan and doctors Mario Leyba, Mary Deka, Vikram Deka, Stephanie Mayes, Marshall L. Smith and John Ferrera from the Simulation and Training Center at the Banner Good Samaritan Medical Center in Phoenix.

**Prabhdeep Singh**, a Ph.D. student in computer science and engineering, and **Hasan Davulcu**, a professor in the CSE department, launched USuggest.com in 2005. Now, the consumer-oriented, online marketplace receives about 500 unique visitors a day. The numbers continue to increase as more people discover the innovative Web site. In 2005, Singh was awarded the $20,000 grand prize from the ASU Technology Entrepreneurship Challenge business plan competition for his proposal that detailed his plans for USuggest.com.

The **Center for Cognitive Ubiquitous Computing (CUBiC)** received a $50,000 award from ASU Foundation’s Women & Philanthropy program for the iCARE project, which focuses on using information technology solutions to assist sight-impaired individuals carry out everyday activities and ensuring their access to educational opportunities.

ASU was recently designated as a **National Center of Academic Excellence in Information Assurance Education** for academic years 2007-2012. A ceremony recognizing this achievement was held on June 5 during the annual conference of the Colloquium for Information Security Education in Boston. This honor recognizes that ASU has made, “a significant contribution in meeting the national demand for information assurance education, developing a growing number of professionals with information assurance expertise in various disciplines, and ultimately contributing to the protection of the national information infrastructure.” The designation was certified by the National Security Agency and the Department of Homeland Security. The Center is directed by SCI professor **Stephen S. Yau**.

**Ted Shortliffe**, a cross-appointed faculty member at BMI and the founding dean of the University of Arizona College of Medicine-Phoenix, was honored in the May/June 2007 issue of the Journal of the American Medical Informatics Association for winning the Morris F. Collen Award. This award is the American College of Medical Informatics’s highest honor for lifetime achievement and contributions to the field of biomedical informatics.
Distinguished Lecture Series


Dr. Stephen Racunas, Stanford University, “Hypothesis-Centered Integration of Biological Knowledge.” May 30, 2007

Dr. Ben Shneiderman, University of Maryland- College Park, “The Thrill of Discovery: Information Visualization for High-Dimensional Spaces.” Feb. 19, 2007


Dr. Laxmikant Kale, University of Illinois at Urbana Champaign, “Upcoming Challenges in Parallel Computing.” Oct. 13, 2006

Dr. Elisa Bertino, Purdue University, “Digital Identity Management and Protection.” Feb. 5, 2007

Dr. Nageswara S.V. Rao, Oak Ridge National Laboratory, “Dynamics of Internet Transport Protocols.” Oct. 9, 2006

Dr. Bhubaneswar Mishra, New York University School of Medicine & Mount Sinai School of Medicine, “SMASH: Single Molecular Approaches to Sequencing by Hybridization.” Dec. 18, 2006


Seminar Series


Dr. Timour Paltashev, Northwestern Polytechnic University, “Teraflop Performance on your Desk.” Feb. 1, 2007

Dr. Joong S. Ma, Information and Communication University, Korea, “Low Power MANET Technology.” Jan. 30, 2007


Dr. S. Stanley Young, National Institute of Statistical Sciences, “Linking Metabolic and Gene Profiles to Biological Outcomes.” Dec. 1, 2006


Gaming Camp

CampGame, a six-week summer program designed to teach high school students the fundamentals of video game creation, visualization and production, hosted 23 students in this year’s successful program. Instructors Ashish Amresh, Joseph Grossman and Robert Srinivasiah and assistants Jacob Shufro and David Capra taught design, art and programming to the tenth, eleventh and twelfth graders enrolled in the course. On July 27, the students had the opportunity to demonstrate the video games they created to parents, friends and assorted SCI faculty and staff at an awards ceremony and reception. “Death’s Hand” a six-person team, took home the top honors for their video game creation. The contest was judged by developers at Rainbow Studios, one of the largest video game developers in the southwest. According to Amresh, “Their team was the most complete. It had fully functional levels, a solid storyline and good game play mechanics.” The Armstrong Family Foundation, an Arizona charitable corporation, provided scholarships to four program participants. Additionally, six Nintendo Wii sets were donated by Nintendo of America, Inc. and given to the members of the winning team. ASU alumnus Steve Singer is Nintendo’s vice-president of licensing.

Robotics Camp

The 23 participants enrolled in SCI’s 2007 Robotics Camp for high school students were there to, “experience the excitement of engineering and computer science as well as to gain basic computer science and programming background,” said Dr. Yinong Chen, lead instructor and faculty coordinator of the program. “Service-oriented robotics programming and robot building are the perfect vehicle to achieve these objectives.” The camp culminated with the second annual ASU Sumobot Competition, held on July 13. The winning team was decided based on the ability of their robot to demonstrate computer controlled maneuvers, intelligence and fighting. Instructors Yinong Chen and Calvin Cheng were assisted by Theresa Denofre and SCI student Jennifer Hale.
SCI is a leader in High School Outreach

The School of Computing and Informatics participated in two exciting high school outreach programs in 2006. The first pilot partnership was with Chandler High School and the second with the Scottsdale Unified School District. The programs were designed to educate both teachers and students in basic principles of computer science.

In June of 2005, representatives from Chandler High School visited with Sethuraman Panchanathan, chair of the Department of Computer Science and Engineering, to draft a plan to educate both Chandler High School students and one of their teachers in introductory computer programming skills. By August of 2006, with the financial support of Intel and the teaching expertise of CSE faculty member Faye Navabi, the plan became a reality.

Fifteen students took this year-long, Advanced Placement course in introductory Java programming. These students were required to have taken pre-calculus before entering the class. Chandler’s International Baccalaureate coordinator recruited students who had met the criteria and who showed an interest in math and computer science.

Navabi worked with Sam Alexander, a teacher at Chandler High School, to provide appropriate lessons. She and her teaching assistant, Harneet Sidhana, also went to the classroom once a week for hands-on instructional time with the students. Said Navabi of her experience, “I like to go there. I really enjoy it. The students want to learn and work really hard.”

ASU is hoping to recruit some future computer science students from this group. During one class period, the students made an on-site visit to the campus to see where they might be continuing their education in the coming years. They also met with academic advisors to discuss the program of study and other pertinent student life issues.

The Department of Computer Science and Engineering also worked with students and teachers in the Scottsdale Unified School District. Led by ASU researchers Wei-Tek Tsai and Yinong Chen, the pilot program offered a course to both teachers and students in Service-Oriented Computing.

Service-Oriented Computing offers a new approach to computer education. Students in the course learned how to use existing code to develop computer programs without having to learn a specific computer language. Students were trained to apply the software instead of writing it. Every piece of code is open source and stored in one place, and the user pays as needed. Therefore, no one must own entire software packages.

The concept was so interesting that the U.S. Department of Education funded the project in the amount of $596,427 and the Scottsdale Unified School District pledged another $168,000. Gary Bittner from the Mary Lou Fulton College of Education is also leading this project. In fact, this course will soon be offered as an elective class in the college of education at ASU.
ACADEMIC BOWL COMPETITION
On Nov. 6, the Ira A. Fulton School of Engineering beat the W.P. Carey School of Business in a fiercely-close competition at the ASU Academic Bowl recorded before a studio audience at Eight/KAET-TV. The Fulton team beat out 15 other college teams from ASU in the university’s first Academic Bowl competition that started on Oct. 12.

Marko Manojlovic, a CSE freshman student, was one of the winning team members. Nicholas Vaidyanathan, also a CSE student, was a team alternate.

“I’m very proud of our team for winning,” said Vaidyanathan. “It was absolutely nail-biting at the end, but I knew we could do it!”

CELEBRATION OF EXCELLENCE
This year’s Celebration of Excellence was held on April 19, 2007 and honored SCI students who have been awarded scholarships through the Ira. A. Fulton School of Engineering, as well as ASU’s Foundation. Family, friends and many donors were at the event.

PROGRAMMING COMPETITION
Programming Competition 2007, an ASU annual contest, was held on March 24. Twenty-seven teams and more than 50 students participated. SCI student Nathan Winchester took the top honors and won an iPod nano as well as 300 dollars. Winchester and the other winners were also invited to meet with employees at Google and Microsoft. Robert Srinivasiah and Jose Acero came in second. Siddhi Shah, Hanh Nguyen, Ling Zhou and Women in Computer Science and IEEE CS@ASU organized and coordinated the event.

SCI STUDENTS PRESENT FURI RESEARCH
The Fulton Undergraduate Research Initiative (FURI) program offers opportunities for students to experience research through hands-on applications. Fulton undergraduates find a mentor and perform research. SCI boasts 10 of the 70 students during the Fall 2006 semester and 17 of the 75 students involved during the Spring 2007 semester. These students presented their fully-funded 10-week research projects at the FURI Undergraduate Student Research Symposium on April 20.

GRADUATING STUDENT RECEPTIONS
The School of Computing and Informatics hosted a Graduating Student Receptions for students graduating in the Fall 2006 and Spring 2007 terms. The event gave the students the opportunity to say goodbye to classmates, faculty and staff. Dr. Panchanathan, Director of the School of Computing and Informatics, welcomed the
students and wished them luck in the future, with hopes that each graduating student will stay connected to the CSE department by becoming active in our growing alumni outreach program.

TECH TALKS
During “tech talks”, unique mini-classes sponsored by the SCI Advising Center, undergraduates have the opportunity to learn from company representatives and find out about employment and internship opportunities. It’s a great opportunity for students to discover technical, “behind the scenes” information from the most knowledgeable of sources. Companies that have provided tech talks include Microsoft, Ustrive and Google.

SCI JOB FAIRS
The semiannual job fair provides graduate and undergraduate students with the opportunity to meet with representatives from both local and national companies to discuss career possibilities specifically related to computer science and engineering. Participating companies may have full-time, part-time or internship opportunities available. Companies often invite selected students to participate in on-campus interviews.

Companies that have attended the SCI job fair: Charles Schwab Corporation, Cerner, Freescale, Garmin, GoDaddy, Google, IAESTE, Intel, Interactive Alchemy, JDA Software, Lockheed Martin, MediServe, Microsoft Corporation, PayPal - an eBay Company, Raytheon, Software Architects and Tektronix.

GRADUATION
Fall 2006 Number of Graduates
Bachelor of Science in Computer Science: 33
Bachelor of Science in Engineering in Computer Systems Engineering: 36
Master of Science in Computer Science: 11

Spring 2007 Number of Graduates
Bachelor of Science in Computer Science: 35
Bachelor of Science in Engineering in Computer Systems Engineering: 28
Master of Science in Computer Science: 8
Master of Computer Science: 7
Doctor of Philosophy in Computer Science: 3

Summer 2007 Number of Graduates
Bachelor of Science in Computer Science: 2
Bachelor of Science in Engineering in Computer Systems Engineering: 4
Master of Science in Computer Science: 6
Master of Computer Science: 2
Doctor of Philosophy in Computer Science: 5

“There was not a single place I could go to, or a site I could place my resume on, that would be more useful than being at the SCI job fair.”
Lance Wheeler, Fall 2006 Graduate
Academic Excellence

New Informatics Certificate and Graduate BMI Program

Academics

Student Awards
The School of Computing and Informatics began offering a certificate in Informatics in fall of 2007. Informatics is defined as the study of the ways in which computer technology can be used to gather, synthesize, store, visualize and interpret information. This certificate is in an emerging technological discipline that is becoming essential to careers in many fields and will be available to students in most disciplines. It will provide them with an understanding of the capabilities and technologies of Informatics as it applies to domain specific problems in their field of study. The certificate can also be used as one of the areas of concentration for the BIS degree. Students completing this certificate will be able to:

- Understand information management issues and become intelligent users of data management systems
- Develop, implement and analyze conceptual models with different information science techniques for solving problems
- Apply mathematical modeling, computing, and visualization techniques and tools to real data in order to present results in a meaningful visual environment
- Understand ethical and social issues involving information science technology
- Utilize various information technology resources for making decisions
- Incorporate information technology to enhance their communication effectiveness
- Write simple programs in a high level programming language

There really is not an area where informatics doesn't touch our lives,” says Dianne Hansford, an associate research professor in the School of Computing and Informatics who will be among informatics instructors. “Not only is it a key tool for popular Web applications, it's important in almost any area - particularly life sciences, social sciences, business, medicine, mathematics and engineering.” Those with informatics skills “will be the real winners in this transforming world, because they will have the tools to transform data into information and then into knowledge,” Hansford says. “Our ability to find answers to the most pressing problems of today, such as global warming and finding cures for diseases, depends on our abilities to develop innovative methods in informatics. The certificate's value can be seen in the overwhelming support and commitment we have received from faculty all over campus,” Hansford says.

“Such widespread support is arising from the realization that informatics is becoming one of the more significant career skills of the 21st century,” says Sethuraman Panchanathan, director of the School of Computing and Informatics. “It’s not just about finding data but being able to assess the credibility and the value of information from the overwhelming amount of available resources, and being able to effectively put the information to productive use in whatever field you are working in,” he says. Such “information fusion capabilities will help drive economic competitiveness, scientific and medical advancements and even social and cultural progress,” he says.

The informatics certificate committee is an interdisciplinary team comprising six faculty members from the School and Computing and Informatics, as well as John Howard, associate dean of libraries; Libby Wentz (Department of Geography); Sharon Crook (Department of Mathematics and Statistics); Mike Rosenberg (School of Life Sciences); Phil Bernick (Department of English); Dmitri Roussinov (Department of Information Systems); and Marcus Janssen (School of Human Evolution and Social Change).
Graduate Degree Programs

Department of Biomedical Informatics

Biomedical informatics refers to the development and application of methods for acquiring, representing, retrieving and analyzing biomedical knowledge and data. The M.S. program in biomedical informatics is designed to meet the rapidly growing need for professionals with expertise in informatics, computer sciences, biosciences and statistics in addition to a knowledge of the clinical environment in the healthcare professions.

The program features a sequence of courses specifically designed to bring together clinicians and researchers in teams, applying new developments in informatics theory to clinical practice. This approach will make the M.S. program in biomedical informatics at ASU distinctive, if not unique, among biomedical informatics programs in the United States. The new program is supported by our collaborators including: the University of Arizona College of Medicine, Phoenix Program; Mayo Clinic; Barrow Neurological Institute; and Banner Health.

“\textit{I was excited to learn at orientation that the students themselves come from a variety of backgrounds, including psychology, biomedical engineering and a few physicians as well. I look forward to working together with these students to develop the skills and knowledge to make a meaningful contribution to health care and research.}”

\textit{Bryan Hendrickson}  
\textit{BMI graduate student}

Graduates from this program will:

\begin{itemize}
  \item Understand theoretical foundations and current applications of informatics in health sciences and health care delivery systems.
  \item Understand how to evaluate, select and deploy informatics solutions in health care sciences and health care delivery systems.
  \item Understand information management issues and become intelligent users of data management systems.
  \item Understand how to acquire, convert and organize biological data into relevant diagnostic, therapeutic or research information.
  \item Demonstrate skills in team dynamics, communication and project management.
  \item Understand theory and application of information of biomedical informatics standards and lexicons.
  \item Understand the legal and ethical aspects of biomedical informatics.
  \item Understand the use of quantitative and qualitative tools for decision support and data analysis.
\end{itemize}

Students enter the biomedical informatics program from a variety of fields, including:

\begin{itemize}
  \item Bioengineering
  \item Medicine (MD)
  \item Psychology
  \item Computer Science and Engineering
  \item Biophysics
  \item Biology
  \item Information Technology
\end{itemize}
**Master’s Degrees**

The Department of Computer Science and Engineering offers two degree programs at the master’s level. The Master of Science (M.S.) in Computer Science is a research-oriented degree targeted at students with an undergraduate education in the science of computation. It provides advanced course work and emphasizes student research as well as offers numerous opportunities for interdisciplinary study. Within this degree, a concentration in Arts, Media and Engineering (AME) is offered in collaboration with faculty in the Department of Electrical Engineering and the Herberger College of the Arts. M.S. students can also pursue concentrations in Information Assurance and Biomedical Informatics.

The Master of Computer Science (M.C.S.) is an advanced degree targeted at students with undergraduate education in computer-related disciplines who can benefit from further breadth and background. The M.C.S. also provides an opportunity for students employed in industry to seek advanced education in computer science.

Admission to both degrees is highly competitive. The graduate-level course work emphasizes research topics of current interest, such as embedded systems; information assurance and computer security; multimedia and the arts; database systems; algorithm design and analysis; bioinformatics; sensor and ad-hoc networks; data mining; information integration; optical networks; and computer aided-geometric design. Independent study in research is encouraged as part of the M.S. program. The Consortium for Embedded Systems, a partnership of ASU, Intel and Freescale, supports work that applies academic research to industrial problems in embedded systems and networks. This is one of the many ways the M.S. and M.C.S. programs combine academic excellence and relevance to industry.

**Doctoral Degree**

The Doctor of Philosophy (Ph.D.) degree in Computer Science prepares students to undertake fundamental and applied research in computer science in academia, government and industry. Having matured as a discipline in its own right, computer science is now developing deep interactions with other fields, not just in engineering and science, but throughout the arts and humanities, education, law, medicine and business. While computers have become essential tools in these areas, the depth of interaction of fundamental computer science with each is rapidly evolving.

Strong collaborations with the six other engineering departments in the Ira A. Fulton School; the Department of Mathematics and Statistics; the School of Life Sciences and the Biodesign Institute; the W. P. Carey School of Business; the Herberger College of the Arts; the Consortium for Embedded Systems; and the Translational Genomics Research Institute (TGen), provide a wealth of experience for our doctoral students. The interdisciplinary strength of the program has been enhanced by a concentration on Arts, Media and Engineering (AME) within the Ph.D. degree, as well as a concentration in Information Assurance.

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*Photo: Graduate students working in the Information Assurance lab*
The Department of Computer Science and Engineering offers two degree programs at the undergraduate level:

The Bachelor of Science in Engineering (B.S.E) in Computer Systems Engineering emphasizes the design and production of hardware and software components comprising a computer system. It includes courses on computer organization and architecture, system programming, operating systems, embedded micro systems and digital hardware design. Although the program addresses numerous application areas, a unique focus on embedded systems sets it apart.

The Bachelor of Science (B.S.) in Computer Science provides a solid background in computing principles and enables students to customize their degrees with 21 hours of computer science and technical electives. More than 30 senior-level courses are offered within the department. Students may also select courses in mathematics, other engineering areas and biology to meet requirements. This degree also offers a software engineering concentration consisting of four courses in which students have an opportunity to master software development techniques while working in teams, as well as a 15 credit hour concentration in Information Assurance.

Undergraduate research opportunities exist for students in both degree programs. The department provides scholarships to encourage undergraduate research, which can culminate in an undergraduate thesis through the university’s Barrett Honors College. Last year, the department awarded five scholarships. The Fulton Undergraduate Research Initiative program offers opportunities for students to participate in such research.
Student Excellence Highlights

Sean Williams, a graduate student and teaching assistant in the School of Computing and Informatics, was selected as a 2007 fellow in the NASA-Harriett G. Jenkins Pre-doctoral Fellowship Program (JPFP). The fellowship will provide Williams with a maximum of three years of stipend and tuition support as he pursues his graduate studies.

Recent SCI PhD graduate Chun Fan, along with SCI professor W.T. Tsai and lecturer Yinong Chen, received recognition for having co-authored the most frequently read article of Science Direct’s “Top 25 Hottest Articles.” The piece, entitled, “A service-oriented modeling and simulation framework for rapid development of distributed application” was collaborated on with Dr. Raymond Paul, the technical director for command and control policy with the U.S. Department of Defense.

Computer Science Ph.D. student Krishna Venkatasubramanian and professor Sandeep Gupta received a Best Paper Award for their paper “Security for Pervasive Health Monitoring Sensor Applications.” The award was presented at the Fourth International Conference on Intelligent Sensing and Information Processing, held in Bangalore, India, December of 2006.

Anthony Gitter, a senior majoring in computer science, took first place at the ACM Student Research Competition. The competition, which took place from March 7-10 in Covington, Ky., occurred during the SIGCSE Conference (Special Interest Group on Computer Science Education). The research Gitter presented concerned a biomedical extraction system.

Gitter, whose research is in close collaboration with SCI professors Chitta Baral and Graciela Gonzalez, also received an Honorable Mention on Computing Research Association’s list of 2007 Outstanding Undergraduates.

Student Awards

Exceptional Students, Faculty and Staff Honored at SCI Annual Award Ceremony

SCI’s annual awards ceremony, SCI Night, was held at the Tempe Mission Palms Hotel on April 20. The event recognized outstanding students, faculty and staff. The keynote speaker, Ted Shortliffe, M.D., Ph.D., of the University of Arizona College of Medicine-Phoenix, discussed the collaboration with Arizona State University and the emerging biomedical informatics field.

Student Awards from SCI Night
Distinguished Undergraduate Seniors: Anthony Gitter and Kevin Gundlach
Undergraduate Student Leadership: Hanh Nguyen and Siddhi Shah
Outstanding M.S. Student: Hemal Khatri
Outstanding Ph.D. Student: Weiyi Zhang
Graduate Student Leadership: Ling Zhou
Outstanding Teaching Assistant: Guofeng Deng
Programming Competition Winners:
1st: Nathan Winchester
2nd: Robert Srinivasiah and Jose Acero
Research

CBioC software
Research Themes
Affiliated Centers
Research Awards
A data-finding tool that promises to dramatically improve the efficiency of medical research has been developed by a small team of ASU researchers. The computer software program called Collaborative Bio Curation, or CBioC, can analyze vast amounts of biomedical data to locate and extract specific information critical to research efforts. It’s a fusion of computer science, information management, medical research methods and clinical practice that could lead to significant advances in the way scientific data searches are conducted, say CBioC developers Chitta Baral and Graciela Gonzalez.

The quantity of biomedical literature worldwide increases on average by more than 1,000 articles and research papers each day, making it almost impossible for researchers to keep up with the latest findings, says Baral, a professor in ASU’s Department of Computer Science and Engineering, and an affiliate faculty member with the Department of Biomedical Informatics. Both departments are part of the university’s School of Computing and Informatics.

CBioC is expected to save researchers the time and effort of wading through hundreds of thousands of articles to locate specific information relevant to their particular research, Baral says.

CBioC can be compared to Wikipedia in its collaborative capabilities, and to Google in its search capabilities, although Google searches only by terms and not by higher-level concepts.

For example, a Google search can find occurrences of information in medical literature about a specific gene. But Google doesn’t produce the results provided by CBioC when performing a search for concepts such as “genes related to brain cancer,” or data on gene-disease relationships or protein interactions that are crucial to understanding diseases and the development of new therapies.

The program is a Web browser application that is a search engine and collaboration tool of PubMed, the primary online repository of biomedical papers maintained by the National Library of Medicine.

CBioC runs in a small frame at the bottom of the browser each time a researcher uses PubMed. When an article is selected, CBioC extracts and displays the facts reported in the article. For example, extracted facts that a certain gene has been found to be linked to brain cancer are added to the CBioC database. Similar facts then can be searched from within CBioC.

CBioC allows individual researchers to vote on the correctness of the extracted facts and enables them to share notes and comments about the data among colleagues and other PubMed users. Over time, a consensus is reached among researchers as to which facts are correct, enabling information to be updated and kept accurate, Baral says.

Use of CBioC has been steadily increasing since it became available in December. Researchers throughout the United States, Japan, Australia and Europe are downloading the software. It also caught the attention of Science magazine, which featured CBioC in the NetWatch news section of its Web site.

Gonzalez, an ASU biomedical informatics researcher, says she and Baral are exploring ways to make CBioC useful to a wider range of biological and medical research endeavors.

“We’ve been talking with the Biodesign Institute at ASU about adapting the software to look for sugar and gene relationships,” Gonzalez says. “We’re also working with TGen (the Translational Genomic Research Institute in Phoenix), exploring its applications for cancer research.”

Collaborative Bio Curation is available for free download at the Web site (www.cbioc.org).

Photo: (left to right) Graciela Gonzalez, Chitta Baral and student researcher Anthony Gitter
Computing Research Themes

**Algorithms and Theory Research**

The algorithms and theory group conducts research in areas ranging from applied algorithms to fundamental research on the limits of computing. Our applied research focuses on combinatorial design and its application to hardware and software design as well as the use of algorithmic techniques for computational biology.  

**Subcategories:** Applied Algorithms, Fundamental Algorithms and Foundations, Network Algorithms, Security and Dependability  

**Faculty Contacts:** Rida Bazzi, Charles Colbourn, Goran Konjevod, Seungchan Kim, Andrea Richa, Arun Sen, Guoliang Xue

**Computer Security**

Researchers in the area of computer security are working on a variety of topics and developing protocols and systems that harden computers against attacks. The scope of problems ranges from personal computers to corporate servers, from e-commerce sites to government systems.  

**Subcategories:** Anonymity, Authentication for Humans, Consumer Computer Security, Data Privacy and Confidentiality  

**Faculty Contacts:** Rida Bazzi, Karam Chatha, Partha Dasgupta, Sandeep Gupta, Dijiang Huang, Guoliang Xue, Stephen Yau

**Data, Information and Artificial Intelligence**

The data, information and artificial intelligence cluster of SCI consists of researchers addressing core problems in database systems, information management, information integration, and intelligent agent design. The application of the technologies include scientific and enterprise data integration, management of distributed data, multi-agent systems, mining and extraction of information from heterogeneous sources, real-time data stream and workflow management, and semantic Web.  

**Subcategories:** Automated Planning and Scheduling, Data Description and Management, Data Mining, Data Stream Management, Information Integration, Knowledge Representation and Reasoning, Machine Learning  

**Faculty Contacts:** Chitta Baral, K. Selcuk Candan, Yi Chen, Hasan Davulcu, Subbarao Kambhampati, Seungchan Kim, Joohyung Lee, Huan Liu, Hari Sundaram, Joseph Urban, Susan Urban, Jieping Ye

**Hardware Architectures and Embedded Systems**

Hardware architectures and embedded systems are distinguished from general purpose computing systems by their well defined functionalities and stringent design constraints (real time, energy efficiency, form factor, robust operation) as determined by the context of their deployment. Faculty addresses the design challenges of silicon and system complexities, and a cross-cutting challenge of increased power consumption.  


**Faculty Contacts:** Karam S. Chatha, Yann-Hang Lee, Aviral Shrivastava, Violet R. Syrotiuk, Sarma Vrudhula
Multimedia, Visualization and Modeling

Current work in multimedia, visualization and modeling focuses on the development of computational models for experiential systems as well as multimedia communications and distributed multimedia systems, and ubiquitous multimedia computing. Current modeling research includes urban/terrain modeling, point cloud fitting and geometric modeling of cloud interface surfaces while current visualization research concentrates on volume visualization based upon isosurface extraction.

Sub-categories: Data Modeling, Computer Graphics, Media Processing and Analysis, Media Processing Workflow Management, Media Semantics Multimodal Systems for Learning, Assistance and Rehabilitation, Visualization

Faculty Contacts: K. Selcuk Candan, Karamvir Chatha, Gerald Farin, Gregory M. Nielson, Baoxin Li, Sethuraman Panchanathan, Hari Sundaram, Peter Wonka

Networks, Operating Systems and Compilers

Research in networks, operating systems and compilers focuses issues such as routing, quality of service, and reliability in optical networks, sensor networks, and wireless and mobile ad hoc networks. Faculty are also solving problems in efficiency and scalability over large networks and diverse applications and developing novel compilation techniques to help achieve important design goals of system power, performance, and reliability.

Sub-categories: Compilers, Integrated Infrastructure for Identity Assurance, Networks, Operating Systems

Faculty Contacts: Rida Bazzi, Hasan Cam, K. Selcuk Candan, Charles Colbourn, Partha Dasgupta, Sandeep Gupta, Dijang Huang, Goran Konjevod, Yann-Hang Lee, Donald Miller, Andrea Richa, Arun Sen, Aviral Shrivastava, Violet Syrotiuk, Guoliang Xue, Stephen Yau

Software Engineering

The researchers in software engineering are engaged in component-based software development; adaptable service-based software; software architecture; context- and situation-aware software; QoS-aware software; simulation-based design; distributed co-design; collaborative modeling; software process improvement; formal methods; embedded software; middleware; web-based software engineering; distributed workflow analysis; and modeling methodologies.

Sub-categories: Customized Software Processes, Simulation-based Software Engineering, Software Process, Environment, and Automation Research (SPEAR) Area

Faculty Contacts: James Collofello, Hessam Sarjoughian, Wei-Tek Tsai, Joseph Urban, Stephen Yau

Photo: (left to right) Sandeep Gupta, CSE associate professor, Georgios Varsamopoulos and Su-Jin Kim (research students) from the iMPACT mobile computing lab.
Biomedical informatics researchers enhance patient care and human health by expediting the process of transferring basic biomedical research to clinical use effectively and safely. Analysis and cognitive modeling of human behavior in real world health care environments, mathematical modeling of population health, analysis of human-computer interaction, and computational modeling of living systems all play important roles in these cross-disciplinary research activities.

**Sub-categories:** Bioinformatics, Clinical Informatics, Cognitive Sciences, Imaging Informatics, Public Health Informatics

**Faculty Contacts:** Vimla L. Patel, William Johnson, Trevor Cohen, Valentin Dinu, Kanav Kahol, Seungchan Kim, Chitta Baral, Shu-Chuan (Grace) Chen, Howard Silverman

Cyberinfrastructure is defined as “the coordinated aggregate of software, hardware and other technologies, as well as human expertise, required to support current and future discoveries in science and engineering”. Cyberinfrastructure has fundamental computing technologies at the bottom most layer and community specific knowledge environments for research and education at the top layer. The challenge lies in the creation of the services between these two layers, often referred to as “middleware”.

**Sub-categories:** High Performance Computing: Systems, software, and middleware, Knowledge Environments, Collaborative Communities

**Faculty Contacts:** Goran Konjevod, Sandeep Gupta

The information assurance program addresses the broad issues of developing trustworthy information systems to store, process and transmit information over networks. In addition, IA faculty members are also engaged in both academic and outreach training programs including the establishment of an Information Assurance Center to be certified by NSA/DHS as a national Center of Academic Excellence in Information Assurance Education (CAEIAE).

**Sub-categories:** Data Security and Privacy, Network Security, Security and Other QoS in Development of Service-based Systems, Security in Real-time Systems, Trust Management in Distributed Systems

**Faculty Contacts:** Chitta Baral, Rida Bazzi, K. Selcuk Candan, Charles Colbourn, Partha Dasgupta, Hasan Davulcu, Sandeep Gupta, Dijiang Huang, Huan Liu, Hessam Sarjoughian, Arunabha Sen, Wei-tek Tsai, Gouliang Xue, Stephen S. Yau

The researchers in modeling and simulation are engaged in model composability; simulation of heterogeneous continuous, discrete, cellular automata, and optimization models; visual hybrid software/hardware model specification; agent modeling; model consistency checking; modeling methodologies; mixed logical- and real-time simulation; simulation-based design and experimentation; and automated simulation analysis. The application domains include supply-chain enterprises, service-based software processes, socio-ecological dynamics, and command and control systems.

**Sub-categories:** Model Composability, Simulation-based System Design and Testing, Software Development Process Modeling

**Faculty Contacts:** James Collofello, Gerald Farin, Marco Janssen, Huan Liu, Hessam Sarjoughian, Wei-Tek Tsai, Peter Wonka
Pervasive and Ubiquitous Computing

Pervasive and ubiquitous computing researchers come from diverse core areas and are developing intuitive interfaces and pervasive media processing to support sensor data management, multimedia software to help blind people to easily search text in library, biomedical sensor-based middleware for pervasive health monitoring, mobility-tolerant and mobility-aware protocols for seamlessly integrating mobile devices into the wired infrastructure, and light weight security solutions for pervasive commercial applications.

Faculty Contacts: K. Selcuk Candan, Sandeep Gupta, Dijiang Huang, Sethuraman Panchanathan, Hari Sundaram

Service and Enterprise Systems

Faculty in service and enterprise systems tackle significant challenges that exist in the design, specification, and development of intra-organizational enterprise systems as well as business-to-business and business-to-customer enterprise systems. Researchers address issues in service-oriented computing, service-oriented architectures, and service-oriented software development as well as process modeling and service orchestration together with middleware for event processing and service execution.

Sub-categories: Enterprise Computing, Service-Oriented Computing, Service-Oriented Computing Curriculum and Education Related Research

Faculty Contacts: K. Selçuk Candan, Yinong Chen, James Collofello, Yann-Hang Lee, Wei-Tek Tsai, Hessam Sarjoughian, Joseph Urban, Susan Urban

Social Science Informatics

Social science informatics facilitates the improvement of human-computer interfaces. Social science driven activities include the computational simulation of social phenomena such as governance of common pool resources and ancient societies; the integration of data from social science research activities; and the social analysis of electronic documents. Informatics driven activities contain the development of interfaces and improving the accessibility of information by using insights of cognitive scientists.

Sub-categories: Computational Social Network Analysis, Geospatial Intelligence, Human-Computer Interfaces, Social Science Data Integration, Social Simulation

Faculty Contacts: K. Selçuk Candan, Hasan Davulcu, Nicholas Findler, Marco Janssen, Baoxin Li, Huan Liu, Hessam Sarjoughian, Hari Sundaram, Subbarao Khambampati, Peter Wonka

Photo: Virtual reality simulation training
Arts, Media and Engineering
http://ame.asu.edu
The Arts, Media and Engineering (AME) center is comprised of a transdisciplinary network of faculty and students working under a common, use-inspired research and education agenda. The center emphasizes research on the integration of the human physical experience with computation and digital media. Researchers produce experiential media systems and models that evolve human ability, facilitate learning, enhance scientific discovery, empower creativity, assist the disadvantaged and improve quality of life. Within these application areas, researchers explore sensing, perception and modeling, interaction and feedback, and experiential construction and knowledge creation. Experiential media products created at AME have been presented and won distinctions in top tier scientific and artistic venues such as the ACM Multimedia, Siggraph, ICM, and Lincoln Center conferences. The program has secured competitive grants across the sciences, arts and humanities from the federal government, industry, and private foundation sources. Preparing experiential media specialists across the arts, sciences and engineering, AME offers concentrations as part of a variety of graduate degrees at MA, MFA, and Ph.D. levels. Beginning in Fall 2007, AME will also offer a Ph.D. in Media Arts & Sciences (MAS). The center provides top students National Science Foundation (NSF) Integrated Graduate Education and Research (IGERT) Traineeships as well as a variety of other research opportunities.

Center for Cognitive Ubiquitous Computing (CUBiC)
http://cubic.asu.edu
The Center for Cognitive Ubiquitous Computing is dedicated to design, development and evaluation of human centered multimodal applications that present multisensory information in a fast and efficient manner. The rapid emergence of multimedia technologies and standards is resulting in an explosion of media-rich applications. The future of innovative multimedia solutions lies in understanding the needs of the customer with the ultimate goal of achieving a symbiosis between the human and the computer, resulting in evolving a human centered multimedia computing paradigm. This requires a multi-disciplinary approach to understanding, designing and solving problems. Researchers in CUBiC are engaged in designing and developing multimedia solutions for assistance, learning, and rehabilitation. This research involves neurologists, psychologists, biomedical engineers, disability specialists, human computer interaction and computer graphics researchers, multimedia experts, and industrial designers. Some of our exemplary projects include multimodal interfaces to enable information access and environment perception; surgical simulation systems for automatic surgical proficiency judgments, feedback systems, and dynamic virtual reality simulations; development of novel virtual reality and computationally based diagnostic and rehabilitative systems for neuropsychological assessment.
**Center for Decision Making and Cognition**

http://cognitive.asu.edu

This center is a multidisciplinary research unit devoted to the study of medical decision-making, cognitive foundations of health behaviors, and the effective use of computer-based information technologies. The research is steeped in theories and methods of cognitive science, with a particular focus on the analysis of medical error, models of naturalistic decision-making, development and use of clinical guidelines, and evaluation of human-computer interactions. These studies are guided by a concern for improving performance of individuals and teams in the healthcare system. Towards this end, we focus on the cognitive characteristics involved in learning, instruction, and design of decision-support and other health information technologies for safe use in clinical environments.

**Center for Health Information & Research**

http://chir.asu.edu

The Center for Health Information and Research (CHIR) is an interdisciplinary research group that uses data to provide actionable information about health care in our community. Designated as an Arizona Board of Regents (ABOR) Center in January 2007, CHIR houses Arizona HealthQuery (AZHQ), a nationally unique database of patient-specific health information for longitudinal tracking of health outcomes for individual providers. The center’s series of community reports on various health care topics reflect CHIR’s deep ties to the Arizona community and the commitment of the more than sixty organizations that share their data in AZHQ. CHIR is one of six national demonstration sites for a Centers for Medicare and Medicaid Services initiative to improve the effectiveness of health care nation-wide. The results of a recently completed two-year National Institutes of Health grant examining disparities in health and health care will be published later this year. The project compares more than 70,000 children, primarily of Mexican descent, to more than 24,000 non-Hispanic children in the border community of Yuma. In 2006-2007, grants and contracts totaled nearly $1.1 million CHIR faculty authored more than ten refereed articles with an additional seven manuscripts in process.

**Decision Theater**

http://dt.asu.edu

The Decision Theater is an innovative center for science-based, informed analysis where people visualize possibilities and realize solutions. Its visualization, simulation and modeling, and collaboration tools are used to explore issues ranging from the environment and urban growth to health and education. The center enables decision makers to better understand the past and present as well as to predict the future. By combining advanced computer technology with Arizona State University’s deep research expertise, the Decision Theater’s state-of-the-art services are benefiting a wide range of public sector and commercial clients. It also functions as a laboratory for researchers to advance the fields of computer science, cognitive sciences, and policy sciences. The theater itself consists of an interactive 3D immersive environment built with cutting edge graphics technologies. The 260-degree faceted screen with seven rear-projection passive stereo sources displays panoramic computer graphics or 3D screen video content.
Research

Enabling Technologies for Intelligent Information Integration
http://rakaposhi.eas.asu.edu/et-i3/

Enabling Technologies for Intelligent Information Integration, or ET-I3, is a collaborative program that addresses the challenge of information integration. ET-I3 is developing enabling integration technologies for scalable “Do What I Mean” (DWIM) processing for sources and services over the Internet. DWIM-integration involves using the higher-level information goals of the user to decide what sources and services on the available information web are directly or indirectly relevant. After accessing these sources, the system efficiently composes the relevant services to answer requests. Technologies to support DWIM-integration will be critically important for high-profile areas, such as bioinformatics and ebusiness, and useful in other disciplines.

Enterprise Computing

The Enterprise Computing center supports research that integrates issues from computer science, industrial engineering, and information systems to study the dynamic, self-adjusting behavior required for the support of organizational collaboration in a service-oriented computing environment. Their objective is to develop an innovative research and educational environment for creating a new breed of information technology professional, one who understands not only the need for intelligent, adaptable, scalable, and secure computing solutions, but also the business context that drives the volatility of enterprise applications.

Our research methodology is focused on the development of enterprise physics which is needed to lend a sound approach to service computing and its supporting research areas of ontological service/process description, dynamic orchestration of services, modeling and simulation of enterprise collaboration, component business modeling, decision support systems, agent-based collaboration and resource virtualization and performance. We are establishing industry/university partnerships for the purpose of conducting enterprise computing research in the context of applications, such as supply network integration, banking and credit card processing, and medical informatics.

High Performance Computing Initiative
http://hpc.asu.edu

The Fulton High Performance Computing Initiative (HPCI) serves as the hub for parallel and grid scientific computing on the ASU Tempe campus, maintaining centrally managed high-performance computing systems for over 1,000 processors across campus. The Fulton HPCI provides state-of-the-art machine room facilities, system administration, expertise in parallelization of scientific and engineering codes and training to ASU researchers.

The mission of the HPCI is to maximize the utility of high-end computing resources deployed by ASU researchers. The HPCI currently collaborates with more than 70 faculty across the engineering disciplines, with industry partners as well as with other ASU initiatives, including the Decision Theater and the Biodesign Institute. In addition to its mission in collaborative research, the HPCI also performs computer science research in the areas of system software and programming models for high-end computing systems. Current research projects include parallelization of discrete event simulators for advanced chip design; optimization of golf ball design; protein structure modification for more effective methods of drug delivery; and design of high temperature materials for more efficient power plants.
The Information Assurance Center focuses on both research and educational activities to address the broad issues of developing trustworthy information systems (TIS) and ensuring the quality of information being stored, processed and transmitted by these TIS. Center researchers are currently studying foundational, network, system and application aspects of developing TIS including logic, techniques, languages and tools for development of adaptive TIS; composition methods; measuring, modeling, monitoring, analyzing, verifying and testing of TIS; steganography; facial recognition, video surveillance, multimedia data processing, and survivable network design; dynamic and deterministic quality of service management; data mining for security and privacy in data management; and situation awareness.

The Center received certification as a National Center of Academic Excellence in Information Assurance Education (CAEIAE) by the National Security Agency and the Department of Homeland Security in June 2007, and currently offers three concentration programs within the B.S., M.S., and Ph.D. degree programs in computer science. The Center is also actively engaged in continuing education for industry as well as assisting IA educational activities in community and minority colleges.

The Institute for Computing, Information Sciences and Engineering (InCISE) in the ASU Vice President for Research and Economic Affairs fosters interdisciplinary research centered around computer science and informatics expertise to help transform the world in which we live. Research specializations include: software engineering; networking and sensing; data management and storage; security; artificial intelligence; modeling; analysis; presentation and visualization. InCISE incubates new ideas by bringing together interdisciplinary teams of researchers to address complex research questions and develop proof-of-concept examples that help attract competitive external funding. In addition to research collaborations with researchers from over 23 departments, InCISE includes several interdisciplinary research centers: Center for Ubiquitous Computing, Partnership for Research in Spatial Modeling, Enabling Technologies for Intelligent Information Integration, and Center for Health Information and Research. InCISE is also assisting in the creation of the new Biomedical Informatics Department, Center for Decision Making and Cognition, Center for Embedded Systems, a newly recognized Center for Information Assurance, and a number of other collaborative research efforts with new schools including Earth and Space Exploration, Human Evolution and Social Change, and Sustainability. FY 07 ROI on InCISE collaborations is $1.6M Expenditures, $2.5M Awards, and $21 M of $53M in collaborative proposals submitted.

The Partnership for Research in Spatial Modeling (PRISM) is ASU’s focal point for research involving 3D data acquisition, modeling, visualization, and analysis. PRISM is co-directed by Dan Collins (Fine Arts) and Gerald Farin (Computer Science). This diverse leadership accentuates PRISM’s interdisciplinary nature. PRISM’s origins date back to 1997, when several faculty with common interests in 3D modeling and visualization formed an interest group and took its case to ASU’s VP for research (R. Barnhill). As a consequence, PRISM became an official center; soon after, initial funding came from an NSF KDI grant ($2M).

PRISM’s applied research involves 3D data archiving, 3D data query, 3D face recognition, 3D de-aging of a George Washington face bust, 3D telesculture, brain imaging, and visualization for urban planning. Theoretical research is about isosurfaces from Marching Cubes, Voronoi diagrams, curve and surface design, and real-time rendering in a computer graphics context. PRISM covers 3D data acquisition, data modeling, data visualization, and 3D rapid prototyping.
## Research Awards

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<th>FACULTY</th>
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<th>TITLE</th>
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<td>BARAL</td>
<td></td>
<td>Answering Complex Questions and Performing Deep Reasoning in Advance Question Answering Systems</td>
<td>DOD-NSA/ARDA</td>
<td>5/3/04-10/31/06</td>
<td>$810,977</td>
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<td>Gonzalez</td>
<td>Knowledge Representation, Reasoning and Problem Solving in a Cellular Domain</td>
<td>NSF-CISE</td>
<td>8/1/04-7/31/09</td>
<td>$496,465</td>
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<td>Integrating Knowledge based Reasoning, Common Sense Reasoning and Natural Language Semantics in a QA System</td>
<td>DOD-Navy</td>
<td>9/30/06-9/30/07</td>
<td>$408,475</td>
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<td>Gonzalez, Chen</td>
<td>Generalized Text Extraction from Life Science and Biomedicine Abstracts: Empowering the CBioC Mass Collaborative Curation and Reasoning Systems</td>
<td>Science Foundation Arizona</td>
<td>3/30-7/28/08</td>
<td>$138,749</td>
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<td></td>
<td>Lee</td>
<td>Compiling AnsProlog to First-Order Theories - An Approach to Integrate AnsProlog Knowledge Bases with First-Order Knowledge Bases</td>
<td>DOD-Navy</td>
<td>9/30/06-9/30/07</td>
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<td>BAZZI</td>
<td>Chattha</td>
<td>Curriculum Development for the Compiler Construction Course Sequence</td>
<td>Consortium for Embedded Systems</td>
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<td>Pauchananathan, Hedgpeth</td>
<td>Ubiquitous Environment to Facilitate Access to Textbooks &amp; Related Materials for Individuals who are Blind or Visually Impaired</td>
<td>Arizona Department of Economic Security/RSA</td>
<td>1/9/06-12/31/09</td>
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<td>Chattha, Sundaram</td>
<td>Quality-Adaptive Media-Flow Architectures to Support Sensor Data Management</td>
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<td>Stanzione, Dasgupta, Vrudhula</td>
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<td>Splines over Iterated Voronoi Diagrams</td>
<td>NSF-CISE</td>
<td>12/15/03-11/30/07</td>
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</table>
“I hope that our research will have a practical impact and that it will inspire my students to do great things. I am grateful for the high-quality and supportive research environment provided by the School of Computing and Informatics at Arizona State University.”

Hasan Davulcu, SCI assistant professor
2007 NSF Career Award recipient

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<td>Scalable Multi-Objective Planning for Metric Temporal Domains: Heuristics, Algorithms and Tradeoffs*</td>
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<td>Supporting Partial Satisfaction Planning &amp; Replanning in Expressive &amp; Mixed Initiative Domains</td>
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<td>A Software Environment to Integrate Multiple Data Type for the Analysis of Genomic Data for Multiple Myeloma</td>
<td>Mayo Clinic Scottsdale</td>
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<td>A Systematic Approach to 3D Imaging and Visualization for Enhancing Target Detection and Discrimination</td>
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<td>A Framework of Acquisition and Deployment of Digital Imagery for Computer Assisted Evaluation of Diabetic Retinopathy</td>
<td>University of Texas Medical Branch</td>
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<td>Stereoscopic Visualization and Haptic Virtual Exploration of Gastrointestinal Endoscopic Images for Improved Diagnosis</td>
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<td>Geometry Processing for IsoSurfaces</td>
<td>NSF-CISE</td>
<td>7/15/05-6/30/08</td>
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Research

“Our goal is for ASU to be a leading center for interdisciplinary science and technology research, as well as a pioneer in discovery and scholarship in computing and informatics.”

Rick Shangraw
ASU vice president of research, economic affairs

<table>
<thead>
<tr>
<th>FACULTY</th>
<th>CO-PI</th>
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<tr>
<td><strong>PANCHANATHAN</strong></td>
<td>Candan, Black, Hedgpeth</td>
<td>ILEARN: IT-Enabled Intelligent and Ubiquitous Access to Education Opportunities for Blind Students*</td>
<td>NSF-CISE</td>
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<td>Gannod, Golshani, Huey, Lee, Y., Pheanis</td>
<td>A Concentration Track in Embedded Systems</td>
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<td>PPD-FRI: Ubiquitous Environment to Facilitate Engineering Education for Blind Persons</td>
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<td><strong>RICA</strong></td>
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<td>LANL Internship: Efficient Shortest Path Computation in Planar Graphs</td>
<td>Los Alamos National Laboratory</td>
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<td><strong>SARJOUGHIAN</strong></td>
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<td>A Scaleable Approach to Model Validation</td>
<td>Intel Corporation</td>
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<td>Ontological Relations Between Unified Modeling Language and System Entity Structure</td>
<td>UofA</td>
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<td>Lee, B</td>
<td>Shared Vision: Embedded Technology for Military Operations in Urban Terrain</td>
<td>DOD-ARO</td>
<td>10/7/06-8/14/09</td>
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<td>High Performance Technologies, Inc.</td>
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<td>Institute for the Study of Learning and Expertise (ISLE)</td>
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<td>Avaya Labs Research</td>
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<td><strong>SYROTIUK</strong></td>
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<td>Collaborative Research: Characterizing Protocol Interaction in News: A Network Environment Wireless State Service*</td>
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<td>MERIT: A Formal Framework for Systematic Protocol Assessment</td>
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<td>Vehicle Routing for Probe to Characterize Wireless Networks</td>
<td>Defense Sciences Technology Organization</td>
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<td>Routing Protocol Design Toolset for Wireless Ad-Hoc Networks to Maximize Quality of Service</td>
<td>Architecture Technology Corporation</td>
<td>11/3/06-4/26/07</td>
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“To be a computer scientist no longer means living solely within discrete mathematics, formal language theory and all the other touchstones of the field. Instead, it means that we can take these monstrously powerful fundamentals, these tools of invention, and apply them to whatever domain our creativity wishes.”

Dan McClary, Ph.D. student in computer science
Research Assistant for the Mobile Ad Hoc Research (MARS) lab

<table>
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<th>FACULTY</th>
<th>CO-PI</th>
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<td><strong>TSAI</strong></td>
<td>Chen, Yinong, Lee, Y-H, Collofello</td>
<td>Preparing High School Teachers for Service-Oriented Computer Science Education</td>
<td>ED-U.S.</td>
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<td>Dynamic Verification and Validation for Flight Control Software</td>
<td>Scientific Monitoring Inc.</td>
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<td>Developing Highly Dependable Embedded Systems with Reconfigurable Software</td>
<td>Consortium for Embedded Systems</td>
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<td>End-to-End Scenario and Modeling Tool</td>
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<td>ITR: Methodologies for Robust Design of Information Systems Under Multiple Sources of Uncertainty</td>
<td>University of Michigan</td>
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<td>Robustness and Survivability Issues in Wireless Ad Hoc Networks</td>
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<td>Numerical Algorithms for Location Problems Arising in Wireless Sensor Networks and Other Applications*</td>
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<td>ITR Collaborative Research: Fault Tolerance in WDM Optical Networks: Multifailure Recovery and Multilayer Survivability*</td>
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<td><strong>YAU</strong></td>
<td>Davulcu</td>
<td>Adaptable Situation-Aware Secure Service-Based Systems</td>
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* These awards also include a Research Experience for Undergraduates (REU) component. Funded by the National Science Foundation, REUs support research participation by undergraduate students.
## Interdisciplinary Research Awards

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<td>Candan, Panchanathan, Sundaram (CSE 10%)</td>
<td>IGERT: An Arts, Sciences, And Engineering Research And Education Initiative For Experimental Media</td>
<td>NSF-EHR</td>
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<td>Candan, Farin, Panchanathan, Ryu, Sundaram (CSE 20%)</td>
<td>CISE RI: An Interdisciplinary Research Environment For Motion Analysis</td>
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<td>A Digital Media Based Biofeedback System for Neural Rehabilitation</td>
<td>UofA</td>
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<td>Ye (75% CSE)</td>
<td>SEI: Machine Learning Approaches for Biological Image Informatics</td>
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<td>Baral (CSE 10%)</td>
<td>Research Support for Engineering Processes for Facility Delivery Activities &amp; Facility Sustainment Management</td>
<td>DOD-Army Construction Engineering Research Laboratory</td>
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<td>Konjevod, Liu, Stanzione (CSE 10%)</td>
<td>Environmental and Economic Impacts of Material Used in Future Urban Development</td>
<td>Science Foundation Arizona</td>
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<td>Sarjoughian (CSE 36%)</td>
<td>GOALI: Process Control Approaches to Supply Chain Management in Semiconductor Manufacturing</td>
<td>NSF</td>
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<td>Panchanathan (CSE 50%)</td>
<td>Video Traces: Create, Disseminate, Analyze</td>
<td>NSF-CISE</td>
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<td>Chatha, Vrudhula (CSE 75%)</td>
<td>CSR-EHS: Analytical Techniques for Global Energy Minimization of a System of Interacting Components</td>
<td>NSF-CISE</td>
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<td>Chen, Yi (CSE 50%)</td>
<td>Archiving and Querying Scientific Protocols, Data and Provenance</td>
<td>NSF-CISE</td>
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<td>Richa (CSE 33%)</td>
<td>Academic and Professional Development for Computer Science, Engineering, and Mathematics Students: Transitioning to Upper Division, Research, Grad...</td>
<td>NSF</td>
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<td>Chatha, Vrudhula (CSE 75%)</td>
<td>Power Optimization Techniques for a System of Interacting Heterogenous Components</td>
<td>CES</td>
<td>1/3/05-12/31/07</td>
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<td>Stanzione (CSE 50%)</td>
<td>Simulation Tools for Photonic Devices</td>
<td>DOD-Army Research Office</td>
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<td></td>
</tr>
<tr>
<td>Dasgupta (CSE 35%)</td>
<td>A Complex Adaptive System Approach to QOS Assurance and Stateful Resource Management for Dependable Information Infrastructure</td>
<td>DOD-AFOSR</td>
<td>4/9/01-12/31/06</td>
<td>$2,133,095</td>
</tr>
<tr>
<td>Richa (CSE 5%)</td>
<td>Academic and Professional Development for Upper-Division Computer Science, Engineering, and Mathematics Students</td>
<td>NSF-EHR</td>
<td>9/15/06-8/31/10</td>
<td>$500,000</td>
</tr>
<tr>
<td><strong>DEPARTMENT OF MATHEMATICS AND STATISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chen, S (BMI 35%)</td>
<td>Collaborative Research: Statistical Methods and Algorithms for Genomic Data</td>
<td>NSF</td>
<td>8/15/07-7/31/08</td>
<td>$624,592</td>
</tr>
<tr>
<td>Farin (CSE 5%)</td>
<td>Improved Algorithms for PET/MR Physiological Estimates</td>
<td>HHS-NIH-NIBIB</td>
<td>9/20/03-8/31/07</td>
<td>$510,875</td>
</tr>
<tr>
<td>Chen, S, Stanzione (BMI 3%; CSE 7%)</td>
<td>An Interdepartmental Computing Environment for Statistical Research</td>
<td>NSF</td>
<td>9/1/07-8/31/08</td>
<td>$50,000</td>
</tr>
<tr>
<td>Research Area</td>
<td>Project Title</td>
<td>Principal Investigator</td>
<td>Collaborators</td>
<td>Funding Agency(s)</td>
</tr>
<tr>
<td>---------------</td>
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<td>------------------------</td>
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</tr>
<tr>
<td><strong>DEPARTMENT OF PSYCHOLOGY</strong></td>
<td>AZ ASU Alzheimer’s Research Center Project</td>
<td>Farin (CSE 7%)</td>
<td></td>
<td>Alzheimer’s Disease Center</td>
</tr>
<tr>
<td><strong>DIVISION OF COMPUTING STUDIES</strong></td>
<td>Geometry Based Feature Extraction and Analysis of Geo Data</td>
<td>Wonka (CSE 50%)</td>
<td></td>
<td>National Geospatial Intelligence Agency</td>
</tr>
<tr>
<td></td>
<td>3D Face Authentication for Biometric Access Control</td>
<td>Farin (CSE 25%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GLOBAL INSTITUTE FOR SUSTAINABILITY</strong></td>
<td>Decision Center for a Desert City (DCDC): Science and Policy of Climate Uncertainty</td>
<td>Rowe (SCI 5%)</td>
<td></td>
<td>NSF-SBE</td>
</tr>
<tr>
<td></td>
<td>AOC: Archaelogical Data Integration for the Study of Long-Term Human and Social Dynamics</td>
<td>Candan, Davulcu, Kambhampati (CSE 50%)</td>
<td></td>
<td>NSF-CISE</td>
</tr>
<tr>
<td></td>
<td>AOC: Integrated Analysis Of Robustness In Dynamic Social Ecological Systems</td>
<td>Janssen (CSE 9%)</td>
<td></td>
<td>NSF-SBE</td>
</tr>
<tr>
<td></td>
<td>Long-Term Coupled Socio-Ecological Change In Northern Mexico and the American Southwest</td>
<td>Janssen (CSE 5%)</td>
<td></td>
<td>NSF-SBE</td>
</tr>
<tr>
<td></td>
<td>Enabling the Study of Long-Term Human and Social Dynamics: A Cyberinfrastructure for Archaeology</td>
<td>Baral, Candan, Davulcu, Kambhampati, Liu (CSE 30%)</td>
<td></td>
<td>NSF-SBE</td>
</tr>
<tr>
<td><strong>IRA A. FULTON SCHOOL OF ENGINEERING</strong></td>
<td>Shared and Distributed Memory Parallelization of SystemC in Support of System VSIPL</td>
<td>Stanzione (CSE 100%)</td>
<td></td>
<td>Pentum Group, Inc.</td>
</tr>
<tr>
<td></td>
<td>Intel High Performance Computing Graduate Assistantships at Arizona State University: Programming from One Thousand to One Hundred Thousand Threads</td>
<td>Stanzione (CSE 100%)</td>
<td></td>
<td>Intel</td>
</tr>
<tr>
<td><strong>PARTNERSHIP FOR RESEARCH IN SPATIAL MODELING</strong></td>
<td>Observations and Modeling of Orographic Cumulus Development Using Digital Imaging and Data Cataloguing</td>
<td>Nielson, Rowe (CSE 17%; SCI 17%)</td>
<td></td>
<td>NSF-GEO</td>
</tr>
<tr>
<td><strong>SCHOOL OF HUMAN EVOLUTION AND SOCIAL CHANGE</strong></td>
<td>Land-Use and Landscape Socio-Ecology in the Mediterranean Basin</td>
<td>Sarjoughian (CSE 15%)</td>
<td></td>
<td>NSF-ENG-BCS</td>
</tr>
<tr>
<td></td>
<td>Dynamics of Rules in Commons Dilemmas</td>
<td>Janssen (CSE 50%)</td>
<td></td>
<td>NSF-SBE</td>
</tr>
<tr>
<td></td>
<td>Integrating Socio-Ecological Sciences through a Community Modeling Framework</td>
<td>Janssen (CSE 15%)</td>
<td></td>
<td>NSF-SBE</td>
</tr>
<tr>
<td><strong>TRANSLATIONAL GENOMICS RESEARCH INSTITUTE</strong></td>
<td>Targets to Therapeutics in Pancreatic Cancer</td>
<td>Kim (CSE 12%)</td>
<td></td>
<td>NIH/National Cancer Institute</td>
</tr>
<tr>
<td></td>
<td>Chemoprevention of Skin Cancer - Project III</td>
<td>Kim (CSE 20%)</td>
<td></td>
<td>NIH/National Cancer Institute</td>
</tr>
<tr>
<td></td>
<td>Center for High-Throughput Minimally-Invasive Radiation Biodosimetry - Core C</td>
<td>Kim (CSE 10%)</td>
<td></td>
<td>NIH/NIAID</td>
</tr>
<tr>
<td></td>
<td>A New Therapeutic Paradigm for Breast Cancer Exploiting Low-Dose Estrogen-Induced Apoptosis</td>
<td>Kim (CSE 15%)</td>
<td></td>
<td>Department of Defense/CDMRP</td>
</tr>
<tr>
<td></td>
<td>Arizona Clinical and Translational Science Award</td>
<td>Johnson, Panchanathan (BMI 30%)</td>
<td></td>
<td>TGEN/NIH</td>
</tr>
</tbody>
</table>
Department of Biomedical Informatics

Shu-Chuan (Grace) Chen  
Assistant Professor  
Ph.D. Pennsylvania State University 2003  
Phone: 480.965.0115  
Email: scchen@math.la.asu.edu  

Research/Areas of Expertise  
- Pattern recognition  
- Mixture models  
- Bioinformatics  
- Data mining

Trevor Cohen  
Assistant Professor (New Faculty)  
Ph.D. Columbia University - 2007  
Email: trevor.cohen@asu.edu  

Research/Areas of Expertise  
- Latent semantic analysis  
- Comprehension and medical expertise  
- Distributed cognition and medical error

Valentin Dinu  
Assistant Professor (New Faculty)  
Ph.D. - Yale University 2007  
Email: valentin.dinu@yale.edu  

Research/Areas of Expertise  
- Biomedical informatics  
- Translational research  
- Integrative disease association analysis  
- Genome wide association studies  
- Entity-attribute-value database modeling
Robert A. Greenes  
Chair (New Faculty)  
NAS, IOM member  
Ph.D. - Harvard University 1970  
MD - Harvard Medical School 1966  
Phone: 602.827.2548  
Email: robert.greenes@asu.edu  

Research/Areas of Expertise  
- Modeling of clinical decision making  
- Knowledge representation  
- Knowledge management  
- Clinical decision support  
- Personal biosensors  
- Human-computer interaction  
- Group collaborative work

William Johnson  
Professor  
Ph.D. Economics - Rutgers University 1971  
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Research/Areas of Expertise  
- Community health information systems  
- Health care effectiveness  
- Health care disparities  
- Surveillance systems  
- Environmental effects on health  
- Patient safety  
- Health care workforce  
- Economic evaluations of health care

Vimla L. Patel  
Vice Chair (New Faculty)  
Ph.D., D.Sc. - McGill University 1981  
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Website: http://www.fulton.asu.edu/~patel/  

Research/Areas of Expertise  
- Medical cognition  
- Medical decision-making and reasoning  
- Patient Safety and medical errors  
- Socio-cognitive studies of human-computer interaction  
- Cognitive assessment of learning and instruction

Edward H. Shortliffe  
Professor (New Faculty)  
NAS, IOM member  
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Research/Areas of Expertise  
- Clinical decision-support systems  
- Collaborative technologies  
- Role of internet in health care  
- Informatics research policy

Affiliated/Adjunct Faculty

Chitta Baral  
Professor  
Department of Computer Science and Engineering

Kenneth Bobis  
Clinical Faculty  
Department of Biomedical Informatics

Yi Chen  
Assistant Professor  
Department of Computer Science and Engineering

Chris Chute  
Clinical Faculty  
Department of Biomedical Informatics

Gerald Farin  
Professor  
Department of Computer Science and Engineering

Keith Frey  
Clinical Faculty  
Department of Biomedical Informatics

Graciela Gonzalez  
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Department of Biomedical Informatics

Sandeep K.S. Gupta  
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Department of Computer Science and Engineering

Seungchan Kim  
Assistant Professor  
Department of Computer Science and Engineering

Bradford Kirkman-Liff  
Affiliated Faculty  
Department of Biomedical Informatics

Pat Langley  
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Department of Computer Science and Engineering

Laurence Miller  
Clinical Faculty  
Department of Biomedical Informatics

Sethuraman Panchanathan  
Director  
School of Computing and Informatics

Shahram (Shez) Partovi  
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Department of Biomedical Informatics

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Department of Biomedical Informatics

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Department of Biomedical Informatics

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Howard Silverman  
Clinical Faculty  
Department of Biomedical Informatics

Raymond L. Woosley  
Adjunct Professor  
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Department of Computer Science and Engineering
Department of Computer Science and Engineering Faculty

**Gregory Aist**
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Ph.D. - Carnegie Mellon University 2000
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Research/ Areas of Expertise
- Natural language processing
- Computer-assisted learning
- Research methods

**Ashish Amresh**
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Research/ Areas of Expertise
- Computer aided geometric design
- Real-time rendering
- Visualization and video game programming

**Janaka Balasooriya**
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Research/ Areas of Expertise
- Distributed computing
- Internet and grid computing
- Web service coordination primitives and system architectures
- Biological data integration and interoperability
- Middleware and embedded software
Department of Computer Science and Engineering Faculty

Chitta Baral
Professor
Ph.D. - University of Maryland 1991
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Research/Areas of Expertise
- Artificial intelligence
- Knowledge representation and reasoning
- Declarative programming
- Bioinformatics
- Autonomous agents
- Logic programming
- Cognitive robotics
- Multimedia
- Visualization of databases

Winslow Burleson
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Research/Areas of Expertise
- Human-computer interaction applied to: creativity, innovation, well-being, design engineering, exploration, gaming, educational technology

Debra Calliss
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Research/Areas of Expertise
- Computer science education
- Programming languages
- Software engineering
- Project management

Hasan Çam
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Ph.D - Purdue University 1992
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Research/Areas of Expertise
- Wireless networks
- Computer networks
- Network security
- Low-power processor architectures
- Mobile computing
- ATM switches
- Interconnection networks
- Real-time systems

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Ph.D. - University of Maryland 1997
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Research/Areas of Expertise
- Database systems
- Storage/Querying/Retrieval of multimedia and Web data
- Heterogeneous information integration and retrieval
- Assistive technologies for information and data access distributed multimedia systems
- Multimedia Document Authoring

Karamvir Chatha
Assistant Professor
Ph.D. - University of Cincinnati 2001
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Research/Areas of Expertise
- Computer-aided design (CAD) for embedded and VLSI systems
- System-on-Chip (SoC) Design
- Network-on-Chip design
- Hardware software co-design
- Reconfigurable and adaptive computing

Yinong Chen
Lecturer
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Research/Areas of Expertise
- Service-oriented computing
- Embedded systems
- Fault-tolerant computing
- Distributed computing

Kevin Burger
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Research/Areas of Expertise
- Embedded systems
- Computer networking
- Software engineering

Rida Bazzi
Associate Professor
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Research/Areas of Expertise
- Distributed computing
- Fault tolerance
- Security

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Research/Areas of Expertise
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- Storage/Querying/Retrieval of multimedia and Web data
- Heterogeneous information integration and retrieval
- Assistive technologies for information and data access distributed multimedia systems
- Multimedia Document Authoring

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Research/Areas of Expertise
- Computer-aided design (CAD) for embedded and VLSI systems
- System-on-Chip (SoC) Design
- Network-on-Chip design
- Hardware software co-design
- Reconfigurable and adaptive computing

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Research/Areas of Expertise
- Service-oriented computing
- Embedded systems
- Fault-tolerant computing
- Distributed computing
## Department of Computer Science and Engineering Faculty

### Yi Chen
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**Research/Areas of Expertise**  
- Data management in web and scientific applications  
- Data modeling, storage and query optimization  
- Data streams  
- Information integration

---

### Charles Colbourn
Professor  
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**Research/Areas of Expertise**  
- Network reliability  
- Combinatorial design theory

---

### James Collofello
Professor  
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**Research/Areas of Expertise**  
- Software engineering  
- Project management  
- Quality assurance

---

### Partha Dasgupta
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**Research/Areas of Expertise**  
- Computer security  
- Operating systems  
- Distributed and parallel systems

---

### Hasan Davulcu
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**Research/Areas of Expertise**  
- Data mining  
- Web and text mining  
- Data cleaning and information extraction  
- Workflows and semantic Web services  
- Database systems

---

### Gerald Farin
Professor and Vice Chair  
Ph.D. - University of Braunschweig 1980  
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Website: [http://www.farinhansford.com/gerald](http://www.farinhansford.com/gerald)

**Research/Areas of Expertise**  
- 3D modeling  
- Scientific visualization

---

### Sandeep K.S. Gupta
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**Research/Areas of Expertise**  
- Wireless networks  
- Mobile and ubiquitous/pervasive computing  
- Embedded sensor networks for biomedical applications  
- Parallel and distributed computing

---

### Toni Farley
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**Research/Areas of Expertise**  
- Graphs  
- Networks  
- Algorithms  
- Network security  
- Computer science theory  
- Discrete math

---

### Dirk Colbry
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**Research/Areas of Expertise**  
- Pattern recognition  
- Biometric security  
- Computer vision  
- Robotics  
- Cognitive science  
- Artificial intelligence
Department of Computer Science and Engineering Faculty

Dianne Hansford  
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Research/Areas of Expertise  
- Geometric modeling  
- Scientific visualization

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Research/Areas of Expertise  
- Internet security  
- Wireless network security  
- Mobile ad hoc network  
- Privacy and identity management

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Research/Areas of Expertise  
- Agent-based modeling  
- Evolutionary computation  
- Social simulation

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Research/Areas of Expertise  
- Artificial intelligence  
- Automated planning  
- Machine learning  
- Data and information integration

Seungchan Kim  
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Phone: 480.727.8833  
Email: dolchan@asu.edu  
Research/Areas of Expertise  
- Computational systems biology  
- Bioinformatics  
- Genomic signal processing  
- Modeling genetic regulatory networks  
- Identification of genetic or molecular markers for cancer classification  
- Statistical machine learning

Joohyung Lee  
Assistant Professor  
Ph.D. - University of Texas at Austin 2005  
Phone: 480.727.7765  
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Website: http://peace.eas.asu.edu/joolee/  
Research/Areas of Expertise  
- Artificial intelligence  
- Knowledge representation and reasoning  
- Logic programming and answer set programming  
- Commonsense reasoning about actions  
- Nonmonotonic reasoning

Subbarao Kambhampati  
Professor  
Ph.D. - University of Maryland 1989  
Phone: 480.965.0113  
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Research/Areas of Expertise  
- Artificial intelligence  
- Automated planning  
- Machine learning  
- Data and information integration

Goran Konjevod  
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Phone: 480.965.2783  
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Website: http://thrackle.eas.asu.edu/users/goran  
Research/Areas of Expertise  
- Design and analysis of algorithms  
- Combinatorial optimization  
- Graph theory  
- Discrete mathematics

Pat Langley  
Professor and Associate Director of Informatics  
Ph.D. - Carnegie Mellon University 1980  
Phone: 480.727.6592  
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Research/Areas of Expertise  
- Artificial intelligence  
- Adaptive user interfaces  
- Cognitive architectures  
- Computational models of human behavior  
- Computational biology and ecology  
- Computational scientific discovery  
- Machine learning

Joohyung Lee  
Assistant Professor  
Ph.D. - University of Texas at Austin 2005  
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Research/Areas of Expertise  
- Artificial intelligence  
- Knowledge representation and reasoning  
- Logic programming and answer set programming  
- Commonsense reasoning about actions  
- Nonmonotonic reasoning

Kanav Kahol  
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Ph.D. - Arizona State University 2006  
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Research/Areas of Expertise  
- Haptic user interfaces  
- Multimedia  
- Human computer interaction  
- Surgical simulation  
- Assistive and rehabilitation systems

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Research/Areas of Expertise  
- Geometric modeling  
- Scientific visualization

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Research/Areas of Expertise  
- Internet security  
- Wireless network security  
- Mobile ad hoc network  
- Privacy and identity management

Marcus A. Janssen  
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Research/Areas of Expertise  
- Agent-based modeling  
- Evolutionary computation  
- Social simulation

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Research/Areas of Expertise  
- Artificial intelligence  
- Automated planning  
- Machine learning  
- Data and information integration

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Research/Areas of Expertise  
- Computational systems biology  
- Bioinformatics  
- Genomic signal processing  
- Modeling genetic regulatory networks  
- Identification of genetic or molecular markers for cancer classification  
- Statistical machine learning

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Research/Areas of Expertise  
- Artificial intelligence  
- Knowledge representation and reasoning  
- Logic programming and answer set programming  
- Commonsense reasoning about actions  
- Nonmonotonic reasoning

Kanav Kahol  
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Research/Areas of Expertise  
- Haptic user interfaces  
- Multimedia  
- Human computer interaction  
- Surgical simulation  
- Assistive and rehabilitation systems
Department of Computer Science and Engineering Faculty

Yann-Hang Lee
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Research/Areas of Expertise
- Real-time systems
- Computer communication
- Computer architecture
- Fault-tolerant computing
- Distributed/parallel systems
- Performance evaluation

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Research/Areas of Expertise
- Analytical modelling
- Information systems

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Research/Areas of Expertise
- Multimedia processing
- Computer vision
- Statistical methods in visual computing

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Research/Areas of Expertise
- Data mining
- Machine learning
- Artificial intelligence
- Web analytics
- Social computing

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Research/Areas of Expertise
- Address space operating systems
- Distributed and multiprocessor operating systems
- Computer architecture
- Local area networks

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Research/Areas of Expertise
- Active database systems
- Web-based database systems

Gregory M. Nielson
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Phone: 480.965.2785
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Research/Areas of Expertise
- Interactive design of curves and surfaces
- Multivariate data fitting
- Computer-aided geometric design
- Computer graphics
- Visualization of scientific computing

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M.S. - University of Louisiana at Lafayette 1991
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Research/Areas of Expertise
- Computer science education
- Programming languages

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Research/Areas of Expertise
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- Visualization of scientific computing

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Research/Areas of Expertise
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Research/Areas of Expertise
- Agent-based modeling
- Multi-formalism modeling
- Simulation-based design
- Software architecture

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Research/Areas of Expertise
- Resource optimization in optical and wireless networks
- Video transmission over mobile Ad-hoc networks
- Network Optimization and Algorithms
- System on Chip/Network on Chip Design
- Interconnection Topology Design
- Combinatorial Optimization
- Algorithm Design and Analysis

Aviral Shrivastava
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Research/Areas of Expertise
- Compilers
- Processor architectures
- Embedded systems
- Low-power design
- Thermal-aware design
- Compilers for embedded systems error tolerant architectures and software

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Research/Areas of Expertise
- Multimedia: segmentation; databases; structure discovery and summarization
- Represenational and algorithmic approximations for real-time multimedia content analysis

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Research/Areas of Expertise
- Artificial intelligence
- Machine learning
- Cognitive systems

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Research/Areas of Expertise
- Software engineering
- Internet
- Parallel and distributed processing

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Research/Areas of Expertise
- CASE
- Computer languages
- Data engineering
- Distributed computing
- Executable specification languages
- Software prototyping

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Research/Areas of Expertise
- Design and analysis of algorithms
- Combinatorial optimization
- Distributed resource allocation
- Parallel network architectures

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Research/Areas of Expertise
- Multi-hop wireless networks especially mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs)
- Medium access control (MAC) and higher layer protocols.

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Research/Areas of Expertise
- Compilers
- Processor architectures
- Embedded systems
- Low-power design
- Thermal-aware design
- Compilers for embedded systems error tolerant architectures and software

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Research/Areas of Expertise
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- Internet
- Parallel and distributed processing

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- Computer languages
- Data engineering
- Distributed computing
- Executable specification languages
- Software prototyping
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Research/Areas of Expertise  
- Complex event processing  
- Integration of event and stream processing  
- Distributed datamanagement  
- Distributed rule and transaction processing  
- Active/reactive behavior in complex systems  

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Research/Areas of Expertise  
- Computer graphics  
- Visualization  
- Information visualization  

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Research/Areas of Expertise  
- CAD for VLSI circuits  
- Logic synthesis and verification  
- Low power design  
- Power  
- Energy and thermal management in processors performance  

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Research/Areas of Expertise  
- Quality of service survivability and security issues in computer networks  
- Numerical and combinatorial optimization  

**Stephen S. Yau**  
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Research/Areas of Expertise  
- Software engineering  
- Distributed systems  
- Cyber security  
- Reconfigurable context-sensitive middleware  
- Ubiquitous computing  
- Embedded systems  

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Research/Areas of Expertise  
- Bioinformatics  
- Machine learning  
- Data mining  
- Pattern recognition

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Timothy Lindquist  
Anshuman Razdan  
Rosemary Renaut  
Daniel Stanzione

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Forouzan Golshani  
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David Cline  
Kyowoon Lee  
Qing Li  
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Sae-Hong Cho  
Krzysztof Berezowski  
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Hong Mei  
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**Emeritus Faculty**

Vernon Blackledge was a member of Electrical and Computer Engineering (ECE) for many years before the Department of Computer Science and Engineering (CSE) was formed and moved to CSE in 1984.

Robert Barnhill
Ph.D. University of Wisconsin 1964
Joined the CSE department as chair in 1986. R. Barnhill is one of the founders of the discipline CAGD (Computer Aided Geometric Design), in which he published over 100 articles. In 1991, he became VP for research at ASU, where he made ASU’s research revenues the fastest growing in the US. He subsequently served as VP for research at the university of Kansas and at the UT system.

Leonard Faltz
Ph.D. University of California, Berkeley, 1977
Faltz joined ASU in 1979 and the Department of Computer Science and Engineering in 1985. His educational background is in mathematics and linguistics. Faltz’s research examines the formal aspects of natural language morphology, syntax, semantics and lexicon.

Nicholas Findler
Ph.D. Budapest University of Technical Sciences, 1956
Nicholas Findler joined the Department of Computer Science and Engineering at ASU as a research professor in 1982. Since 1996, he has been Professor Emeritus of Computer Science and Engineering, and Mathematics, as well as Director Emeritus of the Artificial Intelligence Lab.

David Pheanis
Ph.D. Arizona State University
David Pheanis joined the ASU faculty in 1975 and the Department of Computer Science and Engineering in 1980. Since 2004, he has been Professor Emeritus of Computer Science and Engineering and continues to work with the Consortium for Embedded Systems providing internships and scholarships for students.

Earl Robbins
Ph.D. Arizona State University, 1968
Earl Robbins joined the ASU faculty in Engineering in 1968 and the Department of Computer Science and Engineering in 1984. Robbins was awarded the title of emeritus in 1989. He is currently working with another ASU emeritus faculty on research involving methane hydrates found in the ocean.

Marvin Woodfill
Ph.D. Iowa State, 1964
Marvin Woodfill joined the ASU faculty in 1966 in Electrical Engineering and helped to found the Department of Computer Science and Engineering in 1980. He retired from ASU in 1999, earning the title of Professor Emeritus.

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“I have an enduring passion for technology, for education, and for the people of Arizona. And I strongly believe you can’t have a great city without a great school of engineering.”

Ira A. Fulton

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