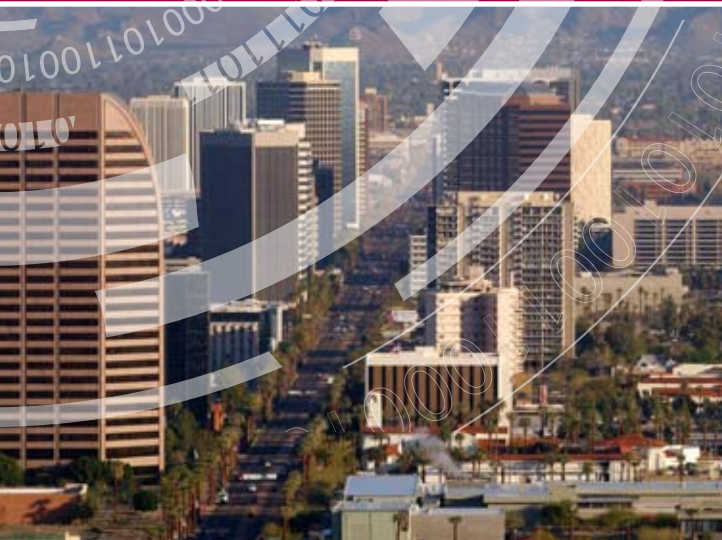


School of Computing and Informatics

ANNUAL REPORT 2007 - 2008



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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.

In keeping with the spirit of ASU President Crow's Sustainability Initiative, 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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Engineering in the Desert



Michael Crow
President
Arizona State
University



Deirdre Meldrum
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of Engineering



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of Engineering

Director's Welcome

Dear Colleagues,

It is a delight to share the exciting developments in our 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 builds on a robust Computer Science and Engineering (CSE) department, a national caliber Biomedical Informatics Department (BMI) and new Informatics programs. We recruited seven outstanding faculty in the past year. SCI faculty includes joint positions with the Biodesign Institute, Arts, Media and Engineering program, College of Public Programs, School of Human Evolution and Social Change, Department of Psychology, Banner Health and Mayo Clinic. The accomplishments of our faculty include memberships of National Academy, Fellowship of professional societies, EIC's/editorship of prestigious journals and chairs of conferences. Our BMI Chair, Prof. Greenes will receive the Morris Collen award from the American Medical Informatics Association for lifetime achievements and significant contributions to Biomedical Informatics.

We have made significant strides in research within a short time, reflected by over a 20% growth in awards and expenditures as well as significant increases in the quality and quantity of proposals. For example, Prof. Patel from our BMI department received a \$4.5M James F. McDonnell Foundation award and Prof. Vrudhula was awarded a \$2M collaborative project with Raytheon funded by Science Foundation Arizona (SFAz). SCI has more than doubled the number of publications in high quality peer reviewed journals, conferences and books over the past five years. SFAz research awards and fellowships have augmented our research capacity and increased top quality graduate student recruitment.

CSE department has 800 undergraduate (CS and CSE), 200 Masters and 150 Ph.D. students and continues to attract and retain excellent students. New M.S. and Ph.D. programs in BMI were launched in Fall 2007 and Fall 2008, respectively. We also launched an Informatics certificate for students from different disciplines across the University. We are already working on launching a model undergraduate BMI program along with Masters and Ph.D. programs in interdisciplinary informatics within a year. Our undergraduate research scholarship program, summer camps and high-school outreach programs help attract the brightest students to our graduate and undergraduate programs. We continue to expand our on-line and distance program offerings.

SCI faculty have strong collaborations inside and outside the University. External partners include, Mayo Clinic, Translational Genomics Institute (TGen), Intel, Raytheon, Motorola, Microsoft, Barrow Neurological Institute (BNI), and Banner Health. Our BMI department is now housed in the new Arizona Biomedical Collaborative building in the Phoenix Biomedical campus and is co-located with the University of Arizona College of Medicine, Phoenix.

We look forward to continued acceleration of 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

The Future of Informatics at SCI

BMI Graduate Program
Completes First Year

New Center for
Information Assurance

Community Outreach

Faculty Awards and Honors

Distinguished Lectures

Events



Informatics @ SCI

Complex problems confront us everyday. Many of these challenges can be solved only with novel technological strategies and an array of new resources. For instance, organizing emergency relief efforts for Hurricane Katrina victims involved collecting and interpreting vast amounts of data from many disparate sources, planning coordinated responses among different agencies in real time and monitoring the overall effects of their action. Likewise, planning and building sustainable cities requires analyzing data on housing and traffic, making zoning and construction decisions and tracking the results of these choices over time.

Informatics is an emerging discipline that applies computing and information technology to address such challenges. Informatics builds upon computer science theory, tools and practice, but differs in its problem-centered, system-level and human-centered approach to technology. This applied focus makes informatics inherently interdisciplinary, cutting across traditional academic boundaries. The School of Computing and Informatics (SCI) at ASU is uniquely positioned as a leader in this important and promising field.

Our dynamic global society requires effective producers and knowledgeable consumers of information and the technologies used to acquire, manage and interpret that information. A workforce trained to build informatics systems, to adapt them to new contexts, and to develop the next generation of policies and practical applications will meet these challenges. In response to this need, SCI offers an Informatics Certificate and plans to launch innovative new interdisciplinary graduate and undergraduate degree programs. The Bachelors of Science in Informatics will prepare students with the skills needed to succeed in the information technology workforce, the Masters of Science will train advanced specialists with deeper informatics knowledge and skills, and the Ph.D. program will educate the next generation of informatics researchers and faculty.

The curriculum revolves around core informatics functionalities not just specific information technologies. For example, relational databases and web search engines operate on different technological principles, but both can be used to extend and augment human memory. Spreadsheets and diagnostic software rely on distinct mechanisms, but both inherently involve reasoning and inference. Recommender systems and route finders differ in detail, but both help inform complex decision making. Students will master the principles that underlie these informatics systems, gain experience in their use and learn to design, analyze and evaluate them in applied contexts.

The School of Computing and Informatics is also building strong connections with industry and other community entities to complement the academic programs. Collaborations such as those at ASU's SkySong, the Scottsdale Innovation Center and funding from private and public sources will provide SCI students with fellowships, internships and applied research experiences to prepare them as future leaders and entrepreneurs.

It is the mission of SCI to produce the next generation of computer and information scientists and engineers, who apply their use-inspired education and fundamental research contributions to solve real-world problems and impact society. We believe that our research and academic programs in informatics are the strong foundation that will secure this goal.

BMI Graduate Program Completes First Year

"Our first year was a resounding success, with launch of the Department, recruiting well-recognized leaders to our faculty, opening of our beautiful new building, start of our M.S. degree program and approval of a Ph.D. program, in-depth involvement in a unique program of instruction of the first-year medical students at the College of Medicine-Phoenix, and achievements of our faculty and students in obtaining a number of grants, publishing papers, and obtaining recognition through several significant awards."

Robert Greenes, Ira A. Fulton Chair, Department of Biomedical Informatics

School of Computing and Informatics joined the ranks of institutions like Columbia University, University of Utah and University of Pittsburgh with the addition of the new master's and doctoral programs in biomedical informatics. This new master's program made its debut in the fall of 2007 with an inaugural class of thirteen students. While providing graduate level preparation in acquiring, representing, retrieving and analyzing biomedical knowledge and data, the new program built on the prior educational and work experiences of the pioneers in this first class. Faculty, staff and students forged alliances and built relationships both inside and outside the Department of Biomedical Informatics (BMI) to make the first year a success.

The academic core began with innovative new courses such as Introduction to Biomedical Informatics, Human Computer Interactions in Biomedical Informatics and Problem Solving in Biomedical Informatics. Throughout the academic year, the students attended the Biomedical Informatics Colloquium Series which provided them with opportunities and exposure to the latest biomedical informatics trends from visiting professors and practitioners. Several students, such as Tarek Saleh, excelled and achieved 4.0 GPAs. This pioneering first class will be joined in the fall by additional masters students and the first five students in the Ph.D. program. The new doctoral program will build on the hard work of the faculty including their significant new research projects, industry collaborations and on the successes of the first year.



Just after the start of the 2007-2008 academic year, BMI celebrated the grand opening of its home, the Arizona Biomedical Collaborative Building I in downtown Phoenix. The facility is a unique research and instructional partnership between Arizona State University and University of Arizona College of Medicine. At the event, ASU President Michael Crow referred to the partnership as a "epicenter of endeavors to help spawn a new era in advancing modern medicine". Arizona Board of Regent President Fred Boyce and Regent Gary Stuart hailed the project as a critical step forward in this "historic and powerful collaboration" between the universities, cementing a partnership that "is dedicated to improving the human condition."

This partnership has already fostered significant new relationships with hospitals and organizations that are now funding BMI research as well as providing student internship and career opportunities. Examples of those partnerships are with organizations such as the Mayo Clinic, the Arizona Health Care Cost Containment System, Maricopa Integrated Health System, Banner Health, Barrow Neurological Institute and Emerge MD.

New Center for Information Assurance

"With so much information existing and new information that is being generated, it is very important that we can protect the information efficiently so that everyone can do a better job in everything, ranging from managing a business to conducting research."

Stephen Yau, Director, Information Assurance Center

In the same way that computers need to be reliable, information systems connected through various types of networks need to be trustworthy. Information assurance grows every day in its importance as entities in both private and public sectors struggle to keep their valuable information safe. According to the National Security Agency, information assurance is defined as the set of measures intended to protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality and non-repudiation.

The new Information Assurance Center (IAC) addresses the broad range of issues in developing trustworthy information systems through engaging academic curricula, internships, collaborations with industry and other universities on various research projects. IAC received recognition as a National Center of Academic Excellence in Information Assurance Education by the National Security Agency and the Department of Homeland Security last year. SCI Professor Stephen Yau, director of IAC, oversees the development of research and educational outreach activities.

IAC has several research projects in information assurance. For example, Yau has projects on improving data security for collaborative work, innovative design of software with multiple quality of service, especially security. SCI Associate Professor Gail-Joon Ahn has research projects on vulnerability and risk management and access control. SCI Professor Sandeep Gupta and SCI



Associate Professor Partha Dasgupta have projects on integrated security infrastructure for personal identifies and consumer computing.

In April 2008, IAC organized a workshop on Information Assurance Research and Education focusing on emerging technologies to address important information assurance issues, as well as innovative educational and training programs for information assurance. Gail-Joon Ahn states, "I strongly believe that our IA program would enhance economic and social impact of research activities at ASU, through the proactive technology transfer and broader collaboration with business partners, including the Phoenix community."

An information assurance concentration is available to students pursuing their bachelor's, master or doctoral degrees. Devon O'Brien, a Computer Systems Engineering, SCI senior, was awarded one of the 50 scholarships offered by the Department of Defense. As part of this award, Devon will intern at the Department of Defense. Devon, who became interested in information assurance after taking a Cryptography class, states, "This scholarship will help provide stability in my further education as well as ensuring a job when I graduate and enter the workforce."

Over the next year, the center plans to expand the research activity, improve the information assurance curriculum and outreach programs in the community.

Community Outreach

SkySong and SCI Unite to Create Student Opportunities

Students and faculty in SCI wishing to combine research with industry and cutting-edge technology now have a new place to pursue these interests. Within a short distance from ASU's Tempe campus is Skysong, a collaborative project between the university, the City of Scottsdale, and various industry partners. The project provides an environment for researchers and entrepreneurs to collaborate both academically and professionally. Current Skysong collaborators include large global enterprises, start-up and midsize technology companies, investors and service providers representing international entrepreneurs from countries such as Canada, China, Germany, India, Ireland, Japan, Singapore and Turkey. The School of Computing and Informatics has been key to Skysong's recruiting efforts, and operates several programs in this exciting new facility.

One of these programs is CampGame, a gaming laboratory which allows high school students to help build interest in careers involving science, math and technology. SCI instructors taught the 2008 summer camp in the gaming classroom developed by SCI at Skysong. The camp was made possible by a \$50,000 grant from the Women and Philanthropy program at the ASU Foundation, and \$17,500 in investments by Skysong.

Ashish Amresh, an SCI lecturer and coordinator of CampGame, works closely with the researchers and industry partners at Skysong. Amresh is one of the faculty from SCI who actively seeks to recruit new industry partners with a relevant interest gaming and other related research. Amresh has also helped to place several interns with gaming companies who have a presence in Skysong.

Currently, the Skysong project consists of two buildings and an outdoor social area. The second building includes classrooms and other academic resources for SCI researchers and students. Eventually, the complex will expand to include four buildings dedicated to academic and entrepreneurial pursuits, a four-star hotel and a 500 to 600 apartment home community.

Skysong has evolved from unique collaboration between ASU and Scottsdale that will foster Research and Economic Development through a blending of entrepreneurship, technology, art and education.

Jeremy Rowe, Associate Director for Strategic Initiatives and Special Partnerships



Photo: rendering of Skysong boulevard



Photo: (left) students preparing their final presentation for Robotics Camp and (right) students working on final video game project in CampGame

Gaming and Robotics Camp for High School Students

SCI's two summer outreach programs for high school students successfully took place in the summer of 2008. The first summer program, Robotics Camp, provides high school students with hands-on experience building an operational robot that can perform tasks on command. Thirty-five students, up from the twenty-three students who participated in 2007, enrolled for the 2008 program with the goal of learning the basics of college-level computer science and programming. This year's program, held Monday through Friday, from June 23 through July 3, was sponsored by the U.S. Department of Education, Arizona Science foundation, Intel Corporation and ASU.

Dr. Yinong Chen, Calvin Cheng, Jay Elston and Larry Xu provided instruction to the students as they worked in teams to build the best moveable robot. Students worked in groups within the American League, National League or US League teams. Six teams made up each league and the goal was to send the best team to the "world championship" competition. This year's world champions were Devin Seeley, Natalya Hankewych and Joann Wang of the Apple Pie Yogurt team. The winning team was decided based on the ability of their robot to demonstrate computer controlled maneuvers, intelligence and fighting.

CampGame held a similar competition for high school students, but the challenge was to build a well-designed video game employing the fundamentals of video game creation, visualization and production. This program introduced fifteen students, twelve male and three female, to the production side of the video game industry. The students spent the first three weeks with instructors who possessed advanced industry experience in video game production. Then the students dedicated their time in the last three weeks building a video game in teams. The final project's goal simulates the collaborative work environment of the gaming industry. This year's winning team was Benjamin Temple, Kathy Garchia, Taliesin Goeson, John Anderson and Kyle Doherty of the Raven Fedora team. CampGame was made possible with funding from ASU Skysong, the Women and Philanthropy program at ASU Foundation and student tuition. The director of Robotics Camp, Yinong Chen, and director of CampGame, Ashish Amresh, work year-round to make both of the annual summer camps successful service-oriented learning opportunities for high school students interested in programming.

Greenes receives top award in Biomedical Informatics field

Robert Greenes, chair of the Department of Biomedical Informatics, was selected to receive one of the highest honors in the field of biomedical informatics. He will be presented the Morris F. Collen Award by the American College of Medical Informatics during the American Medical Informatics Association's annual symposium in November 2008 in Washington, D.C. The award recognizes lifetime achievement and significant contributions to biomedical informatics.



Faculty Awards & Honors

Biomedical Informatics professor and vice-chair of the department, **Vimla L. Patel**, Ph.D., D.Sc., received a five-year, \$5 million dollar grant from the James S. McDonnell Foundation for a collaborative study on research titled, "Cognitive Complexity and Error in Critical Care." Patel's research will be coordinated with medical teams from Banner Healthcare in Phoenix, University of Texas in Houston and Washington University in St. Louis.

SCI professor **Karam S. Chatha** and computer science Ph.D. student **Sushu Zhang** received the William J. McCalla IEEE/ACM Best Paper Award at the 2007 International Conference on Computer-Aided Design for their paper entitled "Approximation Algorithm for the Thermal-aware Scheduling Problem".

For a third straight year, the award for best research paper presented at the international Medicine Meets Virtual Reality conference was co-authored by a team consisting of **Kanav Kahol**, SCI assistant professor, **Anushu Sridaran**, a recent graduate from the Department of Computer Science and Engineering, **Marshall L. Smith**, director of the Simulation and Innovation SimET Center WT-1 for Banner Good Samaritan Medical Center in Phoenix and **Sethuraman Panchanathan**, director of the School of Computing and Informatics.

The **Center for Health Information and Research**, led by professor **William G. Johnson**, received Arizona State University President's Medal for Social Embeddedness during an April 16 ceremony. The Social Embeddedness award recognizes the community benefits of the center's work for Arizona. Specifically, the center is being recognized for development of the Arizona HealthQuery, a data bank providing Arizona with community-level information on the health of its residents and on the nature of the health care that they receive.

Sarma Vrudhula, SCI professor, and electrical engineering master's student **Amit Goel**, were selected for the Best Paper Award for their work entitled, "A methodology for characterization of large macro cells and IP blocks considering process variations."

Computer Science and Engineering emeritus professor **David Pheanis** and **Ted Chua**, who received his Ph.D. in computer science from ASU, were recently awarded the Best Paper Award at ICNS 2007, the Third International Conference on Networking and Services. The paper, entitled, "Application-Level Adaptive Congestion Detection and Control for VoIP" was presented at the conference held in Athens, Greece.

SCI professor **Guoliang Xue** and **Weiyi Zhang**, who received his Ph.D. in computer science from ASU, were recently awarded a Best Paper Award at the IEEE Global Telecommunications Conference. The paper, entitled, "Multiconstrained QoS routing: Greedy is good" was presented at the conference held in Washington, D.C. and was the best paper from the Internet Protocol Symposium.

ASU was recently certified as a **National Center of Academic Excellence in Information Assurance Education for 2007-2012**, recognizing 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 **Information Assurance Center** in the School of Computing is a multi-disciplinary center focusing on both the research and educational activities to address the broad issues of information assurance, especially regarding trustworthy information systems and ensure the quality of information being stored, processed and transmitted by information systems and networks.



Distinguished Lectures

Bridges and Myths: Brain Science and Education
Nov. 1st, 2007

John T. Bruer, Ph.D.
President, James S. McDonnell Foundation in St. Louis
Adjunct Professor of Philosophy, Washington University

In *Education and the Brain: A bridge too far* (Bruer 1997) and *The Myth of the First Three Years* (Bruer 1999), Bruer argues that developmental neurobiology was not relevant to educational practice. On the positive side, Bruer claimed that the brain science most likely to have implications for education in the future would be cognitive neuroscience. Cognitive psychology currently remains the primary candidate for a basic science of teaching and learning.

Geometric Algorithms for Layered Manufacturing
Nov. 15th, 2007

Professor Ravi Janardan
Professor of Computer Science & Engineering, University of Minnesota-Twin Cities

Layered Manufacturing (LM) is a relatively new technology that makes it possible to build a physical prototype of a 3D part directly from its digital model, using a “3D printer” attached to a personal computer. In essence, the process involves orienting the digital model suitably, slicing it into parallel layers, and “printing” each layer on top of the previous one. LM is used extensively in the automotive, aerospace, and medical industries, among others, to accelerate the design and verification cycle and reduce the time and cost to bring a product to market.



Privacy and Security in a Medical Center
Nov. 29th, 2007

Soumitra Sengupta, Ph.D., Columbia University
Information Security Officer
New York-Presbyterian Hospital and Columbia University Medical Center

Information privacy and security in academic medical centers are complex undertakings reflective of institutional organization, risk posture, regulations, and technological innovation. In the past few years, significant growth in digital data collection and dissemination of health information has fundamentally changed how care, research and education are practiced.

Evaluating Clinical Decision Support for Personalized Risk Assessment
May 14th, 2008

Lucila Ohno-Machado, M.D., Ph.D.
Associate Professor of Radiology and Health Sciences and Technology, Harvard-MIT
Director, Decision Systems Group, Brigham and Women's Hospital

Medical decision support tools are increasingly available on the Internet and are being used by lay persons as well as health care professionals. The goal of some of these tools is to provide an “individualized” prediction of future health care related events such as prognosis in breast cancer given specific information about the individual. These tools are usually based on models synthesized from data with a fine granularity of information.





Photos (clockwise): BODYNets 2008 Conference, SCI Night Speakers Sethuraman Panchanathan, SCI Director, and keynote speaker William Harris, President and CEO of the Science Foundation of Arizona

BODYNETS CONFERENCE

SCI director Sethuraman Panchanathan and professor Sandeep Gupta chaired BodyNets 2008, the Third International Conference on Body Area Networks. The conference, which took place at ASU from March 13-15, was hosted by SCI with attendees from across the globe.

PROGRAMMING COMPETITION

Programming Competition 2008, an ASU annual contest, was held on March 22. Forty-nine students making up 24 teams participated in the challenge, which was held at SCI. This is the sixth year that the programming competition has been held. The teams (consisting of one to three students each) were given four hours to answer 10 programming problems using programming languages Java, C++, C# or C. They were judged by engineers from the companies that sponsored the competition, including Lockheed Martin, General Dynamics, Microsoft, Google and GoDaddy. The judges

included several ASU and SCI alumni. Computer science sophomore student Josh Wolfe won the competition and Randy Compton, a senior in computer science, placed second. Third place was claimed by Team Polymorphic which consisted of computer science seniors Dan Fearing and Pierre Arakelian.

SCI NIGHT

SCI's annual awards ceremony and dinner, SCI Night, was held at the Tempe Mission Palms Hotel on April 11. The event recognized outstanding students, faculty and staff. The evening's keynote speaker, Dr. William Harris, the president and CEO of the Science Foundation of Arizona, was introduced by Ira A. Fulton Dean Deirdre Meldrum. The following awards were presented:
Distinguished Undergraduate Seniors: Kartik Talamadupula and David Weber
Undergraduate Student Leadership: Joyce Tang
Outstanding M.S. Student: Kaichi Zhou

Outstanding Ph.D. Students: Donglin Xia and Zheng Zhao

Graduate Student Leadership: Sudheendra Murthy
Outstanding Teaching Assistant: Michael Verdicchio
Programming Competition Winners:

1st: Josh Wolfe, *2nd:* Randy Compton

Researcher of the Year: Kasim Selcuk Candan

Teacher of the Year: Yinong Chen

Service Faculty of the Year: Vimla Patel

Young Investigator of the Year: Karamvir Chatha

Staff Excellence: Annelise Cole and Deborah Paterick

Retiring Faculty Recognition: William Lewis, Pearse O'Grady, Joseph Urban and Susan Urban

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. The School of Computing



Photos (clockwise from top left): FURI research poster presentation, SCI Job Fair and Programming Competition 2008.

and Informatics had six students participating in FURI for the Spring 2008 term and three students who were awarded the CSE Undergraduate Research Scholarship, a faculty-nominated award. Undergraduates receive funding for their research topics and earn money while participating in these programs. These students presented their fully-funded 10-week research projects at the FURI Undergraduate Student Research Symposium on April 22.

GRADUATING STUDENT RECEPTIONS

The School of Computing and Informatics hosted graduating student receptions for students graduating in the Fall 2007 and Spring 2008 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 SCI 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, Flypaper 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.

“Microsoft has a strong history of hiring ASU undergrad and graduate students into software development positions as both full-time employees and interns. We expect to continue recruiting from ASU for a pipeline of talented engineers.”

Kim Birds, Microsoft hiring representative

Department of Biomedical Informatics



Chair's Welcome

Cognitive Project
Receives Grant

CHiR: Changing the Future of
Health Data

Academic Programs





Chair's Welcome

As we begin the second year of existence of our Department of Biomedical Informatics, I am writing to reflect on what we have accomplished and our plans for the future. The Department of Biomedical Informatics at Arizona State University was formed in March 2007, with a strong research mandate, but with a twist that takes advantage of its unique situation and setting. The department is part of the School of Computing and Informatics in the Ira A. Fulton School of Engineering, but is located on the downtown Phoenix campus of the University of Arizona College of Medicine. It is also next door to Translational Genomics Research Institute (TGen), in a rapidly developing biomedical enterprise zone in downtown Phoenix.

Our beautiful new building, which had its grand opening on October 15, 2007, has over 44,000 sq. ft. devoted to BMI, and is equipped with high speed networking, videoconferencing, including a state-of-the-art "medpresence" telesuite, and many flexible spaces. Most important is the spirit of innovation and adventure. A new curriculum for the medical students integrates informatics concepts, methods, and applications from the outset. The M.S. program in biomedical informatics began in Fall 2007, and a Ph.D. program begins in Fall 2008.

Thanks to a generous startup budget, we are gearing up rapidly in all the major areas of BMI, with several new additions to our faculty and others

New Faculty - Fall 2008



Wade Bannister, Assistant Research Professor

Ph.D. Industrial Engineering Arizona State University 2007

Research interests: Public health informatics, Data mining, Machine learning, Healthcare information systems, Predictive modeling



Jianming Liang, Associate Professor

Ph.D. Turku Centre for Computer Science, Finland 2001

Research interests: Biomedical Imaging, Biomedical Image Analysis, Computer Aided Diagnosis in Imaging, Computer Vision, Computer Graphics and Visualization



Diana Petitti, Professor

Ph.D. Cornell University 1971 M.D. Harvard Medical School 1975

Research interests: Systematic review, Decision models, Record linkage, Quality of care, Comparative effectiveness, Risk stratification



José Piovanetti-Perez, Associate Research Professor

M.D. Universidad Central del Caribe School of Medicine 1995

Research interests: Electronic Medical / Health Records, Health Information Exchange / Technology, Transactions Standards, Concept Encoding, Systems Interfaces, Outpatient CPOE, Unique Patient ID

planned over the next couple of years. Research programs are already underway in bioinformatics, imaging informatics, clinical informatics, public health informatics, and cross-cutting areas such as data mining/predictive modeling, knowledge representation, cognitive science, medical simulation, and embedded sensors/sensor networks.

The growth that has been occurring all around us can only be considered extraordinary. The enthusiasm, shared vision, and eagerness to collaborate by clinical partners both nearby and across Phoenix and Arizona, including Banner Health, Barrow Neurological Institute, TGen, Maricopa Integrated Health System, the Veterans Administration, and Mayo Clinic, as well as several state agencies and other entities, have resulted in the initiation of a number of research partnerships and joint educational ventures. We are pleased to report that in our first year, the BMI faculty have already received \$9.1 M in research funding commitments.

We look forward to this second year, and to continued development and expansion of our programs. Watch this space!

Robert A. Greenes

Ira A. Fulton Chair, Department of Biomedical Informatics

Department of Biomedical Informatics

Cognitive Project Receives Grant

In 1999, the consequences of medical error began to receive increased public attention when the Institute of Medicine reported that medical errors kill between 44,000 and 98,000 people each year in the United States. These mistakes amount to more deaths each year than the total number of people who die annually from breast cancer, HIV/AIDS and motor vehicle accidents combined. SCI professor Vimla L. Patel, Ph.D., D.Sc, seeks to understand the factors that contribute to medical errors through her research.

Patel received a five-year, \$5 million dollar grant in the fall of 2007 from the James S. McDonnell Foundation for a collaborative study on research titled, “Cognitive Complexity and Error in Critical Care.” The main project goal is to provide research that will form the basis of a more comprehensive understanding of medical error. Aerospace pioneer James S. McDonnell established the James S. McDonnell Foundation in 1950. Founded to “improve the quality of life,” the foundation provides funding for research in cognition and neuroscience research.

Although assigning error to a single individual seems to be the trend in many medical-related lawsuits, the reality is more complicated. This grant allows Patel and her research team to explore what human action, or lack of action, prefaces preventable medical errors. “What happens at those moments? What causes them?” asks Patel. “Is it the hospital policy? Is it the workload? Or is it lack of knowledge? We believe that human cognition and behavior is the key to everything.” From this premise, Patel and her research team are looking for possible solutions to some of the problems. Patel’s research is coordinated with medical teams from Banner Healthcare in Phoenix, University of Texas in Houston and Washington University in St. Louis.

The research team consists of cognitive scientists, critical care clinicians, simulation experts, biomedical informaticians and complex systems scientists. Patel serves as the project’s principal investigator (PI). The project’s co-PIs are BMI assistant professors Trevor Cohen, M.D., Ph.D., and Kanav Kahol, Ph.D. Joanne Olsen, a third year doctoral student in the College of Nursing at ASU, is

also part of the team. Olsen began working with Patel in 2006 by studying the effect of time pressure on medical errors. “I believe this research will contribute to our knowledge on the best methods to design acute care environments to achieve a safer healthcare system,” Patel stated. Five graduate students working on the project are from varied background, such as psychology, computer science, nursing and medicine

Patel has long believed that medical training techniques could be improved. Decision Making and Cognition, is a multi-disciplinary research unit, where Dr. Patel is the director, devoted to the study of medical decision-making, cognitive foundations of health behaviors and the effective use of computer-based information technologies.

The abstract of the project’s proposal notes that, “Medical error is only rarely the result of the actions of a single person, and several leading researchers have raised the importance of systemic causes of medical error. Human error will always be a factor, but recurring systemic weaknesses are amenable to intervention and correction. A productive approach to error reduction and management requires a contextual understanding of when and how errors occur.” A key element of the research is to use models of complexity and distributed cognition that can both predict and prevent future errors. This research has the potential to benefit society with fewer medical errors, increased medical productivity and fewer deaths resulting from medical errors. It will generally improve the culture of safety in health care.



Photo: Decision Making and Cognition research unit

CHIR: Changing the Future of Health Data



Collecting and maintaining information proves to be cumbersome for many hospitals seeking to organize their patient's health information. The Center for Health Information and Research (CHIR) addresses this challenge by pursuing research that will allow health care practitioners to better organize patient information about their patients.

AZHQ is a data system that combines health information from more than 60 partners who voluntarily share their health data. This system is unique in its ability to link patients across discrete systems and through time and to provide large quantities of continuously updated health care information. As a result, the U.S. Secretary of Health and Human Services Michael Leavitt selected CHIR as one of six pilot sites for a U.S. initiative called the Better Quality Improvement for Medicare Beneficiaries (BQI) project designed to develop measures of health care quality.

AZHQ and CHIR have been extremely successful in their research and outreach. In the past year, support was received from dozens of sources including the Centers for Medicare and Medicaid Services and the Agency for Healthcare Research and Quality, for an initiative utilizing both public and private health care data to determine the value of received Medicare assistance. CHIR further expanded its outreach efforts by collaborating with St. Luke's Health Initiatives to hire a consultant to recruit hospital partners outside of Maricopa County and add physician practices to AZHQ. AZHQ expanded into Pima County with several new data partners: University Medical Center, Tucson Medical Center, University Physicians Healthcare and El Rio Community Health Center.

CHIR also maintains an active role in this line of research by providing feedback and expertise to both the sponsors and other pilot sites. Working together, CHIR and AZHQ have drawn national attention and inquiries from the Louisiana Health Care Quality Forum, Health Care Excel, the Brookings Institution and Robert Wood Johnson Foundation for their work with BQI. With the assistance of the Arizona Medical Association and the Arizona Osteopathic Medical Association, CHIR created an expert physician panel.

These physicians, nominated by their respective associations, represent a variety of specialties and subspecialties from across Arizona.

William G. Johnson, director of CHIR, said that when AZHQ began, critics were certain that it could not be done. "Part of what CHIR has done is build a community health data system that has health care information about more than 200 million health care encounters and more than 9 million individuals who have received health care in Arizona," Johnson said. "We basically represent a public health component of the biomedical informatics department and SCI with interests in community-level data and questions of epidemiology and healthcare effectiveness." Johnson credits the regional medical community for the impact of CHIR, "AZHQ has succeeded because of the willingness of members of the Arizona community to share information in a secure setting to promote the health and well being of the citizens of Arizona."

With the CHIR's help, AZHQ expanded to include health care information on more than 200 million health care encounters and more than 9 million individuals who have received health care in Arizona. CHIR also expanded its outreach activities by collaborating with St. Luke's Health Initiatives to hire a consultant with the primary task of recruiting hospital partners outside of Maricopa County and adding physician practices to AZHQ. The center's on-going research and outreach projects were recognized when the center received the ASU President's Medal for Social Embeddedness in April 2008 for their work with Maricopa County. CHIR's current research pathway is likely to spawn future research partnerships to develop better analytic tools and techniques. To this end, CHIR is well placed to address important public health and public policy to improve the ways in which health information is organized.



Department of Biomedical Informatics

Academic Programs

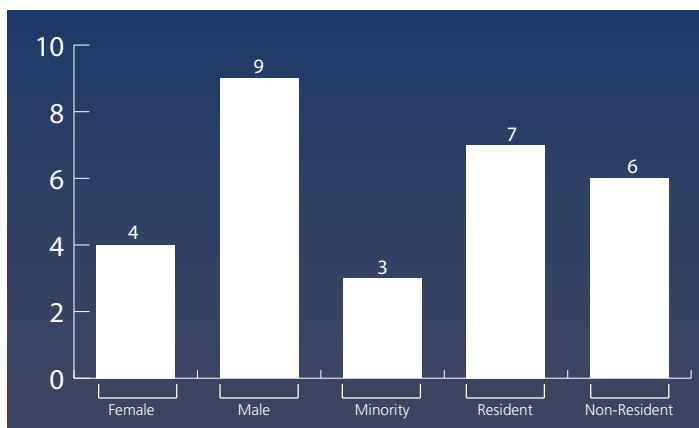
Master's Degree

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

The program features a sequence of courses specifically designed to bring together clinicians, biomedical scientists, computer scientists and information technology professionals to learn about and gain experience in applying new developments in informatics theory, clinical practice and biomedical research. This program, now in its second year, is enhanced by participation of collaborators including the University of Arizona College of Medicine Phoenix Program, Mayo Clinic, Barrow Neurological Institute, Banner Health, Maricopa Integrated Health System, the Veterans Administration and Arizona state health care agencies.

Graduates from this program will:

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



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

- Bioengineering
- Medicine (M.D.)
- Psychology
- Computer Science and Engineering
- Biophysics
- Biology
- Information Technology

Doctoral Degree

The Ph.D. program includes the requirements of the M.S. core curriculum but also requires the students to select an area of concentration of study in order to prepare graduates to assume advanced informatics research-and-development and leadership roles. The core program features five courses specifically designed to bring together clinicians, biological scientists and informatics researchers to apply new developments in informatics theory to clinical practice or biomedical discovery. Beyond the curriculum for the M.S. program, the added concentration courses in an area of focus and emphasis on independent research are intended to place these students at the leading edge of the field. We expect applicants to the Ph.D. program to have similar backgrounds to applicants for the M.S. degree, but they must also show evidence of a strong commitment to and potential for research. The Ph.D. program has admitted its first students in Fall 2008.

Our strong collaborative relationships with a variety of health care organizations as well as bioscience, industry and government agencies provide an unparalleled opportunity for doctoral students to explore and contribute to advances in bioinformatics, informatics related to imaging, clinical medicine and public health, with special focus on cross-cutting areas such as cognitive science, data mining, predictive modeling, embedded sensors and simulation.

"I absolutely believe that the strength of the Department is its faculty, we have got experienced faculty who have been in the field for decades now and also the industry relations are tremendous which gives us a lot of exposure about what's happening outside the academic realm."

Deepa Madathil, BMI graduate student

BMI Student Patents His Research

Robert Yao is one of seven graduate students in SCI's new Ph.D. program in BMI. He completed his undergraduate studies with a bachelor's of science in biology and started his graduate training in medicine in Chicago. While on leave from his medical studies, Yao strengthened his proficiency in computers. He then took medical information learned from his lectures and created a template for disease management. He applied that template to other diseases and conditions. After several people saw the template that he developed, he realized that his work was within the field of biomedical informatics. From that point, Yao decided he needed to do two things. The first thing was to get a patent for the template he created to organize information about disease management. The second was to apply for admissions to graduate programs in biomedical informatics.

He noticed in his application process that several of the key faculty members were leaving their departments and almost all of them were coming to ASU. Yao explained, "I decided to come to ASU simply because it seemed like all the top people in the field were being attracted here." Today Yao is a member of the inaugural BMI Ph.D. class with a patent pending on his software application on disease management. His previous coursework in biology in courses like genetics helped provide the foundation for Yao's interest. "What fascinated me most about genetics is that it was computer programming on a biological level. The genetics classes used the same "if.. then" statements that computer programmers use. I ended up picking a biology route that was very much like computer programming," said Yao. His previous training gives him added perspective about the tools physicians and health care providers need to organize health information. In the coming year, he will be working as a research assistant under BMI Chair Robert Greenes. He adds, "I would like to take advantage of the partnerships ASU is forming and continue my medical education and training while doing research here in Arizona." Now he has his research on information management for disease to look forward to in route to achieving his goal of obtaining a M.D. and Ph.D.

Department of Computer Science and Engineering



Chair's Welcome

Database Management
Research

Department History

Academic Programs





Chair's Welcome

After becoming chair, I became closely aware of the extensive accomplishments, the visibility and the honor, recognition and respect our faculty command in their fields. I would like to highlight them below.

Each one of our research groups (AI, Databases, Embedded Systems, Information Assurance, Graphics and Multimedia, Networks, Theory and Bioinformatics) is well funded and internationally visible.

The AI group with nine faculty has two AAAI fellows and two Cognitive Science society fellows, three past or present editorial board members of JAIR, and a recent AAAI co-program chair. They publish extensively in AAAI and IJCAI, as well as in the major area specific conferences ICAPS, KR, ICML and KDD. For example, IJCAI 2007 had eight papers from CSE faculty and students. The Embedded Systems faculty includes an associate editor of ACM Transactions on Design Automation of Electronic Systems and IEEE Transactions on CAD. It publishes regularly in DAC, DATE, and ICCAD. Information assurance and computer security faculty includes a fellow of IEEE and AAAS, and faculty with DOE and NSF CAREER awards. The Graphics and multimedia faculty includes the editor in chief of the CAGD journal, editor-in-chief of the multimedia magazine who is also an IEEE fellow and associate editor of several other multi-media related journals, and faculty who have published multiple textbooks and monographs. Historically, it has

New Faculty - Fall 2008



Gail-Joon Ahn, Associate Professor
 Ph.D. George Mason University 2000
Research interests: Authentication and Access Control, Formal Models for Computer Security, Network and Distributed Systems Security, Vulnerability and Risk Assessment, Cyber Crime Analysis



Xuerong Feng, Lecturer
 Ph.D. University of Texas at Dallas 2005
Research interests: Algorithms design and analysis, Computational biology



Kurt VanLehn, Professor
 Ph. D., Computer Science, MIT, 1983
Research interests: Applications of Artificial Intelligence to Education, Human Learning, Cognitive Science

been our signature research group and regularly publishes in CVPR, ACM Multimedia, CHI and SIGGRAPH. It continues to be strong with the addition of younger faculty, one of them with an NSF CAREER award. The network group with six faculty is uniformly strong with an NSF CAREER awardee and regular publications in top network conferences and journals. One of them is the TPC co-Chair of INFOCOM'10 and another is the TPC Chair of BodyNets'08 and the co-Chair of GreenCom'07. A Theory faculty working on combinatorics is the recipient of the Euler medal and has solved many-a longstanding open problems including one related to a 1782 problem of Euler on mutually orthogonal Latin squares. Theory faculty have recently published in conferences such as SODA and PODC. The Bioinformatics group publishes in the top Bioinformatics conferences and journals such as ISMB, ECCB and PSB and collaborates closely with the BMI department, TGen and Mayo-Scottsdale. We elaborate on our Database group in the next page.

The above is a short glimpse and I invite you to explore this annual report and our web pages for more details, and discover the exciting developments here that are not always reflected in the external rankings.

Chitta Baral
 Chair, Department of Computer Science and Engineering

Department of Computer Science and Engineering

Database Management Research

Our database group is making a big impact on the data and information management research, with an increasing number of highly visible publications appearing in the most prestigious data management venues.

The three top conferences in data management are the ACM Conference on Management of Data (SIGMOD), Very Large Data Bases (VLDB) conference, and IEEE International Conference on Data Engineering (ICDE). These three conferences are among the top four ranked conferences according to their impact ranking. This ranking comes from the approximately 500 “Knowledge and Data Management” conferences in the survey.

In the past three years, SCI’s database group has published twenty-five research papers in SIGMOD, VLDB and ICDE. In 2006, SCI professor K. Selcuk Candan published four papers at VLDB and Yi Chen published two papers at ICDE. SCI professor Subbarao Kambhampati contributed to the group’s publications with his 2006 paper at ICDE. Their publication records are outstanding accomplishments because VLDB and ICDE have a publication acceptance rate that is approximately fifteen percent.

In 2007, as a team, the database group published four papers in SIGMOD, three papers in VLDB, and two papers in ICDE. In 2008, the group published three papers in SIGMOD, three papers in VLDB, and three papers in ICDE. Aside from these three venues, the database group’s recent publications include those in other high visibility conferences such as CIDR (Conference on Innovative Database Research), World wide web conference (WWW), and Workshop on Web and databases (WebDB), and high impact journals (such as VLDB Journal [ISI impact factor:3.8], ACM Transactions on Information Systems [ISI impact factor:1.96], and IEEE Transaction on Knowledge and Data Engineering

[ISI impact factor: 1.89]) in the area. All the above publications involved Candan, Chen, Kambhampati and Davulcu. The group’s publications in top venues shows that the group is a leader in database management, especially in stream processing, data integration, handling uncertain data and imprecise queries, web services and workflows.

In addition, SCI professors Huan Liu and Jieping Ye published in the top venues in the related areas of Data Mining and Machine Learning, such as Knowledge Discovery and Data Mining (KDD), and SCI professors Chitta Baral and Joohyung Lee published in the top Logic Programming conferences.

The group’s research impact to the community is further evident in the roles that the faculty holds in top database organizations. For example, Candan is on the VLDB journal editorial board that is ranked 4th in all computer science by ISI and 2nd in “Information Systems” journal categories. He was a publicity chair of SIGMOD in 2006 as well. His leadership role also encompasses acting as a 2008 PC chair of ACM Multimedia, the top conference in the area of multimedia research. Kambhampati gave a tutorial on information integration at AAAI 2007. In 2007, Davulcu was the winner of prestigious CAREER award from the NSF Information & Intelligent Systems (IIS) division. In 2009, Chen will serve as a publicity and proceeding chair for ACM Symposium on Principles of Database Systems (PODS), the premiere international conference on the theoretical aspects of database systems.

Department History

In 1979, faculty from the Electrical and Computer Engineering Department, Industrial and Management Systems Engineering Department and Mathematics Department at ASU recommended the creation of a new department especially focused on computer science and computer engineering programs. The Department of Computer Science and Engineering (CSE), known then as the Computer Systems Engineering track of Engineering Special Programs, officially began in the spring of 1980. Since that time, hundreds of students have received their bachelor's, master's and doctoral degrees.

Since 1980 seven faculty members have been department chair. Those leaders have paved the way for both students and faculty to advance CSE as a leading department in the country.

"Our CSE department has made significant strides towards becoming a top notch academic department in the country. The faculty, research, students and academic programs are truly world-class"

Sethuraman Panchanathan

Director, School of Computing and Informatics



William Lewis
1980-1985



Ben Huey
1985-1986
(acting chair)
1991-1994



Charles Colburn
2001-2002



Chitta Baral
2008 - present

Robert Barnhill
1986-1992



Stephen Yau
1994-2001



Sethuraman Panchanathan
2002-2008



Department of Computer Science and Engineering

Academic Programs

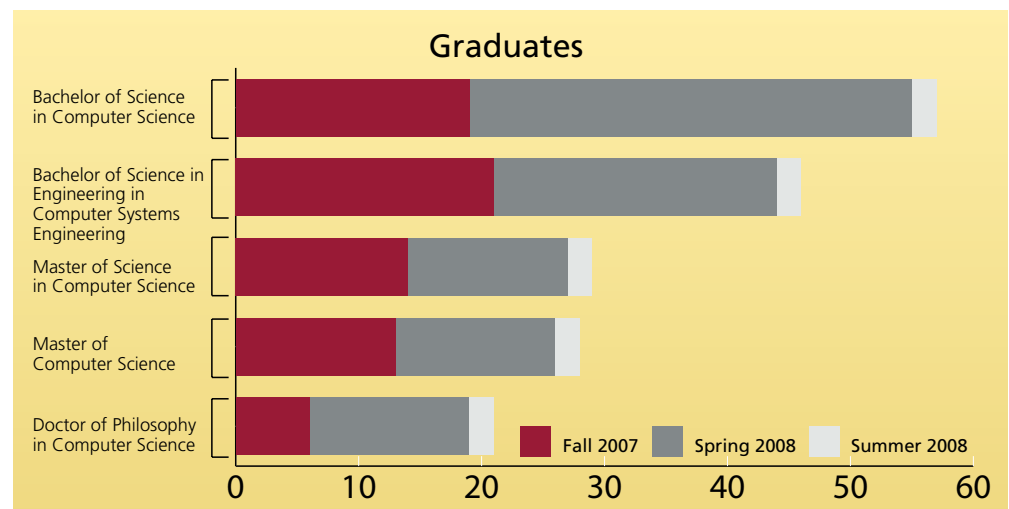
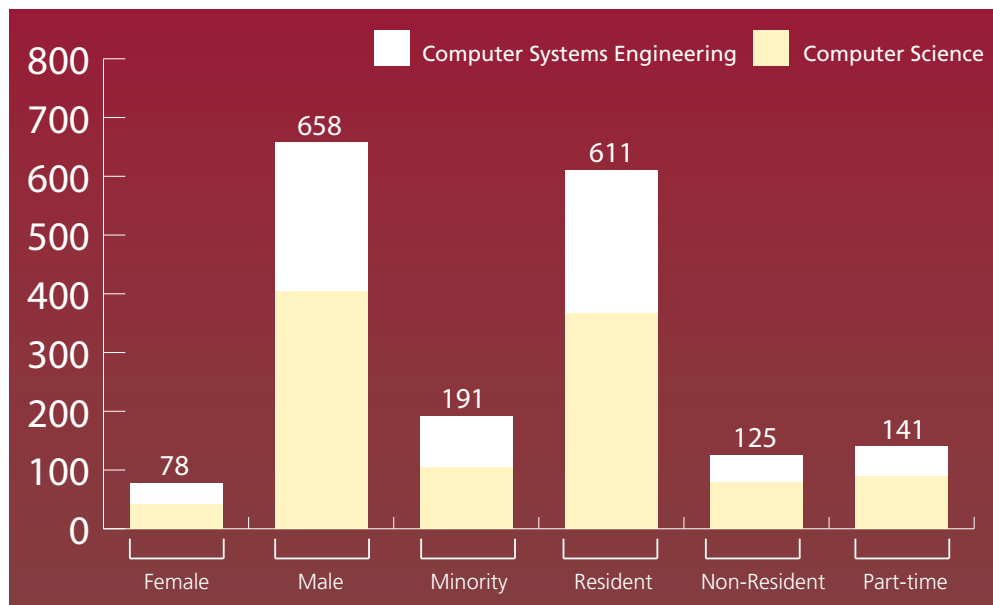
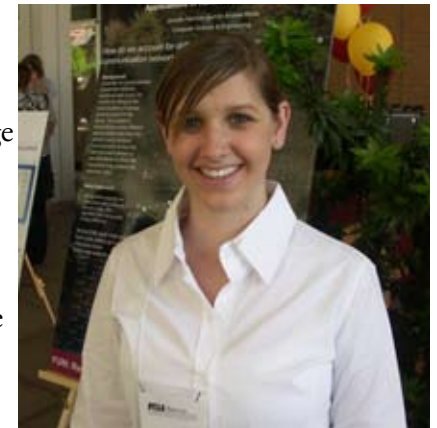
Undergraduate Degrees

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 seven scholarships. The Fulton Undergraduate Research Initiative program offers opportunities for students to participate in such research.



Master's Degrees

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.

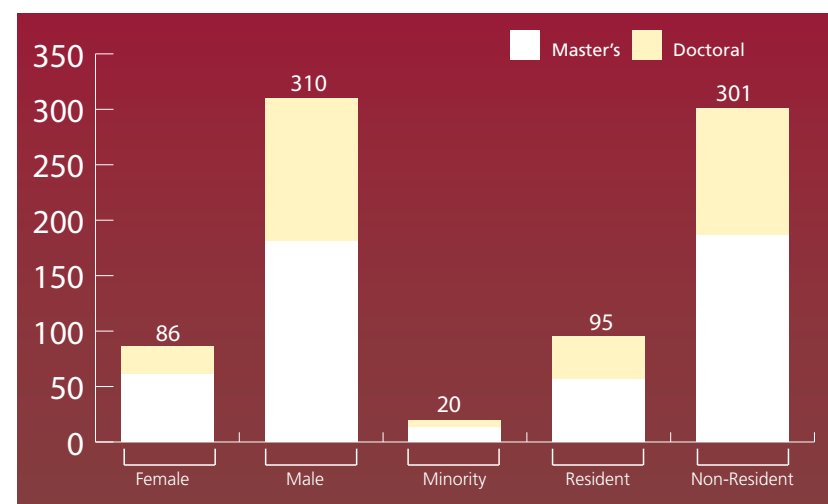
The **Master of Computer Science (M.C.S.)** is an advanced degree targeted at students with undergraduate education in computer-related disciplines who can benefit from further breadth and background. The M.C.S. also provides an opportunity for students employed in industry to seek advanced education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

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; 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 Ph.D. degree is enhanced by a concentration in Arts, Media and Engineering (AME), as well as a concentration in Information Assurance.





Research

Consortium for
Embedded Systems

Research Themes

Affiliated Centers

Research Awards

Consortium for Embedded Systems: Changing Future of Computers

Objects ranging from an iPod to an automobile use advanced computer technology commonly concealed by a metallic or decorative cover. Advanced technology of this nature usually operates through an embedded computer system. The Consortium for Embedded Systems (CES) researches the inner workings of embedded computer systems. A simplified explanation of embedded systems is that they are special purpose computer systems designed to perform one or a few dedicated functions and are part of a complete device including hardware and mechanical parts. Although most people do not realize it, they use some form of embedded systems in their daily interactions at work and at home.

Since its beginning in 2001, CES actively conducts research in order to build an eco-system of knowledge and expertise in embedded systems. Twenty-five students have held internships coordinated through CES along with two dozen other master's and doctoral students who work on CES research projects. CES consists of a large network of professors who mostly have an expertise in Computer Science and Engineering. The research focus of the group splinters into the five core areas of power, energy and thermal aware design, robust IC and system design, software design for embedded systems, advanced processor architectures and networked and distributed embedded systems. Sarma Vrudhula, Director of Consortium for Embedded Systems and SCI faculty Karam Chatha, Yann-Hang Lee and Aviral Shrivastava form the core of CES at ASU. Approximately fifteen professors collaborate throughout the year within CES on a variety of research projects.

Vrudhula's main research interests are in robust very-large-scale integration (VLSI) design, power energy and thermal management for multi-core systems and high performance low power VLSI design. One of his current research projects involves his research interest in robust embedded IC design. The project entitled "Power and Performance Analysis with intra-die and inter-die process variations" addresses the issue of statistical static timing analysis. This research paves the way for future chips embedded within nano systems to perform more efficiently. Thus far, his research appears in two pending publications. In 2007, this project's work resulted in the publication entitled, "A Fast and Accurate approach for Full Chip Leakage Analysis of Nano-scale circuits considering Intra-die Correlations" in the Proceedings of the IEEE International VLSI Design Conference. Also in the same year, this research was featured in Proceedings of the ACM/IEEE International Conference on Computer-Aided Design under the title, "A Framework for Statistical Timing Analysis using Non-Linear Delay and Slew Models." In 2008, the Science Foundation Arizona awarded Vrudhula and other SCI professors with a \$2 million grant to support their research on computer processing capabilities. They will carry out their research jointly with engineers at Raytheon Missile Systems. The project will explore ways to maximize the computational power of multi-core processor systems.

Chatha's research interests centers around multiprocessor system on-chip design and application development and network on chip design. A current research project, "Network-on-Chip: CAD techniques, architectures and performance models," seeks to meet the needs of industry leaders facing challenges with nanoscale semiconductor technology. In essence, this research provides a solution for the problem of creating a small machine to perform at high levels without being too hot or too slow. Projects like Vrudhula's and Chatha's both serve the academic community's need to understand embedded systems as well as the need for industry to have systems that perform better. Day by day researchers within CES collaborate to further their research aims for the betterment of the academic and industrial communities.

"Five years ago, a desktop personal computer (PC) consisted of a single microprocessor, such as the Intel Pentium. In the next five years, the main chip on a desktop PC is expected to have upwards of 16 processors. In the not so distant future, desktop PCs will have hundreds of processors."

Sarma Vrudhula, Director of Consortium for Embedded Systems



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. Application areas also include the use of algorithmic techniques for computational biology. Fundamental research in algorithms addresses graph algorithms as well as search techniques and approximation algorithms. Our research includes resource localization, routing, caching and streaming algorithms for networks, in addition to combinatorial design theory, security issues and fault tolerance in sensor networks and distributed systems.

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

Security of computer systems and networking has become an issue of extreme importance due to the proliferation of the internet and the sophistication of attackers. The scope ranges from personal computers to corporate servers, from e-commerce sites to government systems. At ASU, the researchers in this arena are working on a variety of topics and developing protocols and systems that harden computers against attacks.

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

Faculty Contacts: Gail-Joon Ahn, Rida Bazzi, Karam Chatha, Partha Dasgupta, Sandeep Gupta, Dijiang Huang, Guoliang Xue, Stephen Yau

Data, Information and Artificial Intelligence

Researchers address problems in database systems, information management, information integration and intelligent agent design. Data management research addresses techniques for replication, indexing, security and query processing in databases and systems for sensor data management, scientific data management and web data. Information management investigates the use of events, rules, queries and transactions in workflows over data services. Information integration combines techniques from distributed query processing and artificial intelligence for retrieval of data from distributed sources. Artificial intelligence research investigates automated planning, scheduling, constraint satisfaction, reasoning, logic programming, multi-agent systems, information extraction and the semantic web.

Sub-categories: 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, Pat Langley, Joohyung Lee, Baoxin Li, Huan Liu, Hari Sundaram, Kurt VanLehn, Jieping Ye



Hardware Architectures and Embedded Systems

At the heart of personal, health care, homeland security, education and transportation applications is a computing system that performs the essential functions of sensing, computing, control and communication. Such computing systems that are immersed in their application domains are known as embedded systems. Design technologies for embedded systems are facing twin challenges of silicon and system complexities, and a cross-cutting challenge of increased power consumption. Faculty are engaged in cutting edge research that addresses these design challenges of embedded computing technologies.

Sub-categories: Embedded Processor Architecture and CAD, Mobile and Networked Embedded Systems, Power, Energy and Thermal Management, Robust Embedded IC Design, Software Design for Embedded Systems Testing, Fault Tolerance, and Dependability

Faculty Contacts: Karam S. Chatha, Yann-Hang Lee, Aviral Shrivastava, Violet Syrotiuk, Sarma Vrudhula



Multimedia, Visualization and Modeling

Mathematical data modeling and visualization research leads to development of sophisticated new analysis tools for multimedia data. Multimedia research focuses on computational models for experiential systems, multimedia communication systems, ubiquitous multimedia computing, integration of database/internet technologies, digital media/arts, face/gait analysis and recognition, media processors, multimedia technologies for education and multimedia document authoring. Modeling research includes urban/terrain modeling, point cloud fitting and geometric modeling of cloud interface surfaces. 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 Nielson, Baoxin Li, Sethuraman Panchanathan, Hari Sundaram, Peter Wonka



Networks, Operating Systems and Compilers

The networks, operating systems and compilers cluster of SCI consists of researchers working on many core problems in these areas. Network research focuses on the investigation of issues such as routing, quality of service and reliability in optical networks, sensor networks, wireless and mobile ad hoc networks. Operating systems research investigates efficiency and scalability over large networks and diverse applications with projects that range from large address space operating systems to peer-to-peer computing architectures. Research in the area of compilers is developing novel compilation techniques to exploit innovative architectural features 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, 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

Research in software engineering covers 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, Development of Adaptive Software, Simulation-based Software Engineering, Software Process, Environment, and Automation Research (SPEAR) Area

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



Biomedical Informatics

Biomedical informatics is an interdisciplinary research field that requires collaboration among computer scientists, cognitive, social and decision scientists engineers, mathematicians, biologists and clinicians to advance information technology, data and knowledge management and analysis methodologies and computational and informatics tools to improve our understanding of health care practice, public health and biological systems. Goal of the research is to enhance patient care and human health in general, by expediting the process of transferring basic biomedical research to clinical use effectively and safely. Analysis/cognitive modeling of human behavior in real world health care environment, mathematical modeling of population health, analysis of human-computer interaction and computational modeling of living systems all play important role in these research activities.

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

Faculty Contacts: Chitta Baral, Trevor Cohen, Valentin Dinu, William Johnson, Kanav Kahol, Seungchan Kim, Vimla Patel, Howard Silverman

Cyberinfrastructure

Cyberinfrastructure is best 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.” The challenge of cyberinfrastructure is to integrate relevant and often disparate resources to provide a useful, usable and enabling framework for research and discovery characterized by broad access and “end-to-end” coordination”. Often viewed in layers, cyberinfrastructure has fundamental computing technologies (processing, storage, communication) at the bottom most layer, and community specific knowledge environments for research and education (collaboratories, e-science communities) 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

Information Assurance

The research in information assurance focuses on the broad issues of developing trustworthy information systems and ensuring the quality of information being stored, processed and transmitted by these systems. In addition, IA faculty members are participating in the Information Assurance, a National Center of Academic Excellence in Information Assurance Education (CAEIAE) certified by NSA/DHS.

Sub-categories: Data Security and Privacy, Digital Identity, Network Security, Security and other Assurance Mechanisms in Service-based Systems, Trust Management in Distributed Systems

Faculty Contacts: Gail-Joon Ahn, 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 Yau



Modeling and Simulation

Advances in modeling and simulation, grounded in disciplinary to transdisciplinary subject matters, are central in carrying out research in numerous computing and informatics topics. Modeling and simulation theories, flexible and high-performance software tools and practices are indispensable in understanding and creating engineered and natural network systems. The objective of the modeling and simulation theme is to serve as a foundation and enabler for developing multi-scale, multi-purpose data intensive computational models of complex systems. New kinds of hybrid simulated and physical systems make possible innovative simulation-based science and engineering in domains as diverse as supply-chain enterprises, command and control systems, environmental phenomena and e-businesses.

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

Faculty Contacts: James Collofello, Gerald Farin, Huan Liu, Hessam Sarjoughian, Wei-Tek Tsai, Peter Wonka, Stephen Yau



Pervasive and Ubiquitous Computing

Pervasive and ubiquitous computing researchers come from diverse core areas and are working on various aspects of developing computing infrastructure that are intuitive to use in everyday scenarios irrespective of where and how they are invoked. Specifically, various faculty members are working on developing intuitive interfaces and pervasive media processing to support sensor data management, developing multimedia software to help blind people to easily search text in library, developing biomedical sensor-based middleware for pervasive health monitoring, developing mobility-tolerant and mobility-aware protocols for seamlessly integrating mobile devices into the wired infrastructure and developing light weight security solutions for pervasive commercial applications. These research works are being conducted in various labs and centers under various interdisciplinary projects funded by various sources such as NSF, Intel Corporation and MediServe Corporation.

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



Service and Enterprise Systems

There are 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. To address these challenges, this research group addresses new directions in service-oriented computing, service-oriented architectures and service-oriented software development. Researchers focus on process modeling and service orchestration together with middleware for event processing and service execution. Additional research addresses scalability and performance of enterprise systems as well as semantic description of services and the manner in which semantics can assist in the design and implementation of service-oriented applications.

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, Hessam Sarjoughian, Wei-Tek Tsai



Social Science Informatics

Social science informatics contains a variety of cross-disciplinary activities between the faculty and social, cognitive and behavioral scientists. Social science driven activities contain 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, the social analysis of electronic documents and communication and tools for social scientists to analyze spatial explicit information. Informatics driven activities develop interfaces and improve the accessibility of information. Applications include tools developed for those who are blind or visually impaired.

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, Baoxin Li, Huan Liu, Hessam Sarjoughian, Hari Sundaram, Subbarao Khambampati, Peter Wonka

Affiliated Research Centers

Institute for Computing Information Sciences and Engineering (InCISE)

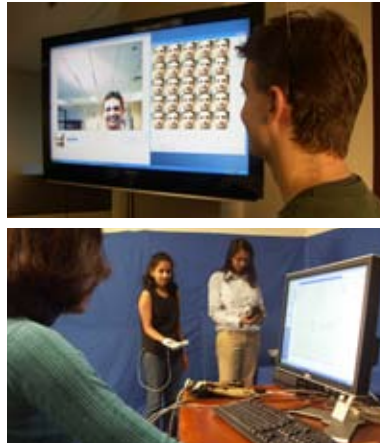
<http://incise.asu.edu>

The mission of InCISE is to foster computer science and applications of data acquisition, analysis and management, security, modeling, visualization and interpretation in interdisciplinary research, education and entrepreneurship. InCISE has successfully fostered inter and trans disciplinary research using this informatics and computer science foundation and has contributed to creation of a new School of Computing and Informatics (SCI), composed of Computer Science and Biomedical Informatics Departments and a program in informatics. InCISE ROI is 6.3:1 based on an investment of \$450K and \$2.7 M Expenditures, \$4.4M Awards and \$40.6 M in collaborative proposals submitted in FY 08.

Center for Cognitive Ubiquitous Computing (CUBiC)

<http://cubic.asu.edu>

The Center for Cognitive Ubiquitous Computing (CUBiC) is an inter-disciplinary research center focused on advancing research in the area of human-centered multimedia computing (HCMC). Most HCMC research is focused on designing devices, technologies and solutions for the general population. At CUBiC, it is our belief that a complete understanding of the issues surrounding HCMC requires capturing a complementary, yet enriching, perspective through inspirations drawn from studying human disabilities, deficits and impairments. Over the past five years, researchers have primarily focused our research on



CUBiC's face recognition and haptics research

designing assistive devices for individuals who are blind or visually impaired. These include a portable reading assistant, wearable social interaction assistant, information assistant, accessible shopping environment and multimodal assistive and rehabilitative (visual, audio, haptic) interfaces. CUBiC's core research has already resulted in innovative solutions for individuals with other disabilities and to the general population. Examples of such interesting projects include virtual surgery training interfaces, rehabilitation of patients with neurological impairments and fall prevention for the elderly. Current research focus of CUBiC encompasses diagnostic, rehabilitative and assistive technologies for a variety of physical, cognitive and neural impediments, such as individuals who are blind, visual and auditory impaired, children with autism, patients with Alzheimer's, elderly care and prosopagnosiacs. Research projects in CUBiC are funded by NSF, NIH, State of Arizona and industry. Clinical partners include Mayo Clinic, Barrow Neurological Institute and Banner Health.

Information Assurance Center

<http://ia.asu.edu>

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 formal model, security policies, innovative mechanisms and toolkits for adaptive TIS; composition



Information Assurance Center

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; situation awareness; digital identify and privacy management for large-scale enterprise TIS; and cyber crime analysis for network-centric TIS. The center received certification as a National Center of Academic Excellence in Information Assurance Education by the National Security Agency and the Department of Homeland Security in June 2007 and currently offers concentration programs in the B.S., M.C.S, M.S., and Ph.D. degree programs in computer science and engineering. The center is also actively engaged in continuing education for industry as well as assisting IA educational activities in community and minority colleges.

Center for Health Information & Research

<http://chir.asu.edu>

The Center for Health Information & Research (CHIR) is an interdisciplinary research group that provides actionable information about health care in our community. An Arizona Board of Regents (ABOR) designated center, CHIR houses the Arizona HealthQuery (AZHQ), a nationally unique data warehouse of comprehensive, patient-centric health information, including 200 million records for 9 million individuals, which supports longitudinal tracking of health outcomes for individuals across providers and insurers. Additionally, CHIR houses the Arizona Health



PRISM's 3D models of George Washington at ages 19 and 57

Care Workforce dataset - an expanding resource of physician, nurse and pharmacist information used to help boost planning and decision making efforts for our community health care workforce leaders.

CHIR's series of community health care reports reflect their deep ties to the Arizona community and the commitment of over 40 of organizations that voluntarily share their data to create AZHQ. CHIR was awarded the President's Medal for Social Embeddedness in 2005 and received the award again in April 2008. CHIR is nearing the end of its second year as a national demonstration site for a Centers for Medicare and Medicaid Services initiative to improve the quality of health care for Medicare beneficiaries. In 2007-2008, grant and contract expenditures totaled more than \$1.1 million. Proposal submissions totaled more than \$15 million. CHIR faculty authored eight refereed articles, one community report and one community brief with an additional five manuscripts in process.

Partnership for Research in Spatial Modeling

<http://prism.asu.edu>

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) and involves interdisciplinary collaborators from throughout the university including SCI researchers Peter Wonka and Jeremy Rowe. PRISM's origins date to 1997, becoming an official center soon after with initial funding from an NSF KDI grant (\$2.3M). PRISM's applied research involves 3D data archiving, 3D data query, 3D face recognition, 3D de-aging of a George Washington face bust, 3D telesculpture, 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 research includes 3D data acquisition, data modeling, data visualization and 3D rapid prototyping.

Consortiums and Collaboratives

Arts, Media and Engineering Program (AME) <http://ame.asu.edu>

Engineering, arts and science disciplines involved in media research and training have come together to create AME. The program's mission is research and education in the integrated development of media systems. AME's specialized focus is the study and development of experiential media systems. These are defined as systems that integrate computation and digital media with the physical-human experience to produce enhanced physical-digital experiences.

Consortium for Embedded Systems (CES) <http://embedded.asu.edu>

CES was established as an industry/university partnership dedicated to developing a globally recognized center for embedded technologies. The charter members of CES are ASU, Intel Corporation and Motorola Incorporated, who have been working together to build an eco-system of knowledge and expertise in embedded systems. CES programs have provided direct industry involvement and feedback towards initiating faculty research projects, improved curriculum and laboratories, and provides students with access to real-world work experiences.

Decision Making and Cognition <http://cognitive.asu.edu>

Decision Making and Cognition 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 in the design of decision-support and other health information technologies for safe use in clinical environments.

Enabling Technologies for Intelligent Information Integration Program (ET-I3)

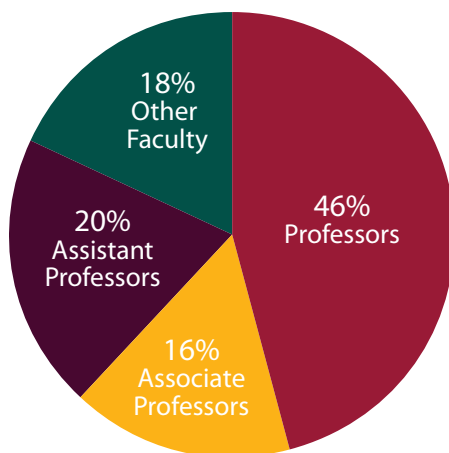
ET-I3 is a collaborative program that addresses the challenge of information integration. ET-I3 is developing enabling integration technologies for scalable "Do What I Mean" (DWIM) processing for sources and services over the internet. DWIM-integration involves using the higher-level information goals 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.

Fulton High Performance Computing Initiative (HPCI) <http://hpc.asu.edu>

HPCI serves as the hub for parallel and grid scientific computing on the ASU Tempe campus, maintaining centrally managed high performance computing systems for more than 1,000 processors across campus. 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.

Research Awards

Total Expenditures



Overall SCI Expenditures

2007 \$4,000,000

2008 \$5,900,000

Submitted Proposals

2007 \$56,506,600

2008 \$90,501,000

Award Amounts Received

2007 \$8,297,000

2008 \$11,828,000

FACULTY	CO-PI	TITLE	SPONSOR	DATES	AWARD
BANNISTER		Arizona Health Query Data and Valley Fever Among Persons with Community Acquired Pneumonia in Arizona	University of Arizona-Valley Fever Center for Excellence	7/15/07-8/14/07	\$5,175
		Scottsdale Healthcare Community Health Needs Assessment	Scottsdale Healthcare	4/1/08-10/31/08	\$63,554
BARAL	<i>Y. Chen, Gonzalez, Joshi</i>	CAA: Generalized Text Extraction from Life Science and Biomedicine Abstracts: Empowering the CBioC Mass Collaborative Curation and Reasoning Systems	Science Foundation of Arizona	3/30/07-9/30/08	\$138,749
	<i>Lee</i>	Compiling AnsProlog to first-Order Theories - An Approach to Integrate AnsProlog Knowledge Bases with First-Order Knowledge Bases	DOD-Navy	9/30/06-12/31/07	\$106,736
	<i>Kambhampati, Langley, Mcbeath</i>	Effective Human Robot Interaction under Time Pressure through Natural Language Dialogue and Dynamic Autonomy	DOD-Office of Naval Research	10/1/07-6/30/12	\$1,000,000
		Integrating Knowledge based Reasoning, Common Sense Reasoning and Natural Language Semantics in a QA System	DOD-Navy	9/30/06-12/31/07	\$408,475
	<i>Gonzalez</i>	Knowledge Representation, Reasoning and Problem Solving in a Cellular Domain*	NSF- Directorate for Computer and Information Science and Engineering	8/1/04-7/31/09	\$496,465
BLACK		Workshop: Doctoral Consortium for ACM Conference on Computers and Accessibility	NSF-Directorate for Computer and Information Science and Engineering	5/15/08-8/30/09	\$28,542

FACULTY	CO-PI	TITLE	SPONSOR	DATES	AWARD
BURLESON		Game as Life - Life as Game	NSF-Directorate for Computer and Information Science and Engineering	9/1/07-8/31/08	\$100,034
		HCC: Collaborative Research: Affective Learning Companions: Modeling and Supporting Emotion During Learning	NSF-Directorate for Computer and Information Science and Engineering	10/1/07-9/30/08	\$334,465
	<i>Hodges, Robinson</i>	Mission Contingencies for Team (Astronaut - Robot - Mission Control) Interactions	NASA-National Aeronautics and Space Administration	8/29/07-8/17/08	\$75,000
CANDAN	<i>Davulcu, Hedgpeth, Li, Sundaram</i>	MAISON: Middleware for Accessible Information Spaces on NSDL	NSF-Division of Undergraduate Education	1/1/08-12/31/09	\$499,970
	<i>Haag, Hedgpeth, Panchanathan</i>	Ubiquitous Environment to Facilitate Access to Textbooks & Related Materials for Individuals who are Blind or Visually Impaired	ED-U.S. Department of Education	1/9/06-12-31/07	\$374,452
CHATHA		CAREER: System-Level Design of Network-On-Chip Architectures	NSF-Directorate for Computer and Information Science and Engineering	3/15/06-2/28/10	\$455,000
	<i>Stanzione</i>	CRI: Collaborative Research: Reconfigurable Computing Cluster	NSF	5/1/06-2/29/08	\$14,415
CHEN, S	<i>Rosenberg</i>	Collaborative Research: Statistical Methods and Algorithms for Genomic Data	NSF-Division of Mathematical Sciences	8/15/07-7/31/11	\$642,592
CHEN, Yi		Designing and Evaluating Protocol Query Languages	University of Pennsylvania (NSF)	12/1/07-11/30/08	\$33,011
		SGER: Enabling Effective Access to Scientific Workflows	NSF-Directorate for Computer and Information Science and Engineering	9/1/07-9/31/09	\$87,370
DASGUPTA	<i>Chatha, Gupta</i>	CNS-SGER Integrated Security Infrastructure for Personal Identities and Consumer Computing	National Science Foundation	5/1/06-10/31/08	\$199,890
DAVULCU		CAREER: A Logic-Based Dynamic Policy Model for Adaptive Workflow Management	NSF-Directorate for Computer and Information Science and Engineering	1/16/07-2/28/11	\$413,112
FARIN		AZ ASU Alzheimer's Research Center Project-Year 10	Arizona Alzheimer's Disease	7/1/07-6/30/08	\$24,589
		Splines Over Iterated Voronoi Diagrams*	NSF-Directorate for Computer and Information Science and Engineering	12/15/03-11/30/07	\$155,253
FARLEY	<i>Dietrich</i>	CSE 180: Computer Literacy	Arizona Board of Regents	7/15/07-6/30/09	\$51,763
FRIDSMA		UPitt Subcontract: A Standards-based Tool for Clinical Trials Protocol Authoring	University of Pittsburgh	9/26/07-8/31/08	\$7,882
GREENES		BMI-AHCCCS Interagency Service Agreement-Task Two	Arizona Health Care Cost Containment System (AHCCCS)	3/1/08-6/1/09	\$500,000
		Committee Chair of the ACR Imaging Network Informatics Subcommittee	HHS-NIH-NCI-National Cancer Institute	9/1/07-12/31/07	\$3,332
		TRIF: ASU Biomedical Informatics Portal Development	University of Arizona	1/1/08-12/1/08	\$150,000

FACULTY	CO-PI	TITLE	SPONSOR	DATES	AWARD
GUPTA	<i>Dasgupta, Stanzone, Vrudhula</i>	CAA: Building Greener Datacenters in Arizona	Science Foundation of Arizona	3/30/07-9/29/08	\$299,737
		CES: Exploring Multicore-Based Hardware/Software Architecture for Mobile Computing Edge Devices (MCED)	Consortium for Embedded Systems	9/19/07-9/18/08	\$50,000
	<i>Dasgupta, Stanzone</i>	SGER-CSR/SMA: Thermal Aware Dynamic Resource Management for Datacenters	NSF-Directorate for Computer and Information Science and Engineering	10/1/06-9/30/07	\$49,956
HEDGPETH		HCC: The iCare Ambient Interactive Shopping Environment	NSF-Directorate for Engineering (ENG)	10/1/07-9/30/08	\$156,927
JANSSEN		CAREER: Innovation of Institutional Rules in the Governance of Common Resources	NSF-Directorate for Social, Behavioral/Economic Science (SBE)	3/15/08-2/28/12	\$414,827
JOHNSON	<i>Bannister</i>	AHCCCS Intergovernment Services Agreement	Arizona Health Care Cost Containment System (AHCCCS)	6/15/07-7/14/07	\$9,528
	<i>Bannister</i>	AHCCCS Intergovernment Services Agreement	Arizona Health Care Cost Containment System (AHCCCS)	6/15/07-6/30/08	\$12,096
	<i>Bannister</i>	AHCCCS Intergovernment Services Agreement	Arizona Health Care Cost Containment System (AHCCCS)	6/15/07-9/30/09	\$272,986
		Arizona Physician Trends: Out of State Physicians "Reason for Leaving"	Arizona Hospital and Healthcare Association	12/1/07-2/28/08	\$25,155
	<i>Russell</i>	Carondelet NAOMI Project	Carondelet Health Network: Carondelet Community Trust	10/19/07-2/18/09	\$74,020
	<i>Russell</i>	Catholic Healthcare West	Catholic Healthcare West-East Valley: Chandler Regional Hospital & Mercy Gilbert Medical Center Community Health Needs Assessment	1/1/08-2/28/09	\$66,662
		St. Luke's Health Initiatives	Phoenix Healthcare Value Measurement Initiative	3/7/08-4/6/09	\$241,364
		Physicians Workforce Study Project	St. Luke's Health Initiative	4/15/18-4/15/19	\$50,000
KAMBHAMPATI		ASU Subcontract of LMCO Proposal to DARPA IL Program	DOD-Defense Advanced Research Projects Agency	5/15/06-12/31/08	\$830,202
		Supporting Partial Satisfaction Planning & Replanning in Expressive and Mixed Initiative Domains	DOD-Office of Naval Research	10/1/05-9/30/08	\$385,000

* These awards also include a Research Experience for Undergraduates (REU) component.

Funded by the National Science Foundation, REUs support research participation by undergraduate students.

FACULTY	CO-PI	TITLE	SPONSOR	DATES	AWARD
KIM		A New Therapeutic Paradigm for Breast Cancer Exploiting Low Dose Estrogen-Induced Apoptosis	DOD-U.S. Department of Defense	9/1/07-8/31/08	\$24,341
		Integrating Genomic Data & Biological Knowledge to Learn Context-Specific Gene Networks	HHS-NIH-NLM-National Library of Medicine	6/1/08-6/30/10	\$354,440
LANGLEY		CAA: Hypothesis-Centered Biological Knowledge Bases	Science Foundation of Arizona	5/1/07-10/31/08	\$257,800
	<i>Kambhampati</i>	Computational Approaches to Creativity Through Goal-Directed Cross-Domain Analogy	NSF-Directorate for Computer and Information Science and Engineering	9/15/07-8/31/09	\$199,828
		Mental Simulation and Learning in the Icarus Architecture	DOD-Office of Naval Research	11/1/07-10/31/08	\$140,165
		Software Integration for Computational Cognitive Models in Virtual Environments	SET Corporation (DOD-AFRL)	12/4/07-6/30/08	\$30,000
LEE		ASU Response to RFP: BAE-07-07 for Participation in the Software Assurance Research Program - extension of existing Subcontract.	NASA-National Aeronautics and Space Administration	7/27/07-12/30/07	\$97,000
	<i>Tsai</i>	Process-based Ontology Design for Smart Home Applications	Electronics and Telecommunications Research Institute	9/1/07-1/31/09	\$73,000
LI		A Systematic Approach to 3D Imaging and Visualization for Enhancing Target Detection and Discrimination	Intelligent Automation, Inc.	11/1/06-10/18/08	\$150,000
		Stereoscopic Visualization and Haptic Virtual Exploration of Gastrointestinal Endoscopic Images for Improved Diagnosis	Mayo Clinic Scottsdale	1/1/07-6/30/08	\$39,980
LIU	<i>Woodward</i>	Blog Trackers: Combining Domain Knowledge and Novel Search Capabilities for Assessing Political Risks	DOD-Office of Naval Research	1/29/08-11/30/08	\$100,000
		Deep Search for Modeling Group Interaction using Open Data Sources	DOD-Air Force Research Laboratory-IFKA	9/1/07-6/1/08	\$26,133
		Link Mining of Textual Data	The MITRE Corporation	10/15/07-9/17/08	\$50,000
		Modeling Group Interactions via Open Data Sources	DOD-Air Force Office of Scientific Research	3/1/08-11/30/08	\$122,756
NIELSON		Analysis of Implicit Modeling of Complex Geometric Environments	DOD-Army Research Laboratory	6/1/05-5/31/08	\$19,951
	<i>Farin</i>	Geometry Processing for IsoSurfaces	NSF-Directorate for Computer and Information Science and Engineering	7/15/05-6/30/08	\$196,513
		Special Project: Building Relationships with Asia to Foster Research Exchanges and Student Training in Scientific Data Visualization and Modeling	NSF-Directorate for Computer and Information Science and Engineering	8/1/07-7/31/09	\$15,000
PANCHANATHAN	<i>Homa, Kabol</i>	Investigation of Spatial Memory Formation and Retention in Patients with Early Alzheimer's Disease	Mayo Clinic Scottsdale	1/1/08-12/31/08	\$39,720
	<i>Black, Candan, Haag, Hedgpeth, Rush</i>	ITR: ILEARN: IT-Enabled Intelligent and Ubiquitous Access to Education Opportunities for Blind Students (includes REU)	NSF-Directorate for Computer and Information Science and Engineering	9/1/03-8/31/08	\$1,212,210

FACULTY	CO-PI	TITLE	SPONSOR	DATES	AWARD
PATEL		Bioscience Research Integration Software Platform	Biofortis, Inc. (NIH)	7/6/07-6/30/10	\$251,124
	<i>Cohen, Kabol</i>	Cognitive Aspects of Mental Disorders Diagnosis and Treatment in Primary Care	Science Foundation of Arizona	7/1/08-6/30/09	\$427,000
	<i>Cohen, Kabol</i>	Cognitive Complexity and Error in Critical Care	McDonnell (James S.) Foundation	1/1/08-1/1/13	\$4,724,573
		Image Mining for Comparative Analysis of Expression Patterns in Tissue Microarrays	UMDNJ - Robert Wood Johnson Medical School	9/30/07-9/29/11	\$68,110
		Usability Evaluation of AHLTA	University of Texas Health Science Center at Houston (DOD-Army)	2/11/08-2/10/09	\$80,850
SEN	<i>Li</i>	VISION-SHARE System: A Test bed for Video Transmission over Mobile Ad-Hoc Networks with Applications to Military Operations in Urban Terrain (DURIP)	DOD-Army Research Office	5/1/07-4/30/09	\$92,657
	<i>Li</i>	Shared Vision: Embedded Technology for Military Operations in Urban Terrain	DOD-Army Research Office	8/1/06-8/14/09	\$304,592
SHRIVASTAVA		Low Power Compilation in Phoenix	Microsoft Corporation	10/11/07-10/10/08	\$50,000
STANZIONE		Intel High Performance Computing Graduate Assistanships at Arizona State University: Programming from One Thousand to One Hundred Thousand Threads	Intel Corporation	8/21/06-3/31/08	\$129,258
	<i>Goodnick</i>	Paradigms for Parallel Computations	DOD-Army Research Laboratory	6/5/07-9/4/08	\$256,500
		Shared and Distributed Memory Parallelization of SystemC in Support of System VSIPL	Pentium Group, Inc.	9/5/06-8/31/07	\$134,753
		The iPlant Collaborative: A Cyberinfrastructure-Centered Community for a New Plant Biology	NSF-Directorate for Biological Sciences (BIO)	2/1/08-1/31/09	\$263,873
		World Class Science through World Leadership in High Performance Computing	NSF-Office of Cyberinfrastructure	10/1/06-9/18/08	\$1,305,906
STRACUZZI		Transfer Learning in Integrated Cognitive Systems	Institute for the Study of Learning and Expertise (ISLE) - DOD-AFRL	11/1/06-4/30/09	\$691,537
SUNDARAM	<i>Candan</i>	CES: Design of Dense RFID Systems for Indexing in the Physical World across Space, Time, and Human Experience	Consortium for Embedded Systems	9/19/07-9/18/08	\$50,000
	<i>Candan</i>	Collaborative Research: Design of Dense RFID Systems for Indexing in the Physical World across Space, Time, and Human Experience	NSF-Directorate for Computer and Information Science and Engineering	9/15/07-8/31/10	\$174,000
		Context Aware Expertise Closure	Avaya Labs Research	12/1/05-8/14/08	\$118,103
TSAI	<i>Bitter, Chen, Collofello, Lee, Miron</i>	Preparing High School Teachers for Service-Oriented Computer Science Education	ED-U.S. Department of Education	11/1/06-12/31/09	\$793,818

Source: PRIDE Monthly Research Pivot Table Report, not including ASU Technology and Research Initiative Fund (TRIF) projects or non-sponsored gift awards.

FACULTY	CO-PI	TITLE	SPONSOR	DATES	AWARD
VRUDHULA		Membership Agreement: Raytheon Company: Consortium for Embedded Systems Membership	Raytheon	1/1/08-12/31/08	\$50,000
	<i>Chatha, Dasgupta, Shrivastava</i>	An Integrated Design Framework for Application Development on Multi-core Processors	Science Foundation of Arizona	5/16/08-7/31/10	\$2,000,000
		Collaborative Research: Synthesis, Verification and Testing for Nano-CMOS and Beyond using Threshold Logic	NSF-Directorate for Engineering (ENG)	10/1/07-9/30/10	\$200,000
WONKA		CAREER: Constraint Procedural Urban Modeling	NSF-National Science Foundation	3/1/07-2/28/11	\$478,257
	<i>Razdan, Wentz</i>	SEI(GEO): Visual Geo-Analytics	NSF-Directorate for Computer and Information Science and Engineering	8/1/06-7/31/09	\$610,335
XUE		ITR Collaborative Research: Fault Tolerance in WDM Optical Networks: Multifailure Recovery and Multilayer Survivability	NSF-Directorate for Computer and Information Science and Engineering	9/15/03-8/31/08	\$162,500
		Numerical Algorithms for Location Problems Arising in Wireless Sensor Networks and Other Applications	NSF-Directorate for Computer and Information Science and Engineering	5/27/07-7/31/08	\$12,000
		Numerical Algorithms for Location Problems Arising in Wireless Sensor Networks and Other Applications	NSF-Directorate for Computer and Information Science and Engineering	7/15/08-7/31/08	\$200,000
		REU: ITR Collaborative Research: Fault Tolerance in WDM Optical Networks: Multifailure Recovery and Multilayer Survivability	NSF-Directorate for Computer and Information Science and Engineering	5/4/05-8/31/08	\$6,000
		Robustness and Survivability Issues in Wireless Ad Hoc Networks	DOD-Army Research Office	9/1/04-8/31/08	\$255,734
		WN:Collaborative Research: Cross-layer Optimization for Dynamic Spectrum Access Wireless Mesh Networks	NSF-Directorate for Computer and Information Science and Engineering	9/1/07-8/31/09	\$100,000
YAU	<i>Xue</i>	Collaborative Research: CT-T Security and Survivability of Real-Time Systems with MANETs	NSF-Directorate for Computer and Information Science and Engineering	9/1/05-8/31/08	\$200,000
	<i>Sarjoughian, Ye</i>	SoD: Design of Service-based Software Systems with Qos Monitoring and Adaptation and Adaptation	NSF-Directorate for Computer and Information Science and Engineering	8/1/07-7/31/10	\$800,000
		Trustworthy Data Sharing and Management for Collaborative Pervasive Computing Applications	NSF-Directorate for Computer and Information Science and Engineering	9/15/04-8/31/08	\$320,000

"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

Interdisciplinary Research Awards

CO-PI (contribution)	TITLE	SPONSOR	DATES	AWARD
ARTS, MEDIA AND ENGINEERING PROGRAM				
<i>Candan, Panchanathan, Sundaram (SCI 10%)</i>	IGERT: An Arts, Sciences, and Engineering Research and Education Initiative for Experimental Media	NSF-Directorate for Education and Human Resources (EHR)	10/1/05-9/30/08	\$599,169
<i>Candan, Farin, Li, Panchanathan, Sundaram (SCI 15%)</i>	CISE RI: An Interdisciplinary Research Environment for Motion Analysis	NSF-Directorate for Computer and Information Science and Engineering	9/1/06-8/31/08	\$94,997
DEPARTMENT OF COMPUTING STUDIES				
<i>Wonka (SCI 50%)</i>	Geometry Based Feature Extraction and Analysis of Geo Data	National Geospatial-Intelligence Agency (NGA)	7/29/05-6/28/09	\$174,094
<i>Wonka (SCI 40%)</i>	ATIC-ASU component of Kutta Consulting, Inc's submission to Dept. Homeland Security STTR, Phase II	DHS-Department of Homeland Security	5/15/08-6/15/10	\$200,000
BIODESIGN INSTITUTE - CENTER FOR EVOLUTIONARY FUNCTIONAL GENOMICS				
<i>Panchanathan, Ye (SCI 25%)</i>	Computational Analysis of Gene Expression Pattern Images	HHS-NIH-NHGRI-National Human Genome Research Institute	7/11/07-1/30/10	\$2,955,716
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING				
<i>Konjevod, Stanzione, Liu (SCI 10%)</i>	CAA: Environmental and Economic Impacts of Material Used in Future Urban Development	SFAZ	3/30/07-9/30/08	\$399,280
DEPARTMENT OF ELECTRICAL ENGINEERING				
<i>Richa (SCI 8%)</i>	Academic and Professional Development for Upper-Division Computer Science, Engineering, and Mathematics Students -II: Transition to Research...	NSF-Directorate for Education and Human Resources (EHR)	9/1/07-8/31/11	\$600,000
<i>Burleson (SCI 15%)</i>	EEE 498/591: Electronics and Instrumentation for Extreme Environment Systems	NASA-National Aeronautics and Space Administration	7/31/07-7/20/08	\$20,000
<i>Richa (SCI 33%)</i>	Academic and Professional Development for Computer Science, Engineering, and Mathematics Students: Transitioning to Upper Division, Research, Graduate	NSF-Directorate for Education and Human Resources (EHR)	8/1/04-7/31/08	\$399,968
<i>Chattha, Vrudhula (SCI 75%)</i>	CSR-EHS: Analytical Techniques for Global Energy Minimizaiton of a System of Interacting Components	NSF-Directorate for Computer and Information Science and Engineering	8/1/05-1/31/09	\$400,000
<i>Chen, Yi (SCI 50%)</i>	Collaborative Research: SEI+II ProtocolDB: Archiving and Querying Scientific Protocols, Data and Provenance	NSF-Directorate for Computer and Information Science and Engineering	8/15/06-7/31/09	\$6,000
<i>Chen, Yi (SCI 50%)</i>	Collaborative Research: SEI+II ProtocolDB: Archiving and Querying Scientific Protocols, Data and Provenance	NSF-Directorate for Computer and Information Science and Engineering	8/15/06-7/31/09	\$321,814
DEPARTMENT OF GEOGRAPHY				
<i>Rowe (SCI 5%)</i>	Decision Center for a Desert City (DCDC): Science and Policy of Climate Uncertainty	NSF - Directorate for Social, Behavioral/Economic Science (SBE)	6/15/04-8/31/09	\$6,900,000

DEPARTMENT OF INDUSTRIAL ENGINEERING

<i>Richa (SCI 5%)</i>	Academic and Professional Development for Computer Science, Engineering, and Mathematics Students	NSF-Directorate for Education & Human Resources (EHR)	9/15/06-8/31/10	\$500,000
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DEPARTMENT OF MATHEMATICS AND STATISTICS

<i>Farin (SCI 14%)</i>	AZ ASU Alzheimer's Research Center Project - Year 10	Arizona Alzheimer's Disease Consortium	7/1/07-6/30/08	\$276,330
<i>Chen, S. (SCI 3%)</i>	An Interdepartmental Computing Environment for Statistical Research	NSF-Division of Mathematical Sciences	9/1/07-8/31/08	\$50,000
<i>Stanzione (SCI 7%)</i>	An Interdepartmental Computing Environment for Statistical Research	NSF-Division of Mathematical Sciences	9/1/07-8/31/08	\$50,000

GLOBAL INSTITUTE FOR SUSTAINABILITY

<i>Candan, Davulcu, Kambhampati (SCI 50%)</i>	AOC: Archaeological Data Integration for the Study of Long-Term Human and Social Dynamics	NSF	11/1/06-10/31/09	\$749,984
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SCHOOL OF ARCHITECTURE

<i>Wonka (SCI 50%)</i>	Pilot: SOUZOU - Creativity through Procedural Modeling	NSF-Directorate for Computer and Information Science and Engineering	7/1/08-6/30/10	\$199,962
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SCHOOL OF HUMAN EVOLUTION AND SOCIAL CHANGE

<i>Candan, Davulcu, Kambhampati (SCI 20%)</i>	Digital Antiquity: Planning a Digital Information Infrastructure for Archaeology	University of Arkansas	7/1/07-6/30/08	\$21,295
<i>Janssen (SCI 50%)</i>	Dynamics of Rules in Commons Dilemmas	NSF - Directorate for Social, Behavioral/Economic Science (SBE)	9/1/05-2/28/10	\$587,306

SCHOOL OF SOCIAL AND FAMILY DYNAMICS

<i>Gupta (SCI 3%)</i>	Peer Relationships and School Readiness	HHS-NIH-NICHD-National Institute of Child Health and Human Development	8/1/04-8/31/09	\$362,283
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TRANSLATIONAL GENOMICS RESEARCH INSTITUTE

<i>Kim (SCI 12%)</i>	Targets to Therapeutics in Pancreatic Cancer	NIH/National Cancer Institute	7/1/05-6/30/10	\$12,812,953
<i>Kim (SCI 20%)</i>	Chemoprevention of Skin Cancer	NIH/National Cancer Institute	7/1/04-6/30/09	\$2,728,631
<i>Kim (SCI 10%)</i>	Center for High-Throughput Minimally-Invasive Radiation Biodosimetry - Core C	NIH/NIAID	8/31/05-7/31/10	\$751,623
<i>Kim (SCI 15%)</i>	A New Therapeutic Paradigm for Breast Cancer Exploiting Low-Dose Estrogen-Induced Apoptosis	Department of Defense/CDMRP	9/1/06-8/31/11	\$675,872
<i>Kim (Lead PI, SCI 10%)</i>	Bioinformatics Software for Integrative Cancer Genomic Analysis	TGen (SFAz)	07/1/08-06/30/09	\$167,000



Directory

Department of Biomedical
Informatics

Department of Computer
Science and Engineering

School of Computing
and Informatics

Emeritus Faculty

Advisory Council



Department of Biomedical Informatics


Trevor Cohen, Assistant Professor

Ph.D. Columbia University 2007

Email: trevor.cohen@asu.edu

Research interests: Latent semantic analysis, Comprehension and medical expertise, Distributed cognition and medical error


Valentine Dinu, Assistant Professor

Ph.D. Yale University 2007

Email: valentin.dinu@asu.edu

Research interests: Biomedical informatics, Translational research, Integrative disease association analysis, Genome wide association studies, Entity-attribute-value database modeling


Douglas Fridsma, Associate Professor

Ph.D. Biomedical Informatics Stanford University 2003

M.D. University of Michigan Medical School 1990

Email: Fridsma@asu.edu

Research interests: Development of computational tools to study patient safety, Clinical work processes, Collaboration between healthcare providers


Graciela Gonzalez, Assistant Research Professor

Ph.D. Computer Science University of Texas at El Paso 2000

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Research interests: Multimedia Databases, Human-Computer Interaction, Artificial Intelligence


Robert A. Greenes, Ira A. Fulton Chair

Ph.D. Harvard University 1970

M.D. Harvard Medical School 1966

Email: robert.greenes@asu.edu

Research interests: 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

Email: william.g.johnson@asu.edu

Research interests: Development of computational tools to study patient safety, Clinical work processes, Collaboration between healthcare providers


Kanav Kahol, Assistant Professor

Ph.D. Arizona State University 2006

Email: kanav@asu.edu

Research interests: Haptic user interfaces, Multimedia, Human computer interaction, Surgical simulation, Assistive and rehabilitation systems


Craig Parker, Associate Research Professor

M.S. Computer Science Brigham Young University 2005

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Research interests: Clinical data architectures, Clinical decision support, Clinical information standards


Vimla L. Patel, Vice Chair

Ph.D. Educational Psychology McGill University, Canada 1981

Email: vimla@asu.edu

Research interests: Medical cognition, 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

Ph.D. Medical Information Sciences Stanford University 1975

M.D. Stanford University 1976

Email: edward.shortliffe@asu.edu

Research interests: Clinical decision-support systems, Collaborative technologies, Role of internet in health care, Informatics research policy

Affiliated/Adjunct Faculty

Chitta Baral, Chair
Department of Computer Science and Engineering, ASU

Kenneth Bobis, Chief Technology Officer
Mayo Clinic Scottsdale

Andrew Bordner, Faculty Member
Mayo Clinic Scottsdale

Yi Chen, Assistant Professor
Department of Computer Science and Engineering, ASU

Christopher Chute
Mayo Clinic Scottsdale

Gerald Farin, Professor
Department of Computer Science and Engineering, ASU

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Sandeep K.S. Gupta, Professor
Department of Computer Science and Engineering, ASU

Seungchan Kim, Assistant Professor
Department of Computer Science and Engineering, ASU

Bradford Kirkman-Liff, Professor
School of Health Management and Policy, ASU

Steve Langer, Director of Imaging Informatics
Mayo Clinic – Radiology

Laurence Miller, Professor of Medicine
Mayo Clinic College of Medicine

Sethuraman Panchanathan, Director
School of Computing and Informatics, ASU

Shahram Partovi, Medical Director
Division of Neuroradiology, Barrow Neurological Institute

Renaut Rosemary, Director
Computational Biosciences Program, ASU

Kimberly Shea, Assistant Professor
College of Nursing and Health Innovation, ASU

Howard Silverman, Clinical Faculty
Department of Biomedical Informatics, ASU

Ron Weinstein, Adjunct Faculty
Department of Biomedical Informatics, ASU

Raymond L. Woosley, President
The Critical Path Institute

Jieping Ye, Assistant Professor
Department of Computer Science and Engineering, ASU

Department of Computer Science and Engineering



Gregory Aist, Assistant Research Professor

Ph.D. Carnegie Mellon University 2000

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Research interests: Natural language processing, Computer-assisted learning, Research methods



Ashish Amresh, Lecturer

M.S. Computer Science Arizona State University 2007

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Research interests: Computer aided geometric design (CAGD), Real-Time rendering, Visualization and video game programming



Janaka Balasooriya, Lecturer

Ph.D. Georgia State University 2006

Email: janakab@asu.edu Website: <http://www.public.asu.edu/~jbalasoo/>

Research interests: Distributed, Internet and grid computing, Web service coordination primitives and system architectures, Biological data integration and interoperability, Middleware and embedded software



Chitta Baral, Chair

Ph.D. University of Maryland 1991

Email: chitta@asu.edu Website: <http://www.public.asu.edu/~cbaral/>

Research interests: Artificial intelligence, Knowledge representation and reasoning, Declarative programming, Bioinformatics, Autonomous agents, Logic programming, Cognitive robotics, Multimedia, Visualization of databases



Rida Bazzi, Associate Professor

Ph.D. Georgia Institute of Technology 1994

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Research interests: Distributed computing, Fault tolerance, Security



Kevin Burger, Lecturer

M.S. Computer Science University of Kansas 1988

Email: burgerk@asu.edu Website: <http://www.public.asu.edu/~kburger2>

Research interests: Embedded systems, Introductory programming, Data structures and algorithms, Computer architecture and organization, Web development



Winslow Burleson, Assistant Professor

Ph.D. MIT 2006

Email: Winslow.Burleson@asu.edu

Research interests: Human-Computer Interaction applied to: creativity, innovation, well-being, design engineering, exploration, gaming, educational technology



Debra Calliss, Lecturer

Ph.D. Arizona State University 1991

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Research interests: Computer science education, Programming languages, Software maintenance



Kasim Candan, Associate Professor

Ph.D. University of Maryland 1997

Email: candan@asu.edu Website: <http://www.public.asu.edu/~candan/index.htm>

Research interests: 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, Associate Professor

Ph.D. University of Cincinnati 2001

Email: karamvir.chatha@asu.edu Website: <http://www.eas.asu.edu/~kchatha/>

Research interests: 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



Yi Chen, Assistant Professor

Ph.D. University of Pennsylvania 2005

Email: yi@asu.edu Website: <http://www.public.asu.edu/~ychen127>

Research interests: Data management in web and scientific applications, Data modeling, Storage and query optimization, Data streams, Information integration



Yinong Chen, Lecturer

Ph.D. University of Karlsruhe (Germany) 1993

Email: yinong.chen@asu.edu Website: <http://www.public.asu.edu/~ychen10/>

Research interests: Service-oriented computing, Embedded systems, Fault-tolerant computing, Distributed computing



Charles Colbourn, Professor

Ph.D. University of Toronto 1980

Email: charles.colbourn@asu.edu Website: <http://www.public.asu.edu/~ccolbou>

Research interests: Network reliability, Combinatorial design theory



Dirk Colbry, Assistant Research Professor

Email: dirkcolbry@gmail.com

Research interests: Pattern recognition, Biometric security, Computer vision, Robotics, Cognitive science, Artificial intelligence

**James Collofello, Professor**

Ph.D. Northwestern University 1978

Email: james.collofello@asu.edu

Research interests: Software engineering, Project management, Quality assurance**Partha Dasgupta, Associate Professor**

Ph.D. State University of New York 1984

Email: partha@asu.edu Website: <http://cactus.eas.asu.edu/Partha/>**Research interests:** Computer security, Operating systems, Distributed and parallel systems**Hasan Davulcu, Assistant Professor**

Ph.D. State University of New York 2002

Email: hasandavulcu@asu.edu Website: <http://www.public.asu.edu/~hdavulcu>**Research interests:** Data mining, Web and text mining, Data cleaning and information extraction, Workflows and semantic web services, Database systems**Toni Farley, Lecturer**

B.S. Arizona State University 2003

Email: toni@asu.edu Website: <http://www.public.asu.edu/~tfarley>**Research interests:** Graphs, Networks, Algorithms, Network security, Computer science theory, Discrete math**Sandeep K.S. Gupta, Professor**

Ph.D. Ohio State University 1995

Email: sandeep.gupta@asu.edu Website: <http://impact.asu.edu>**Research interests:** Wireless networks, Mobile and ubiquitous/pervasive computing, Embedded sensor networks for biomedical applications, Parallel and Distributed computing**Dianne Hansford, Associate Research Professor**

Ph.D. Arizona State University 1991

Email: dianne.hansford@asu.edu Website: <http://www.farinhansford.com/dianne>**Research interests:** Geometric modeling, Scientific visualization**Dijiang Huang, Assistant Professor**

Ph.D. University of Missouri Kansas City 2004

Email: dijiang@asu.edu Website: <http://dj.eas.asu.edu/dhuang/index.html>**Research interests:** Network security, privacy prevention techniques, key management, secure ad hoc network routing, trust management for VANETs**Subbarao Kambhampati, Professor**

Ph.D. University of Maryland 1989

Email: rao@asu.edu Website: <http://rakaposhi.eas.asu.edu/rao.html>**Research interests:** Artificial intelligence, Automated planning, Machine learning, Data and information integration**Seungchan Kim, Assistant Professor**

Ph.D. Texas A&M University 2001

Email: dolchan@asu.edu Website: <http://sysbio.fulton.asu.edu>**Research interests:** Computational systems biology, Bioinformatics, Genomic signal processing, Modeling genetic regulatory networks, Identification of genetic or molecular markers for cancer classification, Statistical machine learning**Goran Konjevod, Assistant Professor**

Ph.D. Carnegie Mellon University 2000

Email: goran@asu.edu Website: <http://thrackle.eas.asu.edu/users/goran>**Research interests:** Design and analysis of algorithms, Combinatorial optimization, Graph theory, Discrete mathematics**Pat Langley, Professor**

Ph.D. Carnegie Mellon University 1980

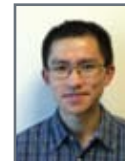
Email: pat.langley@asu.edu

Research interests: Artificial intelligence, Adaptive user interfaces, Cognitive architectures, Computational models of human behavior, Computational biology and ecology, Computational scientific discovery, Machine learning, Problem solving and planning**Joohyung Lee, Assistant Professor**

Ph.D. University of Texas at Austin 2005

Email: joolee@asu.edu Website: <http://peace.eas.asu.edu/joolee/>**Research interests:** Artificial intelligence, Knowledge representation and reasoning, Logic programming and answer set programming, Commonsense reasoning about actions, Nonmonotonic reasoning**Yann-Hang Lee, Associate Chair**

Ph.D. University of Michigan Ann Arbor 1985

Email: yhlee@asu.edu Website: <http://rts-lab.eas.asu.edu/>**Research interests:** Real-time systems, Computer communication, Computer architecture, Fault-tolerant computing, Distributed/parallel systems, Performance evaluation**Baoxin Li, Assistant Professor**

Ph.D. University of Maryland, College Park 2000

Email: baoxin.li@asu.edu Website: <http://www.public.asu.edu/~bli24>**Research interests:** Multimedia processing, Computer vision, Statistical methods in visual computing**Huan Liu, Associate Professor**

Ph.D. University of Southern California 1989

Email: huan.liu@asu.edu Website: <http://www.public.asu.edu/~huanliu>**Research interests:** Data mining, Machine learning, AI, Web analytics, Social computing**Donald S. Miller, Associate Professor**

Ph.D. University of Southern California 1972

Email: donald.miller@asu.edu

Research interests: Address space operating systems, Distributed and multiprocessor operating systems, Computer architecture, Local area networks



Mutsumi Nakamura, Lecturer

Ph.D. University of Texas at Arlington 2001

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Research interests: Active database systems, Web-based database systems



Faye Navabi, Senior Lecturer

M.S. University of Louisiana at Lafayette 1991

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Research interests: Computer science education, Programming languages



Gregory M. Nielson, Professor

Ph.D. University of Utah 1970

Email: nielson@asu.edu

Research interests: Interactive design of curves and surfaces, Multivariate data fitting, Computer-aided geometric design, Computer graphics, Visualization of scientific computing



Andrea W. Richa, Associate Professor

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Research interests: Design and analysis of algorithms, Algorithms for distributed wireless and mobile networks, Graph algorithms, Randomized algorithms, Approximation algorithms, Combinatorial optimization, Distributed resource allocation, Parallel network architectures



Hessam S. Sarjoughian, Assistant Professor

Ph.D. University of Arizona 1995

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Research interests: Agent-based modeling, Multi-formalism modeling, Simulation-based design, Software architecture



Arunabha Sen, Associate Professor

Ph.D. University of South Carolina 1987

Email: asen@asu.edu Website: <http://www.public.asu.edu/~halla/>

Research interests: Resource optimization in optical, Wireless and sensor networks, Video transmission over mobile ad-hoc networks, Network processors, System/Network on chip design, Combinatorial optimization, Algorithm design and analysis



Aviral Shrivastava, Assistant Professor

Ph.D. University of California, Irvine 2006

Email: aviral.shrivastava@asu.edu

Research interests: Compilers, Processor architectures, Embedded systems, Low-power design, Thermal-aware design, Compilers for embedded systems, Error tolerant architectures and software



David J. Stracuzzi, Assistant Research Professor

Ph.D. University of Massachusetts Amherst 2006

Email: david.stracuzzi@gmail.com Website: <http://www.public.asu.edu/~dstracuz/>

Research interests: Artificial intelligence, Machine learning, Cognitive systems



Hari Sundaram, Assistant Professor

Ph.D. Columbia University 2002

Email: hari.sundaram@asu.edu Website: <http://www.public.asu.edu/~hsundara>

Research interests: Multimedia, Segmentation, Databases, Structure discovery and summarization, Representational and algorithmic approximations for real-time multimedia content analysis



Violet R. Syrotiuk, Associate Professor

Ph.D. University of Waterloo, Canada 1992

Email: syrotiuk@asu.edu Website: <http://www.public.asu.edu/~syrotiuk/>

Research interests: Multi-hop wireless networks especially mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs), Medium access control (MAC) and higher layer protocols



Wei-Tek Tsai, Professor

Ph.D. University of California Berkeley 1985

Email: wtsai@asu.edu

Research interests: Software engineering, Internet, Parallel and distributed processing



Sarma Vrudhula, Professor

Ph.D. Electrical and Computer Engineering University of Southern California 1985

Email: vrudhula@asu.edu Website: <http://veda.eas.asu.edu/>

Research interests: CAD for VLSI Circuits, Logic synthesis and verification, Low power design, Power, Energy and thermal management in processors performance, Power and yield optimization of VLSI circuits, Novel logic structures and applications to Biology



Peter Wonka, Assistant Professor

Ph.D. Technical University of Vienna 2001

Email: peter.wonka@asu.edu Website: <http://www.public.asu.edu/~pwonka/>

Research interests: Computer graphics, Visualization, Information visualization



Guoliang Xue, Professor

Ph.D. University of Minnesota 1991

Email: xue@asu.edu Website: <http://optimization.asu.edu/~xue/>

Research interests: QoS routing, Resource allocation in wireless networks, Security and survivability in sensor networks



Stephen S. Yau, Professor

Ph.D. University of Illinois Urbana-Champaign 1961

Email: yau@asu.edu Website: <http://dpse.asu.edu/yau/>

Research interests: Cyber security, service-based systems, trustworthy computing, ubiquitous computing, development of adaptive software, situation awareness, collaborative and secure data sharing



Jieping Ye, Assistant Professor

Ph.D. University of Minnesota 2005

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Research interests: Machine learning, Data mining, Bioinformatics

Affiliate/Adjunct Faculty

Yu Cao, Assistant Professor
Department of Electrical Engineering, ASU

Suzanne Dietrich, Associate Professor
Department of Mathematical Sciences and Applied
Computing, ASU

Gerald Gannod, Associate Professor
Department of Computer Science and Systems Analysis,
Miami University

Morris Goldberg, Adjunct Faculty
Department of Computer Science and Engineering, ASU

Deirdre Meldrum, Dean
Ira A. Fulton School of Engineering, ASU

Anshuman Razdan, Associate Professor
Division of Computing Studies, ASU

Kyung Dong Ryu, Research Staff Member
Advanced Operating Systems Group, IBM T.J. Watson
Research Center

Alan C. Skousen, Adjunct Faculty
Division of Computing Studies, ASU

Daniel Stanzione Jr.
Director, High Performance Computing Initiative, ASU

Faculty Associates

Frank Calliss
Arnavd Ehgner
David Ott

Post Doctoral Research Associates

Huiping Cao
Qing Li
Georgios Varsamopoulos

School of Computing and Informatics

**Sethuraman Panchanathan, Director**

Ph.D. University of Ottawa, Canada 1989
Email: panch@asu.edu

Research interests: Multimedia computing, Face/Gait analysis and recognition, Genomic
signal processing, Ubiquitous computing environments for blind persons, Haptic user
interfaces for assistive rehabilitative and virtual surgery applications

**Gerald Farin, Associate Director of Academic Affairs**

Ph.D. Mathematics University of Braunschweig 1980
Email: farin@asu.edu Website: <http://www.farinhansford.com/gerald>

Research interests: 3D modeling, Scientific visualization

**Jeremy Rowe, Associate Director for Strategic Initiatives and Special Partnerships**

Ed.D. Educational Policy & Administration/Higher Ed. Arizona State University 1997
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Research interests: Informatics and Digital Libraries incorporating 3-D data, 3-D handwriting,
Enterprise distributed authentication and authorization, Water policy planning, 3-D digital
libraries

SCI Staff

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Informatics, CHIR

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Academic Programs

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Systems Analyst Senior

Gary Cleveland
Systems Programmer

Annelise Cole
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Manager

Pamela Dunn
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Miwa Edge
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Connie Gardiola
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Sandra Hoeffler
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Patricia Hutton
Administrative Associate

Tameka Jackson
Administrative Associate,
CHIR

Connie Mudd
Accountant Sr.

Deborah Paterick
Manager of Creative Services

Kathleen Russell
Associate Director, CHIR

Amy Sever
Assistant Director,
Academic Services

Lincoln Slade
Technology Support
Analyst, Prin.

John Smitheran
Academic Specialist
Coordinator

Dana Souser
Instructional Designer

Krista Stracuzzi
Program Coordinator, Sr.

Rhonda Steele
Coordinator, Sr.

Martha Vander Berg
Academic Associate /
Academic Advisor

Wayne Woodland
Systems Programmer, Pr.

Kaitlin Yacob
Program Coordinator, Sr.

Angela Zadorozny
Student Services Coordinator
Assistant

Emeritus Faculty

Vernon Blackledge

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.



Joseph Urban

Ph.D. University of Louisiana at Lafayette 1977

Joseph E. Urban worked at the University of Miami, the University of Southwestern Louisiana and part-time at the University of South Carolina while with the U.S. Army Signal Center before joining ASU. He is currently chair of the Department of Computer Science at Texas Tech University.



Susan Urban

Ph.D. University of Louisiana at Lafayette 1987

Susan D. Urban joined ASU in 1989. She retired from ASU after 18.5 years of service and is currently a Professor in the Department of Computer Science at Texas Tech University.



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.

Industry Advisory Council

Each semester, members of SCI's industry advisory council meet to discuss the school's research and curriculum developments. The role of the council is to advise the school in its strategic planning. The council also assists the school in accomplishing its teaching, research and service mission objectives.

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Lalit Ahuja

President, Target Corporation
India Private Limited

Rick Anderson

Senior Software Engineering
Manager, Tektronix, Inc.

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Operations, Yahoo! Research;
and Vice President, Yahoo!
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Software Engineering Function
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and Emerging Business, Research,
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Financial Systems - Phoenix
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Vice President, Global Information
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Philip Steitz

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Technology Officer, American Express

Stephen H. Watson

Project Software Systems Engineer
on the Juno Mission to Jupiter, NASA
Jet Propulsion Laboratory

Hans J. Wolters

Director, Informatics, XDx, Inc.



"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

Ira A. Fulton School of Engineering

