Transforming data into knowledge

Ira A. Fulton Schools of Engineering
Arizona State University

School of Computing, Informatics, and Decision Systems Engineering

Annual Report 2015-2016
Excellence at scale

The School of Computing, Informatics, and Decision Systems Engineering continues to make transformative advances in human-technology systems through our innovative research and education.

Industry groups recognize our faculty’s excellence

Our faculty are further enhancing our school’s far-reaching reputation by winning prestigious honors and positions in leading industry groups.

Pitu Mirchandani was named one of eight INFORMS fellows in 2015 for his fundamental research contributions to transportation system modeling and analysis, Sarma Vrudhula was named an IEEE Fellow for his extraordinary record of accomplishments in improving the energy efficiency of digital devices, and Ross Maciejewski was named an IEEE Senior Member in 2015.

At the 2015 IEEE International Conference on Data Mining, Hanghang Tong and two colleagues received the Ten Year Highest Impact Paper Award for their 2006 paper, “Fast Random Walk with Restart and Its Applications,” which has been cited more than 400 times.

Gail-Joon Ahn earned a special designation as Distinguished Scientist by the Association for Computing Machinery, the world’s leading association of computing professionals.

We have early-career faculty who continue to impress on the national level. Jingrui He is CIDSE’s most recent faculty member to receive a National Science Foundation CAREER Award for her work to create new algorithms and theories to better process today’s complex datasets.

Sparking innovations through research

In fall 2016 we added six talented new faculty members to support growing student enrollment and strengthen our key research areas of robotics, industrial engineering and software engineering.

To build on our strengths in Big Data research, Selçuk Candan, Hasan Davulcu and Gail-Joon Ahn were awarded a planning grant from the National Science Foundation for the creation of the Industry/University Cooperative Research Center for Assured and SCAlable Data Engineering (CASCADE) in collaboration with the University of Maryland, College Park. Their goal is to create innovative data architectures and tools to support timely and assured decision making.

Huan Liu’s Data Mining and Machine Learning Lab’s TweetTracker, funded by a grant from the Office of Naval Research, helps track and understand events by geographic region through social media data.

Our faculty also excel in the area of cybersecurity. Ahn is leading a new research center that opened this past academic year, the Center for Cybersecurity and Digital Forensics, which will collaborate with other universities, government agencies and industry partners to advance cybersecurity and digital forensics research.

Ahn is also working with Anna Scaglione, professor of electrical, computer and energy engineering, to lead ASU’s effort in a $28.1 million national research program, called the Cyber Resilient Energy Delivery Consortium, to protect the nation’s energy delivery systems from cyberattacks.

Faculty launch entrepreneurial efforts

Several faculty have leveraged their areas of expertise to promising startup businesses.

Paulo Shakarian, for example has launched two startup companies. With CIDSE alumnus Abhinav Bhatnagar, he founded CrossViral Inc., an analytics consulting firm specializing in data-driven viral marketing strategies for business.

Shakarian also formed IntelliSpyre Inc., a cyber-threat intelligence company specializing in proactive threat warnings based on the activities of the malicious hacker space, with CIDSE research scientist Jana Shakarian. IntelliSpyre created a beta version of its product that is undergoing testing by about a dozen major companies and is licensing technology developed at ASU in the CySIS Lab, which Shakarian directs.
Dijiang Huang is also excelling in his entrepreneurship efforts. He is working to improve computer science lab access at ASU and at universities around the world through virtual, cloud-based lab service ThoTh Lab with his startup, Athena Network Solutions LLC, whose CEO is Huang's former doctoral student. ThoTh Lab will help students and researchers around the world get hands-on education to learn the skills needed by today's cybersecurity professionals. Huang is working with universities in the United States, the United Arab Emirates, India and China to improve lab capabilities and access.

Research aids local communities

Shakarian recently adapted a system he developed for counterinsurgency operations in Afghanistan into the Missing Person Intelligence Synthesis Toolkit to help with a local missing-person case.

Our students are also involved in helping their local communities on projects with the potential to have impacts around the world.

Computer science, computer engineering and software engineering students are working in interdisciplinary groups to help local community members regain or enhance their physical abilities through assistive technology.

Computer science doctoral student Prajwal Paudyal is working in the iMPACT Lab on SCEPTRE, a smartphone interface that takes in American Sign Language gestures to communicate via computer systems. Paudyal works with local ASL users in his research and was recognized with a Spring 2016 Graduate and Professional Student Association Outstanding Research Award.

Students continue success in international programs and competitions

We have excellent students involved in distinguished international programs and competitions. From among 120 applicants, computer engineering doctoral student Imane Lamrani was one of only 10 American computer science and computer engineering doctoral students chosen for this summer’s session of the French-American Doctoral Exchange Program.

In China, a team of our students led by Yinong Chen won first prize at this year’s Intel Cup for the second time in a row.

Industry partnerships strengthen opportunities

Our students benefit from expanding educational and research partnerships with major corporations in the Phoenix area, including Intel, AVNET, Honeywell, the Mayo Clinic, Banner Health, General Motors, PayPal and NASA’s Jet Propulsion Laboratory.

Students regularly catch the attention of distinguished industry programs. This year, for example, computer science graduate student Tathagata Chakraborti earned an IBM Ph.D. Fellowship award that allows him to pursue human-AI collaborative planning research with IBM.

Our graduates are also finding industry positions with companies at the top of their industries.

Subbarao Kambhampati’s doctoral students recently went to prestigious research positions at IBM to work on its Watson research and to Google for work on YouTube. Liu's students have recently gone on to work at LinkedIn, Yahoo Labs and Intel. My own students have gone to research positions at Nokia Labs. Other students have had success in academia. Kambhampati and Liu’s students have also been hired by leading universities.

School expands program inclusiveness

The rapid growth of student enrollment at CIDSE puts us at the largest among the Ira A. Fulton Schools of Engineering, and the growth isn’t limited to the number of students at ASU’s Tempe and Polytechnic campuses. The Fulton Schools, and CIDSE in particular, continue to lead in online education. CIDSE boasts the first four-year, completely online engineering management program, and recently participated in a partnership with Intel Corp. to provide master’s level engineering education to its employees around the world. Engineers in China and Vietnam studied industrial engineering from our esteemed faculty, including Ron Askin and Dan Shunk.

We work diligently to foster student diversity and inclusion in our programs. Carole-Jean Wu organizes a scholarship program to support female undergraduate and graduate students in computing-related majors to attend the Grace Hopper Celebration of Women in Computing. In 2014 and 2016, around 145 students attended the Grace Hopper event in Phoenix and Houston for professional career development.

Wu and Farideh Navabi-Tadayon also participate in BRAID — Building, Recruiting and Inclusion for Diversity — a national partnership of universities that aims to increase the percentage of women and underrepresented minorities majoring in computer science.

Generous support leads to enduring excellence

All our faculty and student success is not possible without the help of our benefactors, who contributed more than $1 million to CIDSE in the 2015-2016 academic year. These generous contributions include donations to the Gerald Farin Memorial Fellowship, established in remembrance of an esteemed faculty member who passed away in early 2016, which has already raised $31,150 from 45 donors. The 2016-2017 academic year is already off to a great start, with more than $1 million contributed since July 1. Help our faculty and students embark on many more years of research and educational excellence.

Take a look at our website and plan a visit for an on-site exploration of a school designed and dedicated to providing a life-changing education and research.

Sandeep Gupta, Interim Director and Professor
School of Computing, Informatics, and Decision Systems Engineering
Sandeep.Gupta@asu.edu
Contents
At a glance 4
Research themes 6
Faculty honors 22
Beyond the classroom 29
Doctoral degrees awarded 2015-2016 32
Academic programs 36
Outstanding graduates and CIDSE Night Awards 38
Students 39
Undergraduate student research 48
Alumni 50
Outreach 52
New faculty 53
Faculty directory 54
In memoriam 70
Staff 72
Acknowledgements 73

School rankings

Computer Science
22nd Academic Rankings of World Universities (United States)

Computer Engineering
31st U.S. News and World Report Graduate Rankings

Industrial Engineering
23rd U.S. News and World Report Graduate Rankings

Research expenditures

<table>
<thead>
<tr>
<th>Fiscal Year (FY)</th>
<th>Expenditures</th>
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<tbody>
<tr>
<td>FY2012</td>
<td>$11,401,511</td>
</tr>
<tr>
<td>FY2013</td>
<td>$11,396,128</td>
</tr>
<tr>
<td>FY2014</td>
<td>$14,177,558</td>
</tr>
<tr>
<td>FY2015</td>
<td>$15,155,092</td>
</tr>
<tr>
<td>FY2016</td>
<td>$15,732,422</td>
</tr>
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</table>

$0M $2M $4M $6M $8M $10M $12M $14M $16M
Ron Askin: a dedicated, driving force behind Fulton Schools rise and recognition

When today’s fastest growing industries increasingly rely on computing and information sciences, a school devoted to these disciplines needs a director who can keep pace. Since Ron Askin became the inaugural director of the School of Computing, Informatics, and Decision Systems Engineering in 2009, he has been just what it needed.

“Ron has been on a mission to promote the research and academic programs not only in CIDSE, but also of related fields at ASU,” said Kyle Squires, dean of the Ira A. Fulton Schools of Engineering. “I appreciate his dedication to a vision of creating a world-class school at ASU, and I wish him the best as he moves into the next stage of his career.”

Askin has exhibited foresight throughout his stewardship of CIDSE, including adding programs that would be important to meeting the needs of industry. Master’s and doctorate programs for Computer Engineering were added in 2010, new undergraduate Informatics and Engineering Management programs were approved for fall 2011, and the Software Engineering program at the Polytechnic campus was incorporated into CIDSE’s portfolio in 2014. He led the school through Accreditation Board for Engineering and Technology, Inc. (ABET) accreditation process to ensure in-person and online students get quality education in all programs.

His goal was to strengthen the school’s core disciplines and increase the size and scope of its student body, faculty and research. For example, in the past year CIDSE has led the development of a Center for Cybersecurity and Digital Forensics under the direction of Professor Gail-Joon Ahn as part of ASU’s Global Security Initiative and the Center for Assured and Scalable Data Engineering under the direction of Professor K. Selçuk Candan, both computer science faculty members.

From the first semester of the newly named school through June 2016 when he stepped down as director, he has no doubt accomplished what he set out to do.

Research awards

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Total Research Awards</th>
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<tr>
<td>FY2012</td>
<td>$12,761,031</td>
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<td>FY2013</td>
<td>$15,891,482</td>
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<tr>
<td>FY2014</td>
<td>$16,383,775</td>
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<tr>
<td>FY2015</td>
<td>$13,850,454</td>
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<tr>
<td>FY2016</td>
<td>$13,208,586</td>
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Research proposals (number)

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<tr>
<th>Fiscal Year</th>
<th>Total Research Proposals (number)</th>
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<tbody>
<tr>
<td>FY2012</td>
<td>$85,271,103 (222)</td>
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<tr>
<td>FY2013</td>
<td>$93,927,170 (227)</td>
</tr>
<tr>
<td>FY2014</td>
<td>$106,805,001 (268)</td>
</tr>
<tr>
<td>FY2015</td>
<td>$109,255,809 (295)</td>
</tr>
<tr>
<td>FY2016</td>
<td>$104,013,757 (320)</td>
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At a glance

Degree programs

Computer Engineering (M.S., Ph.D.)
Computer Science (B.S., M.S., M.C.S., Ph.D.)
Computer Systems Engineering (B.S.E.)
Engineering Management (B.S.E.)
Industrial Engineering (B.S.E., M.S., Ph.D.)
Informatics (B.S.)
Software Engineering (B.S., M.S.)

Research impact areas

Computational intelligence and algorithms
Data management and information assurance
Network science and systems
Software and systems engineering

Research impact

Computing data into information — secure and affordable, anytime, anywhere. It’s an ambitious goal. To deliver on this vision, we rely on the energy, ingenuity and knowledge of our faculty, students and partners. We’re all working together to ensure that our data-hungry society gets what it demands: the information we live by, delivered as safe, as accurate, as fast, as cheap and as accessible as possible. In that process we are learning new ways to improve our enjoyment, productivity and our safety as we go through our life journey.

Research centers

Advanced Technology Innovation Center (ATIC)
ASU-Mayo Clinic Imaging Informatics and Analytics Laboratory (AMIIAL)
Center for Assured and Scalable Data Engineering (CASCADE)
Center for Cognitive Ubiquitous Computing (CUbiC)
Center for Cybersecurity and Digital Forensics (CDF)
Center for Embedded Systems (CES)
Center for Engineering Logistics and Distribution (CELDi)
Information Assurance Center (IAC)
Innovative Learner and User Experience (iLUX)

Fall enrollment

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<tr>
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<tbody>
<tr>
<td>Degrees</td>
<td>1,440</td>
<td>1,603</td>
<td>1,861</td>
<td>2,312</td>
<td>2,871</td>
<td>4,325</td>
<td>5,183</td>
<td>5,675</td>
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Degrees granted

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<tbody>
<tr>
<td>Fall</td>
<td>334</td>
<td>336</td>
<td>334</td>
<td>356</td>
<td>400</td>
<td>565</td>
<td>751</td>
<td>951</td>
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Graduated from Fulton Schools in five years

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<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>Graduated</td>
<td>35%</td>
<td>31.5%</td>
<td>36.1%</td>
<td>45.8%</td>
<td>39.4%</td>
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</table>
Enrollment increase 294%
Degrees granted increase 125%
Graduation rate increase 12.6%

<table>
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<tr>
<th>Program</th>
<th>Bachelor's</th>
<th>Master's</th>
<th>Doctoral</th>
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<tbody>
<tr>
<td>Computer (Systems) Engineering</td>
<td>69</td>
<td>70</td>
<td>-</td>
</tr>
<tr>
<td>Computer Science</td>
<td>214</td>
<td>292</td>
<td>23</td>
</tr>
<tr>
<td>Engineering Management</td>
<td>31</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>69</td>
<td>99</td>
<td>9</td>
</tr>
<tr>
<td>Informatics</td>
<td>9</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Software Engineering and Computing Studies</td>
<td>34</td>
<td>32</td>
<td>*</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Program</th>
<th>Bachelor’s</th>
<th>Master’s</th>
<th>Doctoral</th>
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</thead>
<tbody>
<tr>
<td>Computer (Systems) Engineering</td>
<td>467</td>
<td>128</td>
<td>46</td>
</tr>
<tr>
<td>Computer Science</td>
<td>1953</td>
<td>588</td>
<td>174</td>
</tr>
<tr>
<td>Engineering Management</td>
<td>529</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>348</td>
<td>139</td>
<td>58</td>
</tr>
<tr>
<td>Informatics</td>
<td>97</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Software Engineering and Computing Studies</td>
<td>950</td>
<td>199</td>
<td>*</td>
</tr>
</tbody>
</table>

* Computer Engineering (Computer Systems), Engineering Management and Informatics were all established in FY2012. Engineering Management and Informatics do not offer graduate degrees. Software Engineering does not offer a doctoral degree.
Computational intelligence and algorithms

Computational intelligence encompasses a collection of fundamental research areas dealing with the creation of knowledge from data, the development of algorithms for controlling computing decisions, and the effective approaches for interfacing computers and humans. The area focuses on enhancing human decision making, automated learning, discovery from data and the automation of computing processes.

Specialty areas

Artificial Intelligence
Our researchers are addressing problems in automated planning and scheduling, constraint satisfaction, knowledge representation and reasoning, natural language processing, multiagent systems, and the semantic web. Advances are being applied to robotics and other intelligent systems.

Theory and Algorithms
Understanding complexity and the theory of computation is critical for developing efficient algorithms. Research in this group focuses on both fundamental theory for analyzing algorithms and on developing specific deterministic and randomized algorithms for solving classic problem formulations relevant to the emerging problems in society and technology. This includes the study of complex, adaptive systems and nature-inspired approaches such as biomimicry.

Data Mining and Machine Learning
As scientific and enterprise data sets grow with respect to data characteristics (volume, variety, velocity), it becomes imperative to develop new approaches to extract spatial and temporal relationships, correlation patterns and knowledge. The faculty is actively engaged in developing new scalable methods for learning with big data.

Imaging, Graphics and Visualization
Rendering clearer images of urban scenes for games and homeland security, geometric modeling of images for new approaches to detect biosignature disease indicators using volumetric and other measures, recovery and digitization of information content in physical media and dynamic movements are all being addressed by researchers.

Statistical Modeling
From universe to earth to nanoscale, random phenomena influence behavior. Models and methods are being developed to better understand and predict random behavior to allow for more efficient acquisition of knowledge (Design of Experiments), improved estimation of system reliability, better characterization of system capability and making more accurate and meaningful inferences from data.

Faculty contacts

<table>
<thead>
<tr>
<th>Artificial Intelligence</th>
<th>Subbarao Kambhampati</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chitta Baral</td>
<td>Ted Pavlic</td>
</tr>
<tr>
<td>Heni Ben Amor</td>
<td>Kurt VanLehn</td>
</tr>
<tr>
<td>Georgios Fainekos</td>
<td></td>
</tr>
<tr>
<td>Joohyung Lee</td>
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<table>
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<tr>
<th>Theory and Algorithms</th>
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<tbody>
<tr>
<td>Rida Bazzi</td>
<td>Ted Pavlic</td>
</tr>
<tr>
<td>Charles Colbourn</td>
<td>Andrea Richa</td>
</tr>
<tr>
<td>Adolfo Escobedo</td>
<td>Jorge Sefair</td>
</tr>
<tr>
<td>Pitu Mirchandani</td>
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</table>

<table>
<thead>
<tr>
<th>Data Mining and Machine Learning</th>
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<tbody>
<tr>
<td>Jingrui He</td>
<td>Paulo Shakarian</td>
</tr>
<tr>
<td>Baoxin Li</td>
<td>Hanghang Tong</td>
</tr>
<tr>
<td>Huan Liu</td>
<td>Teresa Wu</td>
</tr>
<tr>
<td>George Runger</td>
<td>Nong Ye</td>
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</table>

<table>
<thead>
<tr>
<th>Imaging, Graphics and Visualization</th>
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</thead>
<tbody>
<tr>
<td>Baoxin Li</td>
<td>Ted Pavlic</td>
</tr>
<tr>
<td>Ross Maciejewski</td>
<td>Giulia Pedrielli</td>
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<td>Yalin Wang</td>
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<thead>
<tr>
<th>Statistical Modeling</th>
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<tbody>
<tr>
<td>Jing Li</td>
<td>Ted Pavlic</td>
</tr>
<tr>
<td>Doug Montgomery</td>
<td>Giulia Pedrielli</td>
</tr>
<tr>
<td>Rong Pan</td>
<td>George Runger</td>
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Methods developed in Ben Amor's lab allow robot assistants to anticipate the actions of human co-workers and help whenever needed. Photo provided by ASU's Interactive Robotics Lab.
Exploring new frontiers in human-robot collaborations

Imagine an assembly robot that collaborates with a human to assemble a piece of IKEA furniture. The robot would need to analyze the movements of the human to avoid potentially hazardous collisions.

Heni Ben Amor is trying to help robots better understand and respond to human behavior — for example, an assembly robot may learn that it must hand over a screwdriver whenever a human is stretching out an arm.

Ben Amor, an assistant professor of computer science and engineering, is working to make advances in human-robot collaboration and on identifying the importance of such collaborations.

“I develop new methods that allow a robot to work in close proximity with human partners,” he said. “To ensure safe interaction, autonomous robots need to include movements and actions of human partners into their decision-making process.”

There is a widespread misconception that robots will replace humans in all workplaces, Ben Amor said. While it is true that robots can perform mundane, repetitive tasks better than humans, there are still many tasks at which humans are way better than robots.

He believes in a combination of robotic strength and speed on one side, and human decision-making, creativity and dexterity on the other side of a symbiotic relationship between robot and human.

“A fascinating aspect of working with robots is discovering how challenging even presumably simple tasks can be for a machine,” he said. “For humans, opening a fridge is not a particularly difficult thing to do. For robots however, this can be a daunting challenge.”

Even after having a human program all the steps involved, “it may actually take the robot more than five minutes to accomplish the task. It is therefore very inspiring to see how nature managed to find very elegant and versatile solutions to similarly difficult problems,” Ben Amor said.

“I am particularly intrigued by learning capabilities of biological systems,” he said. “Humans and animals often learn to adapt and change their behavior whenever faced with a new challenge.”

Human-robot collaboration has become an important aspect of many applications of robotic technologies, such as in the automotive industry.

There is a strong interest in bringing human and robot capabilities together. For many tasks, human skills remain important, but other tasks could best be accomplished by the strength and agility of robots. Deploying robots to help humans in physically demanding tasks could, for instance, lead to a significant reduction in work-related injuries.

Ben Amor is intrigued by machine learning involving robots. He wants to find out if robots can learn how to solve tasks on their own, by employing a human-like trial-and-error strategy to acquire new motor skills or imitating observed human behaviors and learning to program themselves based on what they observe.

“One idea that I am particularly fascinated by is a robot that reads a manual to learn to program itself,” he said.

He expands on the idea of robot assembling IKEA furniture. All of the pieces of furniture come with a manual that is originally intended for humans. He hopes that in the future a robot could scan the manuals and extract the knowledge it needs to program itself to do the assembly.

“I think for the acceptance of robots in many application domains it is important to reduce the programming effort that is currently involved,” he said. “Robot learning can help eliminate this effort and thereby enable even laymen to train or program a new robot.”

One area Ben Amor is looking to investigate further is bi-manual grasping and manipulation by robots. Typically, robotic technologies employed in manufacturing operations use only one arm to perform various tasks. He wants to develop methods that give robots increased dexterity so they can match the ability of humans in using two hands and arms.
Bringing disparate data together with new computing theories and tools

Current computing models that look at data to predict a process’s desired output are able to accurately analyze one form of heterogeneous or variable data, but applications today collect data that spans multiple types of heterogeneity. The existing models can no longer keep up.

Assistant Professor Jingrui He is looking to create new algorithms and theories that will address this challenge. He’s research will take three forms. First is to create a suite of effective and efficient algorithms for modeling the interaction of multiple types of heterogeneity. Second is to theoretically characterize the model’s performance and how it is affected by the interaction of multiple types of heterogeneity. And third is to systematically evaluate the algorithms and theories on real applications.

ASU’s TweetTracker helps make sense of social media

TweetTracker, a web-based system built at the Data Mining and Machine Learning Lab led by Director and computer science Professor Huan Liu, collects and visualizes social media data. It allows users to track events as they happen in order to understand which geographic regions are talking about each topic and who the top users are in the context of the event, among other properties.

The app arose out of a grant from the Office of Naval Research, and can help the military, government agencies and first responders understand what is unfolding on the ground during crises and what resources are needed to help increase the number of people that are given relief.

Ants marching to a better future for human sustainability

Ted Pavlic studies decision-making strategies for autonomous agents like robots, and looks to ants for inspiration. Ant colonies have been found to make coordinated decisions that increase the efficiency of a task. However, unlike current engineering solutions, decisions are executed in a decentralized way with very little communication. Having a mathematical framework to pinpoint what makes this natural decentralized implicit coordination possible can give insight on how to improve artificial decision-making systems.

Pavlic plans to illuminate how behavioral analysis can be used in the design of sustainable, resilient automation systems across a wide range of applications. This will help to grow the field of operations research to better address the needs of high-performance multi-agent robotic systems as well as decentralized algorithms for the sustainable built environment.
Data management and information assurance

While networks connect entities, it is the data transmitted across those networks that empowers objects and enriches life. With data being produced at high volume, variety and velocity, authentication, storage, processing and retrieval become key challenges. Knowing what, where, how and how long to store and index data for later use are major challenges. The secure and efficient functioning of this aspect of cyberinfrastructure is critical to supporting the needs of our modern information society.

Specialty areas

Database Management and Information Retrieval

Query processing and extracting desired information from large, heterogeneous databases represents a major challenge being addressed by our researchers. Designing platform and protocol solutions for data services and semantic web for structured and unstructured data are foci of this group’s activities.

Srividya Bansal
Chitta Baral
Selçuk Candan
Hasan Davulcu

Information Assurance and Security

As a certified National Center for Academic Excellence, the Information Assurance Center forms a focal point for research and education in information assurance and security. Ensuring privacy and protection from attack for personal mobile devices and corporate servers are challenges being addressed as well as developing schemes for supporting emerging technologies such as cloud computing.

Gail-Joon Ahn
Rida Bazzi
Partha Dasgupta
Adam Doupé
Dijiang Huang
Guoliang Xue
Stephen Yau
Nong Ye

Multimedia

Data comes in many forms with intended use for many purposes in many environments. Virtualization must accommodate text, video, audio, tactile and eventually taste, smell and emotional response for high fidelity representation of the real-world experience. Models for integrating multimedia for enhanced educational experiences and new data fusion tools to aid physically-impaired individuals are being developed.

Selçuk Candan
Baoxin Li
Sethuraman Panchanathan

Faculty contacts

Subbarao Kambhampati
Mohamed Sarwat
Ming Zhao
Mohamed Sarwat designs experimental data management systems at his Data Systems (DataSys) Lab that bridge the gap between the data systems community and other scientific and business domains.
Cybersecurity expert recognized among world’s top computing professionals

Fifteen years of research in cybersecurity and keeping the world’s data safe has earned Gail-Joon Ahn a special designation among leading members of the computing field.

Ahn, a Fulton Entrepreneurial Professor and director of the Global Security Initiative’s Center for Cybersecurity and Digital Forensics, was named a Distinguished Scientist by the Association for Computing Machinery (ACM), the world’s leading association of computing professionals.

Ahn is one of 49 distinguished members selected in 2015 for significant accomplishments or impact within the computing field. The recognition aims to highlight how the work of these innovators is changing the world.

“Ahn’s early work, focused on access control models and mechanisms, is the core of modern security systems,” said Ziming Zhao, an assistant research professor and one of Ahn’s former students. “His work has significantly advanced our understanding of role-based access control (RBAC) models and mechanisms, which are used by the majority of public organizations and private enterprises.”

Ahn is known as an expert in security analytics and big-data-driven security intelligence. Ahn’s research is imperative as society becomes increasingly mobile and cyber-dependent. This has been the inspiration and thrust behind his research in addressing critical cybersecurity challenges.

“The notion of identity is the most important component of the current computing age,” said Ahn, who has earned six U.S. patents for his research in user-centric identity management.

When users interact with internet services, such as video conferencing, e-commerce and web-based applications, the services are often tailored for their personal use. Ahn has invented a technology that allows users to better manage their online identities by controlling what information is stored, the content of that information, and who is allowed to view the information.

Ahn’s contribution is extremely important in the context of user privacy. His contributions enable more secure transactions and mobile payments and allow more autonomy in an individual’s privacy control. They also have the potential to dramatically reduce identity theft.

The import of his research can be seen in the names of his financial supporters: the National Science Foundation, National Security Agency, Department of Defense, Office of Naval Research, Army Research Office, Department of Justice, Department of Energy, Bank of America, Google and Microsoft.

He has attracted funding in excess of $3.4 million since joining ASU in 2008, and has authored more than 150 refereed research papers.

Ahn is currently helping to lead ASU’s contributions to a $28.1 million national research program funded by the U.S. Department of Energy to develop cybersecurity tools and standards to protect the country’s electricity infrastructure from attacks. The University of Illinois is leading the program, called the Cyber Resilient Energy Delivery Consortium (CREDC).

As director of the Center for Cybersecurity and Digital Forensics, Ahn will continue to fully leverage ASU’s capabilities in cybersecurity.

Zhao complimented his doctoral mentor’s teaching style saying, “Ahn supports his students to pursue their own research interests instead of assigning them to work for him. As a leading researcher who has developed models, algorithms and systems for solving real-world security problems, he guides his students to tackle the most urgent problems in their areas of interest.”

“I aim to continuously focus on three major activities: education, research and innovation,” said Ahn. “By focusing on these areas, Ahn said he intends to play a role in producing an outstanding workforce in the area of national security, tackling short-term and long-term security challenges, and significantly contributing to economic growth in Arizona and the U.S. by transferring innovative and patented technologies to the marketplace.”

His career has been characterized by recognition including earning the Department of Energy’s prestigious Early Career Principal Investigator Award in 2003 for achievements as a junior faculty member, the Educator of the Year Award from the Federal Information Systems Security Educators’ Association in 2005 and becoming an Institute of Electrical and Electronics Engineers (IEEE) Senior in 2007.
ASU cybersecurity center to proactively look at protecting data

Our military, governments, hospitals and financial institutions handle massive amounts of sensitive data that is often shared across networks, which makes it vulnerable to cyber attacks. The Global Security Initiative at ASU has launched the Center for Cybersecurity and Digital Forensics that will collaborate with other universities, government agencies and industry partners to advance cybersecurity and digital forensics research.

The center, led by Gail-Joon Ahn, will focus on three pillars — education, research and innovation — to help produce an outstanding workforce in the area of national security; tackle short-term and long-term security challenges via top-notch research expertise and activities; and significantly contribute to economic growth in Arizona and the U.S. by transferring innovative and patented technologies to the marketplace.

(From left) Todd Hardy, senior economic development adviser, Office of Knowledge Enterprise Development; Stephen Yau, professor, School of Computing, Informatics and Decision Systems Engineering, who set up several information assurance programs in computer science; Sethuraman “Panch” Panchanathan, senior vice president for Knowledge Enterprise Development; Gail-Joon Ahn, director of Cybersecurity and Digital Forensics; Jamie Winterton, director of strategic research initiatives at Global Security Initiative, who leads cybersecurity strategy for the initiative; and Nadya Bliss, director of Global Security Initiative. Photo courtesy of ASU News.

NSF I/UCRC planning grant received to create Center for Assured and SCAlable Data Engineering

Computer science and engineering Professors Selçuk Candan, Hasan Davulcu and Gail-Joon Ahn are leading a group of researchers awarded a planning grant from the National Science Foundation for the creation of an Industry/University Cooperative Research Center for Assured and SCAlable Data Engineering, a collaborative effort with the University of Maryland, College Park.

CASCADE’s mission is to enable a fundamental shift from ad hoc approaches of data technology design to a principled framework for the engineering of data systems that support reliable and timely data-driven decision making.

The CASCADE ecosystem includes a Research Center that aims to tackle key data challenges through interdisciplinary and fundamental research and a Data Services Center that will provide data services to a wide spectrum of partners in industry and academia.
Network science and systems

Networks permeate modern life. Open and virtual private networks support electronic data interchange within and between commercial enterprises. Wireless mobile networks enrich our personal lives by keeping us in contact with our friends and family. Sensor networks protect the homeland and enable scientific exploration.

Specialty areas

Cloud and Distributed Computing
Maximizing the effective use of dispersed idle computing cycles while ensuring information reliability and security poses a major challenge being addressed by researchers. At the same time, growing calls for sustainable energy use dictate the need for careful design and management of large data centers and new strategies to support service oriented architectures. Problem complexity and federations require coordination of distributed processors. Software-defined network management provides new flexibility and opportunity. Along with these computing trends, the growing use of multimedia data presents the need for new data structures, application programming interfaces, and encoding rules.

Computer Design and Architecture
Architectural design and parallelism issues are paramount in preparing for multithread and multicore processors. The integration of power management and heat dissipation issues into architectural design plays a paramount role in on-going research. Next generation technologies that can sustain computational advances beyond CMOS are also being developed.

Cyber Physical and Embedded Systems
Most modern devices from automobiles to smart phones are defined by their integrated hardware/software systems for sensing, computing, controlling, and communicating. Designing the network of interacting cyber-physical entities for efficiency, reliability, autonomy, sustainability and functionality is an on-going challenge being addressed by the group as well as embedded systems issues such as partitioning functions between hardware and software for maximizing performance with minimal power and cost. The Center for Embedded Systems forms the core of this research and provides numerous opportunities for industrial collaboration as well as addressing fundamental challenges.

Network Algorithms
Research spans problems in wireless, wireline, optical and transportation networks encompassing a broad range of problems from the design of resilient network architectures to operational routing to ensuring connectedness in mobile ad hoc networks. Location services, access control and scheduling, self-stabilizing protocols, coverage and connectivity, multipath and QoS routing and congestion modeling are among areas of active interest by the research group.

Social Computing
Social computing research seeks to understand social behavior and context based on computational systems. By integrating social, physical, psychological and governmental mechanisms with artificial intelligence knowledge representation and learning, this multidisciplinary collaboration develops novel theories, behavior models and pattern mining tools to predict and connect the actions and interactions of individuals, groups, communities and nation-states. The results have important applications for commercial sponsors, social scientists and security agencies alike.

Faculty contacts

Selçuk Candan
Partha Dasgupta
Sandeep Gupta
Dijiang Huang
Andrea Richa
Hessam Sarjoughian
Stephen Yau
Ming Zhao
Aviral Shrivastava
Sarma Vrudhula
Carole-Jean Wu
Giorgios Fainekos
Sandeep Gupta
Yann-Hang Lee
Pitu Mirchandani
Ted Pavlic
Georgios Fainekos
Giulia Pedrielli
Fengbo Ren
Aviral Shrivastava
Carole-Jean Wu
Sandeep Gupta
Pitu Mirchandani
Andrea Richa
Jorge Sefair
Arunabha Sen
Violet Syrotiuk
Guoliang Xue
Gail-Joon Ahn
Hasan Davulcu
Huan Liu
Ted Pavlic
Paulo Shakarian
Guoliang Xue
Protecting the nation’s energy delivery systems from cyber attacks

Gail-Joon Ahn, Fulton Entrepreneurial Professor of computing, informatics and decision systems engineering and director of the Global Security Initiative’s Center for Cybersecurity and Digital Forensics

Gail-Joon Ahn and Anna Scaglione, professor of electrical, computer and energy engineering, will lead ASU’s effort in the $28.1 million national research program, called the Cyber Resilient Energy Delivery Consortium, to develop cybersecurity tools and standards to protect the country’s electricity infrastructure from attacks.

The University of Illinois-led program will work with 11 other universities and national laboratories to undertake research, development, education, and outreach activities — with intense industry engagement — to develop solutions. The CREDC model explicitly creates a pipeline that generates research results and takes them through to evaluation and deployment of prototypes in industrial settings, with a handoff to the energy sector through licensing, startups and open-source mechanisms.

Sandeep Gupta leads the IMPACT Lab, a mobile computing lab that develops protocols and middleware for pervasive and mobile computing applications in addition to sensor and network optimization and security.
Robotic autonomous cars teach cyber-physical system design

Today’s computing systems are increasingly intertwined between software, electronics and mechanical components. Engineering students need a hands-on, comprehensive approach to understand how these parts interact.

Computer science and engineering Associate Professor Aviral Shrivastava noticed that the required embedded systems course CSE 325: Embedded Microprocessor Systems he teaches didn’t prepare students to work with the more complex cyber-physical systems they’ll encounter in industry.

“Cyber-physical systems are systems that have both a computing aspect and a physical or real-world aspect,” Shrivastava said. “In cyber-physical systems you need to understand the physical aspects to be able to design the system correctly.”

Autonomous cars are one high-profile example of a cyber-physical system that includes many of the embedded system concepts computer systems engineering students need to learn, and they represent an exciting and growing industry.

Scale them down to a semester-length project, and students in Shrivastava’s class get hands-on experience building a complex system through a robotic toy car they learn to build from scratch.

Shrivastava course now holistically teaches three critical parts to design a cyber-physical system: parts of the system; processing and communication; and feedback control.

First, students learn how batteries, sensors and motors work within a system. Next, students learn about processors, protocols and programming similar to the original course that solely focused on computing. And last, students learn the systematic and continuous approach to getting a system to behave how they want.

It was a challenging series of projects as students had to learn how to deal with finicky sensors and inconsistent outdoor and real-world situations. But dealing with the new and unpredictable will be key to their success as systems engineers after college.

“The robotics industry, which spans from Nest Labs and iRobot to Google, Tesla Motors and SpaceX, is looking for engineers that have experience in designing complete, complex robotics systems,” Shrivastava said. “They’re looking for engineers who can write software for systems that have imperfect sensors, inaccurate motors, and so on — that’s how real systems are!”

Students in computer systems engineering class Embedded Microprocessor Systems test their self-navigating cars in the first of four demonstrations. The class was redesigned this semester by Associate Professor Aviral Shrivastava to teach the complexity of modern embedded systems through robotic model cars.

Teams line up for the final project of the semester — a race to earn some extra credit. Students competed at Old Main lawn in five heats of three teams, avoiding obstacles and navigating to a destination. Teams who reached the destination without hitting anything reached the finals, where the fastest car won.

Students get the car chassis, batteries, wires, Arduino Mega microcontroller board, drive and steering motors, and sensors — an inertial measurement unit (IMU), global positioning system (GPS) and Light Detection and Ranging (LIDAR) unit — learn how the components work and interact with each other, put them together and program them in stages to add increasingly complex capabilities.

Teams line up for the final project of the semester — a race to earn some extra credit. Students competed at Old Main lawn in five heats of three teams, avoiding obstacles and navigating to a destination. Teams who reached the destination without hitting anything reached the finals, where the fastest car won.
In the second demonstration, students had to use GPS and a magnetometer to get their cars to navigate themselves to a given destination.

Students often needed to make adjustments on the fly to address design and software problems.

The third demonstration project added a LIDAR sensor to the car and with it the ability for obstacle avoidance.

A self-navigating car from CSE 325: Embedded Microprocessor Systems.

The redesigned CSE 325 course is related to the teaching outcomes of Shrivastava’s National Science Foundation (NSF) project, “Scaling the Real-Time Capabilities of Power-train Controller of Automotive Systems.”

“Even though the regular performance of processors is improving, real-time performance — how many real-time tasks can be executed simultaneously — is not,” Shrivastava said. “The reason is that real-time performance of a processor depends on the worst-case execution time. If the worst case execution time of tasks does not reduce, then the real-time capability of a processor does not improve.”

This is especially important in safety-critical systems where a task cannot ever miss a deadline because it would have disastrous consequences, such as in car software that controls braking.

“For my NSF project I propose new processor designs and ways to write software so that their real-time performance can be improved in safety-critical robotic systems,” Shrivastava said.

Traditionally, improving performance of processors and improving the performance of robotics were two separate topics. This project brings both of them together in an end-to-end solution — where improvement in performance of processors translates into improved performance of robots.

Teaching real-time performance is a critical metric to improve safety-critical robotic systems, and with Shrivastava’s input into this course based on his NSF award project research, students are now closer to being able to design the next generation of computing and robotic systems. They can see how the mechanical, electrical and computing parts come together to make a complete working system.
Software and systems engineering

Software instantiates our intentions and controls modern devices. New computing paradigms and the growing complexity of many systems dictate the need for ongoing development of flexible, reliable and usable tools and development practices. Those new software tools and practices are then applied to applications that integrate computational theory, data and networks. Within CIDSE major efforts are advancing healthcare delivery, personalized learning, logistics and enterprise information systems.

Specialty areas

Enterprise Systems
Collaborative design and decision making in an environment with dynamically evolving and distributed collaborators and competitors motivates the development of new tools and information sharing protocols being developed by the faculty. Methods for evaluating and improving systems engineering tools are also being developed.

Health Informatics
CIDSE faculty is actively engaged in the development and application of data mining tools for diagnosing disease incidence from health records. Designing patient and work flow processes to improve system efficiency are also active initiatives. An additional thrust focuses on utilizing ubiquitous and pervasive computing to increase functionality and independence of physically challenged individuals.

Personalized Learning and Educational Games
With a basic goal of understanding how we learn and a secondary goal of improving the attractiveness and effectiveness of STEM education, CIDSE faculty are developing intelligent virtual tutors and games that customize learning to the individual.

Production Logistics
Operations engineering of enterprises with an emphasis on the movement of people, information and goods constitutes a major application area for operational analysis and systems modeling. Faculty research develops algorithms to efficiently produce products to meet demand and ensure safe, efficient transport of goods.

Software Engineering
Improving the software development process and ensuring software reliability are on-going challenges addressed by CIDSE. Research is ensuring effective functionality for middleware and application systems through requirements definition and improved development processes and education.

Faculty contacts

Enterprise Systems
- Dan Shunk
- Teresa Wu

Health Informatics
- Kevin Gary
- Esma Gel
- Baoxin Li
- Jing Li
- Sethuraman Panchanathan
- George Runger
- Yalin Wang
- Teresa Wu
- Nong Ye

Personalized Learning and Educational Games
- Ashish Amresh
- Robert Atkinson
- Sharon Hsiao
- Brian Nelson
- Kurt VanLehn
- Erin Walker

Production Logistics
- Ron Askim
- Esma Gel
- Feng Ju
- Pitu Mirchandani
- Giulia Pedrielli
- Rene Villalobos

Software Engineering
- Srividya Bansal
- James Collofello
- Ashraf Gaffar
- Kevin Gary
- Timothy Lindquist
- Stephen Yau
Team chemistry is key ingredient in formula for research success

The increasing complexity of the technological solutions that scientists and engineers are chasing today makes it clear that progress demands teamwork as well as talent.

Associate Professor Robert Atkinson holds a joint appointment in the Fulton Schools and the Division of Educational Leadership and Innovation in the Mary Lou Fulton Teacher’s College. He said his success as a researcher wouldn't be possible without interdisciplinary collaboration; in his lab he works with research partners and graduate students in industrial engineering, social sciences, education, computer software development and learning technologies to develop more effective methods of teaching and learning.

His expertise stretches across cognitive science, computer science, informatics, human-computer interaction and educational technology. Research in his field could yield better methods for productive collaboration.
Yalin Wang is developing modern geometry-based computation algorithms to understand human brain structures.
Unlocking the mystery of the human brain with modern geometry-based imaging computation

According to the Alzheimer's Association, the number of people age 65 and older with Alzheimer's disease may nearly triple, from 5.1 million to a projected 13.8 million by 2050, barring the development of medical breakthroughs to prevent or cure the disease.

Working with world-class neurologists, physicians and psychologists, Yalin Wang, an assistant professor of computer science and engineering, is developing modern geometry-based software to analyze brain imaging to find the specific brain morphometry change patterns which may discriminate between Alzheimer's disease development and normal aging. This work may help provide computational software to monitor and understand the structural changes related to Alzheimer's disease.

"Our work is mainly with brain morphometry study," said Wang. "As a noninvasive diagnostic method, imaging plays more and more important roles in neuroscience research. A good resolution magnetic resonance imaging (MRI) image provides detailed information on brain development and neurodegenerative disease progress. Instead of checking each individual image frame, my work builds detailed 3D brain surface and volumetric representation so that a global view and analysis of brain structure becomes possible."

Wang's work is deeply rooted in mathematics. During his postdoc period, he worked with several first-class mathematicians, including Shing-Tung Yau, a Fields Medal recipient, and Tony F. Chan, a member of the National Academy of Engineering.

"Aided by modern geometry research, my colleagues and I made solid progress to develop robust and efficient computation solutions on brain morphology study," said Wang. "It, in turn, will expedite drug development to treat neurodegenerative diseases, such as Alzheimer's disease, or help prevent some neural impairment. For example, our research on preterm babies could help predict neurodevelopmental outcomes, thus enabling the design of early intervention treatments — before years of pathological brain development and symptoms occur."

Wang's research on the brain goes beyond Alzheimer's. He is working to apply geometry computation to understand human low-level visual functions — in particular, on how a map in one's retina is mapped to the brain occipital cortex. His work aims to discover the underlying biological structures by imaging and computation. This fundamental research will play an important role in some psychology research projects, such as visual or schizophrenia-related research. Wang also aims to quantify brain white matter integrity by analyzing diffusion MRI images. The geometry-based software will provide a detailed and unprecedented map of the brain white matter structure, which could help prevent Alzheimer's disease as well as analyze the genetic effects on human brain structure.

His research is supported by six research grants from the National Science Foundation, National Institutes of Health and Arizona Alzheimer's Consortium. He has published 45 journal papers, three book chapters and hundreds of conference papers and abstracts on his work.

"I want to make computers have more intelligence to help improve our quality of living," said Wang. "The geometry research opens many new doors to solve brand new questions with computers. I think it is something that really motivates me to pursue such research every day."

The methods developed by Wang and his colleagues can be applied to computer graphics, animation and geometric modeling. As an example, Wang is teaching two computer graphics classes.

"Our methods can compute surface conformal parameterizations on general surfaces, which helps many geometric modeling problems," Wang said. "For example, our work can help process geometric structures, 3D printing and add textures to the products of the 3D animation and computer gaming industries."

In Wang's work, human cerebral cortex is modeled by a cortical surface. By considering to put some common gyri and sulci as boundary conditions, the cortical shape difference is further measured by computing the Wasserstein distance on the hyperbolic space. Images provided by Yalin Wang.
Distinguished Scientist, Association for Computing Machinery (ACM)
Gail-Joon Ahn

National Science Foundation Faculty Early Career Development Award (or NSF CAREER Award)
Jingrui He

Ten Year Highest Impact Paper Award, IEEE ICDM (International Conference on Data Mining) 2015
Hanghang Tong

2016 Fulton Entrepreneurial Professor
Paulo Shakarian

2016 Distinguished Alumni for Excellence in Academia from Lehigh University
Ron Askin

Best app-based game and Overall Second Prize for Weather Trouble, European Game-based Learning Conference
Brian Nelson

Best Research Paper Award at the 16th IEEE International Conference on Mobile Data Management 2015
Mohamed Sarwat

CIDSE Night 2016

Emeritus Faculty Award (Posthumous)
Gerald Farin

2015-2016 A. Alan B. Pritsker Outstanding Industrial Engineering Teacher Award
Linda Chattin

2016 Engineering Best Teacher Awards (Top 5%)
Adam Doupé
Dijiang Huang
Karthik Kumar
Yann-Hang Lee
Ryan Meuth
Phillip Miller
Erin Walker

2015-2016 Best Researcher Senior Faculty
Kurt VanLehn

2015-2016 Best Researcher Junior Faculty
Ross Maciejewski
The Fulton Exemplar Faculty program recognizes tenured and tenure-track faculty distinguished by the unique combination of having high research productivity, instructional load, student evaluations and doctoral student mentoring. In 2016, three CIDSE faculty were chosen:

Fulton Exemplar Faculty

Gail-Joon Ahn

Professor Gail-Joon Ahn’s research in security architecture, cyber crime analysis and vulnerability and risk management is making advancements to keep our increasingly connected world secure. Ahn is currently helping to lead ASU’s contributions to a Department of Energy $28.1 million national research program, the Cyber Resilient Energy Delivery Consortium, to develop cybersecurity tools and standards to protect the country’s electricity infrastructure from attacks.

Ahn was named an Association for Computing Machinery Distinguished Scientist, a special designation among the leaders of the computing field, and serves on the editorial boards of several prominent publications.

He is also director of the Global Security Initiative’s Center for Cybersecurity and Digital Forensics and a Fulton Entrepreneurial Professor.
Fulton Exemplar Faculty

Huan Liu

Professor Huan Liu’s research focuses on machine learning, artificial intelligence, data mining and social computing. He investigates interdisciplinary problems that arise in the world’s data-intensive applications such as social media. His Data Mining and Machine Learning lab recently developed TweetTracker, a data visualization tool that allows people to track, analyze and understand social media activity funded by the Office of Naval Research. The project earned him an ASU President’s Award for Innovation in 2014.

He is an IEEE Fellow and an ACM Distinguished Scientist as well as a member of several leading industry groups. Liu serves on several editorial and advisory boards, including ACM Transactions on Intelligent Systems and Technology and the Social Network Analysis and Mining Journal.
Fulton Exemplar Faculty

Teresa Wu

Professor Teresa Wu’s research in health information systems, imaging informatics and distributed decision support is advancing the quality of medical imaging and decision making. She is actively involved in health informatics research with industry partners Mayo Clinic and Banner Alzheimer Institute as well as prominent academic research institutions. Wu leads the Collaborative Decision and Informatics Lab, which develops methodologies to assist in medical decision making, and the ASU-Mayo Clinic Imaging Informatics Laboratory, which aims to improve patient care through data analysis and management. She also serves as associate professor of radiology at the Mayo Clinic’s College of Medicine.

Wu received a National Science Foundation CAREER Award in 2003 and her research has been sponsored by the NSF, Department of Defense, National Institutes of Health and industry players including Intel and IBM.
2016 Fulton Entrepreneurial Professor

Paulo Shakarian

Assistant Professor Paulo Shakarian’s expertise in artificial intelligence, social network analysis and cybersecurity has earned him recognition in the cybersecurity field and beyond. He has received the AFOSR Young Investigator Award, DoD Minerva Award, and the DARPA Service Chiefs’ Fellowship. His research has been featured in Popular Science, The Economist, MIT Technology Review and other popular media, and he has authored several books, including Elsevier’s Introduction to Cyber-Warfare.

Shakarian is CEO of IntelliSpyre is a cyber security startup focused on identifying cyber threats in their earliest stages.

Shakarian direc ts the Cyber-Socio Intelligent Systems Laboratory works to create intelligent systems that have a significant impact on addressing the real-world challenges of cybersecurity, social network mining, security informatics and artificial intelligence.
Mirchandani named INFORMS fellow for pioneering advances in network traffic control

Pitu Mirchandani, an industrial engineering and operations research professor, was named one of eight fellows in the Institute for Operations Research and the Management Sciences (INFORMS) in 2015.

He was elected for fundamental research contributions to dynamic and stochastic (randomly determined) networks, location models, adaptive control of transportation systems, and traffic modeling and analysis.

In all of his research areas, Mirchandani’s basic goal is to provide appropriate solutions to managing complex systems, enabling decision-makers to make quick planning and operational decisions under conditions with uncertainties and random variations.

Mirchandani is a pioneer in this area, particularly in incorporating advanced modeling and information technologies into transportation and logistics operations.

This involves using computational technologies to inform and guide decision-making in areas such as transportation and power systems, water distribution systems, urban infrastructure planning and development, and healthcare.

In the field of transportation, Mirchandani is known for the development and implementation of the Real-time Hierarchical Optimizing Distributed Effective System (RHODES), which is a self-learning traffic signal control system that observes approaching traffic at intersections using sensors and sets traffic signals in real-time to minimize delays for drivers and the energy consumption of their vehicles.

“This system observes vehicles that are coming and gives the right amount of green light to those directions with the most need,” said Mirchandani.

He is also currently developing MIDAS, a cyber-physical system for better managing complex urban traffic that uses smartphones, image-based sensors and a cloud computing platform.

Mirchandani plans to tackle at least one more big challenge before even thinking of retirement: operations research related to automated vehicles.

Should we have special streets for robot-controlled vehicles? Should they travel together in groups somewhat like train cars in a railway system? Should traffic lights favor these vehicles because they’re more predictable?

“These types of questions have not been worked out yet — and they are ideal for professionals in operations research,” he said.
Vrudhula named IEEE Fellow for advances in energy efficiency

We live in an energy constrained world, as is evident in the metrics by which we measure desirable digital products. “How long can this mobile device last on a single battery charge?” is a common question for consumers, and battery life is one of the biggest selling points for electronic devices.

A career dedicated to improving the energy efficiency of digital devices has resulted in Sarma Vrudhula’s elevation to a fellow in the Institute of Electrical and Electronics Engineers, one of the world’s most prominent professional organizations.

Fellow is a distinction reserved for the most prestigious IEEE members and is conferred by the Board of Directors upon engineers with an extraordinary record of accomplishments in their field. Less than one-tenth of one percent earn new fellow status each year.

Vrudhula, a computer science and engineering professor, was selected for his contributions to low power and energy efficient design of digital circuits and systems.

Vrudhula’s contributions focus on saving energy without sacrificing performance in digital electronic systems.

To improve efficiency without sacrificing high-level performance, Vrudhula has generated improvements that span hardware and software design, including reducing energy waste in chip transistors during idle periods and more dynamic control over the heat generated by multi-core processors.

Recently, he has been researching alternative ways of computing logic functions that have been computed the same way for more than 50 years. He is also taking what he calls a “radically different approach” to designing new circuit architectures capable of performing these energy efficient logic functions.

The results have been extraordinary: power reductions of up to 30 percent without sacrificing performance. Even more surprising is the fact that this approach has led to smaller chip sizes.

“Our discoveries have been unheard of. Using conventional logic, you always trade savings in power for a loss in performance. And this achievement never comes with a size reduction as well,” said Vrudhula.
Fulton Schools continue to lead in online engineering education

More than 3,500 Fulton Schools students are pursuing online degrees from more than a dozen online master’s degree programs and eight online bachelor’s programs, including the first four-year, completely online engineering management program.

These online engineering graduate programs jumped from a ranking of 14 to 12 out of more than 80 other online programs listed in U.S. News & World Report’s 2016 rankings.

This continual advancement in rankings is testament to Fulton Schools’ commitment to quality online education, said Jeff Goss, Fulton Schools assistant dean and executive director of Global Outreach and Extended Education (GOEE), which oversees online engineering education.

“Online education at ASU has been so successful due to not only the quality of our online courses, but the lack of separation between the online and on-campus programs,” said Goss. “The programs are identical, from the instructors teaching them to the actual coursework and exams, the only difference is the delivery method.”

Professor of Practice Dan McCarville first saw the potential to effectively leverage technology for remote education when he helped launch the online engineering management bachelor of science in engineering in 2012. This program was the Fulton Schools’ first fully online B.S.E. and possibly the first of its kind in the nation.

“We knew a boom in online education was coming,” said McCarville. “That was clear. The question was, do we want to lead, or do we want to follow?”

The availability of the program online instantly drew students who would otherwise have difficulty pursuing higher education in a traditional, brick-and-mortar sense.

“Many students in our program are active military,” said McCarville. “This program and other online programs cater to those students. For instance, if you’re a Naval officer sailing around the world half the year, your program needs to be available online.”

The online engineering management program saw its first two fully online students graduate in May 2015, with more following in the fall. Six more students are on track to graduate in spring 2016.

While bolstering the programs available and improving technology to deliver a top-notch distance learning experience serve to improve online engineering education as whole, GOEE director Octavio Heredia noted that Fulton Schools has broader aims to pursue with these programs.

“Much of our graduate-level online education is intended to help develop the best possible workforce for industry,” said Heredia, “but we also want to simply support lifelong learning.”

Engineers around the world benefit from online master’s program

The first cohort of students recently earned their master’s of engineering through an online, custom-designed course at ASU.

The Fulton Schools, through the office of Global Outreach and Extended Education, designed the program in conjunction with Intel Corp. to meet the needs of industry and working professionals. As Intel has expanded across the globe, so has the need to provide its employees with a graduate-level education.

The program, which includes courses from across the six Fulton Schools, was designed to allow engineers working around the world to earn their graduate degrees while remaining in their home country and working full time.

“We take pride in the fact that we not only collaborated with Intel in developing these courses, we also offer them together by engaging Intel content experts, who are in tune with this fast-paced technology, every time we offer the courses,” said Amaneh Tasooji, an associate research professor. Tasooji works with Intel to identify the real-world applications of the course materials.

A statistician working for Intel in Shanghai, China, Amanda Zhang has a background in industrial engineering, but was able to broaden her areas of expertise with this program.

Zhang said she’d taken single courses online before, but never an entire degree. Regardless, she found the program to be just as immediate and engaging as an in-person class. For instance, despite being thousands of miles away, Zhang always received timely responses to questions. Studying and interacting with professors and fellow students through video conferencing made it seem like any other class.

Noel M. Kiat, a process and equipment engineer at Intel Products Vietnam, said the best part of the program was learning under ASU’s esteemed industrial engineering faculty, such as Professor Ronald Askin and Professor Dan Shunk.

“Studying online offers an opportunity to professionals like me to get the best education U.S. universities like ASU can offer without leaving my country,” Kiat said.

Kiat also praised the flexibility of the online program, which allowed him to control the pace of his studies while balancing his professional commitments simultaneously.
Master Black Belt studies provide building blocks for advanced management skills

Students in the highly interactive, hybrid-format Master Black Belt program run by the office of Global Outreach and Extended Education undergo five days of intensive classroom studies on ASU’s Tempe campus and three months of open access to five graduate-level online courses. These studies prepare them to produce a “white paper” that allows students to apply what they are learning in the program while also providing their employers with a high-quality and well-vetted strategic plan.

Six Sigma programs focus on teaching systematic approaches to improving a broad range of processes that apply to a variety of business operations and industries.

The program is typically drawing 12 to 15 students per session — including a fair percentage from throughout the United States and some from elsewhere, particularly Europe and Asia. The diversity of the students is proving to be an attraction.

“You get valuable opportunities to learn with and from people from a variety of backgrounds and professions. There are engineers, business managers and consultants, and small-business owners,” said Douglas Montgomery, the lead faculty member for the Master Black Belt program and an ASU Regents’ Professor.

The core strength of the program, however, is the quality and experience of the faculty, said Karl Theisen, associate director for professional and executive programs for GOEE.

“You are being taught by faculty who not only understand the theory behind the material they are teaching, but understand the real-world applications of that theory,” Theisen said. “They have conducted extensive research in their areas of expertise and put it into practice in their work as industry consultants.”

Montgomery is widely recognized as a pioneer and international leader in contemporary industrial statistics, quality engineering and operations research.

Dan Shunk, a professor of industrial engineering and faculty member for the Master Black Belt program, is an expert in supply network integration and an experienced extended education teacher and management training instructor.

Daniel McCarville is chair of the engineering management program and a professor of practice who brings 27 years of industry experience to the Master Black Belt programs. Before coming to ASU, he led teams through the development and implementations of large-scale quality systems and complex manufacturing processes.
In leadership role with conference group, professor seeks to improve IEEE events

Computer science and engineering Professor Guoliang Xue has been elected vice president of conferences for the Communications Society of the Institute of Electrical and Electronics Engineers.

IEEE is the world's largest professional association focused on advancing technological innovation, with more than 400,000 members from about 160 countries.

The Communications Society is the second largest society within IEEE, with about 50,000 members. It sponsors about 60 conferences and meetings each year around the world that spotlight cutting-edge research in communications and information technologies.

Overall, about 18,000 research papers are submitted for those events, and about 7,000 papers are chosen each year to appear in the conference and meeting proceedings publications.

Xue's duties in the vice president's role began Jan. 1. His term continues through 2017.

Xue's goals include improving the experience of research paper authors, keeping the costs of conference publications and registration fees affordable, developing new conferences and helping young society members develop into leaders of the group.

He also wants to increase participation of industry representatives in conferences, as well as the presentations of papers by authors who are in industry.

Xue is a Fellow of the IEEE and has published technical papers in several of the institute's leading research journals. He has won several best paper awards and was the Communications Society Distinguished Lecturer in 2010.

He has also been an editor for leading IEEE journals on information and communications technologies.

He has extensive experience in conference organization, serving in chair and vice chair positions for a number of major symposiums and conferences, including INFOCOM 2010 and GLOBECOM 2012.
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<thead>
<tr>
<th>Student</th>
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<tr>
<td>Bagade, Priyanka Vijay</td>
<td>Fall 2015</td>
<td>Evidence-based Development of Trustworthy Mobile Medical Apps</td>
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<td>Bartholomew, Michael James</td>
<td>Spring 2016</td>
<td>Answer Set Programming Modulo Theories</td>
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<td>Chung, Chun-Jen</td>
<td>Summer 2015</td>
<td>SDN-based Proactive Defense Mechanism in a Cloud System</td>
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<td>Clough, Michael</td>
<td>Spring 2016</td>
<td>Efficient Formulations for Next-generation Choice-based Network Revenue Management for Airline Implementation</td>
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<td>Cui, Can</td>
<td>Spring 2016</td>
<td>Building Energy Modeling: A Data-Driven Approach</td>
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<td>Galan Oliveras, Magdiel</td>
<td>Summer 2015</td>
<td>Leveraging Collective Wisdom in A MultiLabeled Blog Categorization Environment</td>
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<td>Hamzeh, Mahdi</td>
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<td>Compiler and Architecture Design for Coarse-Grained Programmable Accelerators</td>
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<td>Bayesian D-Optimal Design Issues and Optimal Design Construction Methods for Generalized Linear Models with Random Blocks</td>
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<td>Nonlinear Variation Pattern Discovery Using Autoassociative Neural Networks.</td>
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<td>Fall 2015</td>
<td>Toward Monitoring, Assessing, and Confining Mobile Applications in Modern Mobile Platforms</td>
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<td>Jonas, Michael G</td>
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<td>Improving AI Planning by Using Extensible Components</td>
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<td>Li, Wu</td>
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<td>Modeling, Simulation and Analysis for Software as Service in Cloud</td>
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<td>Categorical Responses in Mixture Experiments</td>
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<td>Mason De Rada, Andrew</td>
<td>Fall 2015</td>
<td>Development of Horizontal Coordination Mechanisms for Planning Agricultural Production</td>
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<td>Baoxin Li</td>
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<td>Sarma Vrudhula</td>
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<td>A Study of Backward Compatible Dynamic Software Update</td>
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<td>Surface Registration and Indexing for Brain Morphometry Analysis with Conformal Geometry</td>
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<td>Dynamic Analysis of Embedded Software</td>
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<td>Transfer Learning for BioImaging and Bilingual Applications</td>
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<td>A Bayesian Network Approach to Early Reliability Assessment of Complex Systems</td>
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<td>Answering deep queries specified in Natural Language with respect to a frame based Knowledge Base and developing related Natural Language Understanding components</td>
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<td>Self-configuring and Self-adaptive Environment Control Systems for Buildings</td>
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<td>A Study of Privacy Preservation in Mobile Crowd Sensing</td>
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<td>Vectorization in Analyzing 2D/3D Data</td>
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<td>Making Thin Data Thick: User Behavior Analysis with Minimum Information</td>
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<td>Biology question generation from a semantic network</td>
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<td>Visual Analytics for Spatiotemporal Cluster Analysis</td>
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<td>Protecting Identity and Location Privacy in Online Environment</td>
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<td>A probabilistic framework of transfer learning-theory and application</td>
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Undergraduate degrees

The Bachelor of Science in Engineering (B.S.E.) in computer systems engineering focuses on the systems that enable computation and communication and the integration of systems software and hardware. It emphasizes the design and development of hardware and software components comprising a computer system. The curriculum includes courses on computer organization and architecture, system programming, operating systems, embedded microsystems and digital hardware design. Although the program addresses numerous application areas, a unique focus on embedded systems sets it apart. A concentration in information assurance is also available.

The Bachelor of Science (B.S.) in computer science has its foci on computational processes for problem solving, and information transfer and transformation with an emphasis in improving software and system quality, security, performance and usability. It provides a solid background in computing principles and enables students to customize their degrees with technical electives. 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 courses in which students have an opportunity to master software development techniques while working in teams. A concentration in information assurance is available for this degree as well.

The Bachelor of Science in Engineering (B.S.E.) in industrial engineering is ranked among the top 20 in the nation. The program concentrates on the design, operation and improvement of the systems required to meet societal needs for products and services. Students complete 33 hours of upper division industrial engineering courses, three semesters hours of technical electives and nine hours of career-focused study area electives. Undergraduates learn to apply systems modeling and analysis skills to ensure that high-quality products and services are achieved with the optimal use of resources.

The Bachelor of Science in Engineering (B.S.E.) in engineering management prepares students to effectively lead engineering-driven enterprises. The curriculum provides a breadth of engineering science and design with depth in one practice area. Study of business practices, organizational behavior and management skills are emphasized. Topics such as project and resource management, financial engineering, risk management, configuration management, service plans, product liability, entrepreneurship and operations management are covered in addition to product design and process development. Graduates will be employable as project management team members, system specification and customer relationship management specialists, production supervisors, supply logistics engineers or similar roles.

The Bachelor of Science (B.S.) in informatics provides an interdisciplinary experience that responds to the rapidly growing need for skilled informaticians that focus on how people use information. With the tremendous growth in knowledge about computation and its application, informatics represents a large and growing body of knowledge that fits in between disciplinary majors to help utilize computing technology in specific problem domains. Students in the program learn various subjects in software engineering, human-computer interaction, decision theory, organizational behavior and information technology infrastructure. Graduates will develop innovative ways to help people interact with technology and new ways for users to create and share information and to design computational tools that model, aid or automate activities within disciplines such as science, business, geography, education and entertainment.

The Bachelor of Science (B.S.) in software engineering is a unique project-driven curriculum, establishing a new model for software engineering education. The program is built around the concepts of engaged learning, discovery-based education and learn-by-doing. Students complete projects in every semester of the program to provide emphasis on communication, teamwork, critical thinking and professionalism. Students have flexibility in designing their course of study; they select a software engineering application area such as web applications, mobile systems, or graphics and game development, as their primary focus, and may obtain interdisciplinary knowledge through a secondary area of their design.
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 coursework and emphasizes student research as well as offering numerous opportunities for interdisciplinary study. Within this degree, a concentration in arts, media and engineering (AME) is offered in collaboration with faculty in the electrical engineering program and the Herberger Institute for Design and the Arts. Master’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 an 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 pursue a concentration in information assurance. 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.

The Master of Science (M.S.) in industrial engineering is designed for students interested in combining knowledge from the physical, mathematical and social sciences to design efficient manufacturing and service systems that integrate people, research, production and supply-chain logistics and enterprise information systems in challenging manufacturing and service environments. Successful industrial engineering concepts are also spreading to the financial, logistics and healthcare services industries, affording new areas of opportunity for graduates. Students choose from a non-theses or theses track in the program.

The Master of Science (M.S.) in computer engineering degree combines resources from the School of Computing, Informatics, and Decision Systems Engineering (CIDSE) and the School of Electrical, Computer, and Energy Engineering (ECEE). The program provides the knowledge and skills necessary to advance and develop new paradigms for the design, computing, communications and networking (wired and wireless), control functions, sensing, signal processing and actuation. It is a multidisciplinary program that builds on the fundamentals of computer science, electrical engineering, industrial engineering and applied mathematics, with a balance between hardware and software courses.

The Master of Science (M.S.) in software engineering program focuses on developing advanced knowledge and abilities in the design and application of software. Students will learn to apply engineering principles to software development, including design methodologies, operation principles and maintenance and testing approaches. The program involves the application of engineering principles to software development including design methodologies, operation principles, and maintenance and testing approaches. It is aimed at developing professional skills in this discipline as well as providing opportunities for students to engage in and develop research abilities.

Doctoral degrees

The Doctor of Philosophy degree (Ph.D.) 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 interacting at a new level with other fields, not just in engineering and science, but throughout the arts and humanities, education, law, medicine and business. A wealth of experience for computer science doctoral students is available through collaborations with other engineering schools in the Ira A. Fulton Schools of Engineering, the Herberger Institute for Design and the Arts, the Center for Embedded Systems and the Translational Genomics Research Institute (TGen). The interdisciplinary strength of the degree is enhanced by a concentration in arts, media and engineering, as well as a concentration in information assurance.

The Doctor of Philosophy degree (Ph.D.) in industrial engineering offers students a program focused on industrial statistics and quality engineering, applied operations research, production and supply-chain logistics and enterprise information systems in challenging manufacturing and service environments. To complement our traditional strengths in manufacturing, in recent years we’ve developed a focus on health systems. The program has a strong track record of placing graduates in academic positions, as well as in leading industrial labs.

The Doctor of Philosophy (Ph.D.) in computer engineering is designed for students with excellent skills in mathematics and physical science who are interested in gaining in-depth knowledge of the foundational principle of engineering, as they pursue a career in academia, research or a highly technical entrepreneurial innovation. The Ph.D. program provides a broader and more in-depth preparation than the M.S. program, in anticipation of a demonstrated ability to independently pursue more creative and substantive innovation with higher impact. Students may choose to follow a concentration in either electrical engineering or computer systems engineering.

Certificate programs

Computer Gaming Certificate is an 18-credit-hour certificate open to any student at ASU (undergraduate, graduate and non-degree seeking) and is designed to provide a comprehensive game development skill set that the student can apply to his or her major. The goal is to apply gaming technology to domain-specific problems. The certificate can also be used as one of the areas of concentration for the Bachelor of Interdisciplinary Studies (B.I.S.) degree.

Informatics Certificate is defined as the study of ways in which computer technology can be used to gather, synthesize, store, visualize and interpret information. This certificate is available to students in non-computing majors and will provide them with an understanding of the capabilities and technologies of informatics. The certificate can also be used as one of the areas of concentration for the B.I.S. degree.

Lean Six Sigma Black Belt is a graduate certificate aimed at engineers and managers who oversee tactical and strategic projects as well as various operational functions in their organizations. Six Sigma is a proven systematic approach to continuous improvement of critical processes in a wide range of industrial environments such as banks, manufacturing facilities and hospitals. The American Society of Quality (ASQ) defines the Certified Six Sigma Black Belt as “a professional who can explain Six Sigma philosophies and principles, including supporting systems and tools.”
Outstanding graduates and CIDSE Night Awards

Fall 2015
Outstanding Graduates

Computer Science
Ginger Gilsdorf

Engineering Management
Patrick Herrington

Industrial Engineering
Abdulrahman Mahjoub

Fall 2015
Distinguished Graduates

Industrial Engineering
Derek Adams, Jonathan Topliff

Computer Engineering
Mayank “Max” Prasad

Computer Systems Engineering
Kacey Richards

Spring 2016
Outstanding Undergraduates

Industrial Engineering
Logan Mathesen

Computer Science
Patrick Gaines

Software Engineering
Wesley Coomber

Informatics
David Mejia

Engineering Management
Melissa Dunn

Computer Systems Engineering
Nathaniel Flick

Spring 2016
Distinguished Service Awards

Computer Science
Leo Osorio
Jessa Schwarting

Computer Systems Engineering
Ashley Krueger
Sami Mian

CIDSE Night 2016

Outstanding Graduate Senior Award

Computer Science
Patrick Gaines

Outstanding Graduating Senior Award

Computer Systems Engineering
Nathan Flick

Outstanding Computer Science Ph.D. Student

Jie Shi

Outstanding Computer Science Dissertation Award

Michael Bartholomew

Outstanding Computer Science TA Award

Ankur Chowdhary

Outstanding CEN TA Award

Seyed Koosha
Sadeghi Oskooye

Outstanding Graduating Senior Award

Informatics
David Mejia

Engineering Management
Melissa Dunn

Software Engineering
Wesley Coomber

Outstanding Software Engineering TA Award

Neeraj Bahl

Outstanding Industrial Engineering Ph.D. Dissertation Award

Andrew Mason De Rada

Outstanding Industrial Engineering Ph.D. Student

Michelle V. Mancenido

Outstanding Industrial Engineering TA Award

Sarah E. Burke
Body language interpretation research connects computer science student with ASL community

Gestures and body language are important parts of speech that can’t be conveyed in the text- and speech-based input that dominate today’s human-computer interfaces. American Sign Language users in particular could benefit from machine interfaces that can understand gestures as well as spoken or written words.

To address this need, computer science doctoral student Prajwal Paudyal is working in the iMPACT Lab on SCEPTRE, a smartphone interface that uses two wireless armband sensors to take in ASL sign gestures to communicate via computer systems.

For his research efforts, Paudyal received ASU’s Spring 2016 Graduate and Professional Student Association (GPSA) Outstanding Research Award, which recognizes excellence in research and development.

Computer Engineering Graduate Program Chair and computer science Professor Sandeep Gupta nominated Paudyal for the award. The iMPACT Lab faculty advisor thinks Paudyal’s research is very promising and pioneers pervasive personalized and extensible assistive technology for sign language users.

Computer science undergraduate recognized for potential in computing research

Josh Daymude earned an honorable mention for exemplary research as part of the Computing Research Association’s (CRA) 2016 Outstanding Undergraduate Researchers award program, which recognizes students with outstanding potential in computing research.

Daymude conducts research in self-organizing particle systems under the supervision of computer science Associate Professor Andrea Richa, who nominated him for the award program.

“We are looking at the computational algorithms that underpin future forms of programmable matter,” said Daymude, a senior earning concurrent degrees in computer science and mathematics. Programmable matter refers to physical materials that can gather continuous information from their surroundings and then adapt and respond to their environments based on algorithmic rules.

The applications of these self-organizing particle systems could be used in order to coat the surface of a bridge to monitor tension, to fill a crack in a nuclear reactor or to stop internal bleeding by covering the affected area.

His work on the compression problem is being developed for his honor’s thesis at ASU’s Barrett, the Honors College, and was supported by a stipend from the Fulton Undergraduate Research Initiative (FURI) in spring 2015 and a supplementary Research Experience for Undergraduates (REU) grant from the National Science Foundation.
Improving robot-human collaboration with the help of IBM

Automated planning is a field of AI research that looks to generate a plan that takes into account a system’s environment and possible actions it can take to achieve a given goal. However, automated planning research thus far hasn’t addressed problems that may arise when humans and autonomous systems interact, which is essential when the goal of AI is to have intelligent machines work alongside people and not replace them.

Computer science graduate student Tathagata Chakraborti is working to address the challenges of human-AI collaborative planning, or “human-in-the-loop planning.” Working together requires AI systems to be able to model human intentions and plan their own actions with those intentions in mind. So Chakraborti is studying how planners model collaborative behavior and the role of planners as decision support.

“I have investigated how autonomous agents sharing the human workspace can modify their behavior and respect human intentions,” Chakraborti said. “I have also looked at planning challenges in guiding human decision-making with limited domain knowledge, such as in crowdsourced planning and disaster response.”

Chakraborti works in Professor Subbarao Kambhampati’s Yochan Lab where he and other computer science students test their planning algorithms (“Yochan” is the Sanskrit word for “plan”) for human-robot collaboration with several robots that were procured with the help of Defense University Research Instrumentation Program (DURIP) grants from the Office of Naval Research and the Army Research Office.

His research efforts earned him an IBM Ph.D. Fellowship award — a competitive, worldwide program that honors exceptional doctoral students pursuing innovations in computing technology and striving to solve problems that align with IBM’s research goals. Chakraborti’s research fits well with IBM’s cognitive computing and symbiotic computing research thrusts.
Part of the Fellowship involves working with an IBM mentor. For Chakraborti this is Kartik Talamadupula, a research staff member at IBM who is also an alumnus of the Yochan Lab. Talamadupula’s research, conducted at IBM’s T.J. Watson Research Center, investigates the role of automated planning in guiding dialogue between intelligent machines and end users.

IBM also encourages its Ph.D. Fellows to participate in an internship, which Chakraborti planned to do starting in May at IBM’s Cognitive Algorithms Department, where he joins the AI and Optimization group to work on symbiotic human-AI systems.

The award includes a $20,000 stipend for the 2016-2017 academic year and a $10,000 education allowance.

Overall, he sees the award as honoring his past work and providing opportunities for his future. “It’s a great honor to be considered for this prestigious award,” Chakraborti said. “The award is a recognition of the quality of work done here at ASU and the effort I have put in for the last two and a half years, and it’s a huge motivation to work even harder and continue innovating for the coming years.”

Since entering the computer science doctoral program in 2013, Chakraborti has already presented his work in several international forums, published papers as part of international conferences and peer-reviewed workshops, and collaborated with NASA and other research centers and universities.

He has also earned two University Graduate Fellowship Awards from the School of Computing, Informatics, and Decision Systems Engineering as recognition for his work.

“His dissertation will enable better symbiotic workspaces between humans and robots and provide pathways to augment human intelligence for effective synergy,” Kambhampati said.

The next stage in his research at ASU is to work on the human side of the AI-human team by validating theoretical results on biological data like electroencephalogram (EEG) tests to establish psychological or neuroscientific connections to how humans respond to robotic teammates.

“This is vital in order for AI algorithms to move from the drawing board to actual integration with human workflows,” Chakraborti said. “I believe that my research will contribute significantly to the progress of standalone automated planners toward addressing the requirements of the human component, and provide much needed guidance for principled and well-informed design of intelligent symbiotic systems of the future.”
iMPACT lab students experience Solar Impulse in person and in virtual reality

Josh Daymude earned an honorable mention for exemplary research as part of the Computing Research Association’s (CRA) 2016 Outstanding Undergraduate Researchers award program, which recognizes students with outstanding potential in computing research.

Daymude conducts research in self-organizing particle systems under the supervision of computer science Associate Professor Andrea Richa, who nominated him for the award program.

“We are looking at the computational algorithms that underpin future forms of programmable matter,” said Daymude, a senior earning concurrent degrees in computer science and mathematics. Programmable matter refers to physical materials that can gather continuous information from their surroundings and then adapt and respond to their environments based on algorithmic rules.

Peter Lafford and Junghyo Lee met the pilots and Solar Impulse team the week they landed in Phoenix. They were able to show them an early preview of the Google Cardboard app. Photo courtesy of Bruno Boehm, Solar Impulse

Bertrand Piccard tries out the Solar Impulse Cockpit VR Google Cardboard app prior to the spring 2016 Maroon Convocation Ceremony.
The completely solar-powered Solar Impulse 2 aircraft at Phoenix Goodyear Airport. Photo courtesy of Peter Lafford

Junghyo Lee, Bertrand Piccard, Sandeep Gupta, André Borschberg and Ayan Banerjee.

André Borschberg speaks at convocation.
Fulton Schools students win awards at the Phoenix Global Game Jam 2016

Four teams from ASU's Video Game Dev Club participated in Phoenix Global Game Jam on Jan. 29-31, 2016, taking home two awards and cash prizes, including the top award.

A team of Fulton Schools computer science students — Club President Eric Tang and members Angel Diaz and Alex Ryan — won Best Game and $500 for their game, "Dream Works," which uses eye-tracking technology.

Six winning teams at the event were chosen by 20 judges who represent influential Phoenix businesses. Phoenix-area companies GoDaddy and Axosoft in addition to Sweden-based eye-tracking technology company Tobii and others sponsored the event.

The club is overseen by Lecturer Yoshihiro Kobayashi, and includes Fulton Schools students as well as students in a variety of programs including art, digital culture and psychology.

Software Development Association students compete, network and have fun

Nearly 160 computer science students showed off their skills to win prizes and networked with potential employers at the Software Development Association Code Competition on Feb. 27, 2016.

“The competition consists of a three-hour long ‘sprint’ where teams answer as many algorithmic programming challenges they can,” said J.J. Robertson, SoDA president and computer science student.

Along with hosting competitions, SoDA positions itself as a group to help students get access to internship and job interviews and preparation, gain experience, work on projects to showcase and develop skills, and to meet a community of passionate and dedicated student developers.

As part of the Fulton Schools’ Dean’s Funding program SoDA also does outreach with FIRST LEGO League events, homecoming and freshman welcome events, high school engineering outreach events and more.
Students build ability through CUbiC

The Center for Cognitive Ubiquitous Computing focuses on machine learning and pattern recognition, human-computer interaction and haptics with applications for assistive and rehabilitative technologies.

Along with receiving ideas from people in the community, some students working at CUbiC, such as computer science and mathematics student David Hayden, have been motivated by a problem they were facing firsthand. Hayden is legally blind and he found that an optics piece he used to make it easier to see the board wasn’t helping him enough.

Hayden approached CuBIC Founding Director Sethuraman “Panch” Panchanathan to find out if the CUbiC team had a solution, but Panchanathan had him work on it himself with other students in the lab.

Hayden rose to the challenge. Working with a team of mechanical engineers, electrical engineers and industrial designers, he conceived an idea for the NoteTaker and secured funding from the National Science Foundation to help bring it to fruition.

Article by Allie Nicodemo, Knowledge Enterprise Development

David Hayden (seated) works with Sethuraman “Panch” Panchanathan on NoteTaker. The device combines a custom-built camera and a tablet computer. The camera can zoom and tilt as needed to capture a classroom lecture, uploading video to a split-screen where the user can watch the video on one side and make typed or handwritten notes on the other half.

Vibro glove designed by Shantanu Bala, which provides haptic (touch-based) feedback in the shape of a facial expression on the back of a user’s hand.

Troy McDaniel (right) develops wearable cyber-physical systems for stroke rehabilitation with undergraduate student Bijan Fakhri.
Girish Jampani: Making the most of his chance and paying it forward

Girish Jampani is a big believer in collaboration. During his master’s studies in industrial engineering, instead of trying to answer, “Am I the smartest person in the room?” or, “Is my idea the best?” Jampani said his mentors at ASU taught him to ask: “How can I pool the intelligence and resources around me to achieve a positive result?”

While pursuing his doctorate Jampani will focus on questions in the field of operations research and decision sciences — a field that uses mathematics to make applied, day-to-day decisions. After graduation, Jampani plans to utilize his mastery in this field to help business organizations in the Asia Pacific region to successfully navigate important decisions.

In addition to being technically-equipped, Jampani feels prepared to succeed in a global workforce because the collaborative atmosphere of the Fulton Schools “reinforced the importance of values such as tolerance, respect and courtesy while working with team members from diverse backgrounds and cultures.”

Helios Scholar working to learn the canine genome

Computer science major Alexandra Nazareno has worked as a Helios Scholar at the non-profit Translational Genomics Research Institute over the summer in 2014 and 2015. She is learning more about the dog genome, how cancers develop in dogs and how to leverage this knowledge to develop better treatment options for dogs and for humans.

Growing up, Nazareno's primary interest was in healthcare and life sciences. After taking her first programming class in high school, she wanted to continue learning computer science and engineering, which led her to the Fulton Schools.

“I loved the idea that computing technology is so relevant in any field, including health, so all through college I’ve looked for ways to combine my two passions in research and projects,” Nazareno said. “In genomics research, computer scientists/bioinformaticians are needed to help the biologists produce, manage, and analyze, all the data that comes from sequencing.”
Engineering students rake in investments at the Spark Tank Live Pitch event

Dropspot, a team composed entirely of freshman students in Barrett, the Honors College, got an early start to their entrepreneurial ventures when they pitched their functional mobile app at the Sun Devil Igniter Challenge at Spark Tank, a pitch competition in the style of the “Shark Tank” reality show. The app allows users to take photos and “drop” them in a geographical location for friends to find later on.

Scott Fitsimones, Dropspot founder and computer science engineering student, characterized the app as a way to start conversations and leave a digital footprint in the world for others to connect to.

The team took home $10,000 in seed funding, and though they didn’t take home the big prize of $50,000, Brent Sebold, director of the Fulton Startup Center who coached the team, thinks they renewed their resolve to succeed from the experience.

“We’re still winners tonight,” said Fitsimones. “We’re going to work hard to secure the rest of the funding we need and prove we’re a viable app. In a year, we aim to have 100,000 users.”

Doctoral student combines biomedical and industrial engineering to develop better brain diagnostcis

Nathan Gaw studied biomedical engineering for his master’s, working on research to discover the underlying neural mechanisms the brain uses to give commands to the hand. During his studies, however, he realized applying the math and engineering concepts of industrial engineering could greatly benefit his research.

“Diagnostic data, such as results from an MRI, is very high dimensional, has high resolution and can be hard to interpret,” Gaw said. “I decided I wanted to go down the route of how to interpret this difficult data to better understand what parts of the brain are important for different brain diseases and help make better diagnostic decisions based on information from the image.”

He chose to pursue a doctorate in industrial engineering at ASU to further his research to develop theoretical methods to analyze brain data. ASU’s collaboration with Mayo Clinic and Banner Health doctors and other industry partners provided excellent opportunities for his medical focus, and the world-class Industrial Engineering program faculty have been excellent mentors.
The Fulton Undergraduate Research Initiative (FURI) provides hands-on lab experience, independent and thesis-based research, and travel funding to national conferences. In the competitive process, students work with faculty mentors to develop research proposals. Undergraduates earn money for creating knowledge based upon the scholarly method.

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<thead>
<tr>
<th>Name</th>
<th>Mentor</th>
<th>Field</th>
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<tr>
<td>Daniel D'Souza</td>
<td>Subbarao Kambhampati</td>
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<td>Samarth Rawal</td>
<td>Chitta Baral</td>
<td>Education, Health</td>
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<td>John Robertson</td>
<td>Paulo Shakarian</td>
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<td>Adam Tse</td>
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<td>Rolando Garcia</td>
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<td>Sagarika Kadambi</td>
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<td>Andrew Karnes</td>
<td>Angela Sodemann</td>
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<td>Adric Rukkila</td>
<td>Stuart Bowden</td>
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<td>Louis Ship</td>
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<td>Joseph Thweatt</td>
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<td>Jiaqi Wu</td>
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<td>BioParser: A Knowledge Parser for Biomedical Text</td>
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<td>Examining the natural diversity of quorum sensing for orthogonal pathways</td>
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Recent alumna Luz Osuna is giving back to the school and student organizations that have helped her to reach her career goals.

“Student organizations create valuable support systems that help students from diverse backgrounds adjust to campus life, while providing friends, study groups and leadership opportunities,” said Osuna. “And those are the type of organizations I want to support, because they once supported me.”

Osuna completed a bachelor’s degree in industrial engineering in 2010, followed by a master’s degree in industrial engineering in 2011, as part of the accelerated 4+1 program.

Osuna works as a strategic capacity industrial engineer — meeting production goals at the lowest cost — at Intel Corp. in Chandler, Arizona. Before that, she optimized factory space as a layout industrial engineer, also for Intel.

Osuna attributes her successful transition from an engineering student to an engineering professional to her experiences in student organizations during her years in the Fulton Schools that taught her critical and strategic thinking skills, teamwork, and interpersonal and leadership skills.

As an undergraduate, Osuna was president of the Society of Hispanic Professional Engineers — known as SHPE de ASU. SHPE de ASU seeks to empower the Hispanic community by providing awareness, access and support for science, technology, engineering and math educational programs.

As president of SHPE de ASU, Osuna wrote funding proposals, coordinated events, meetings and volunteers, and increased membership. Osuna worked hard to promote weekly study groups for members called “SHPE Studies” and also started an Academic Olympiad team that competed at the SHPE national conference. One of her most memorable experiences was hosting the first Noche de Ciencias (Science Night) — a STEM outreach event for elementary school students and their parents.

“I have always been a strong supporter of organizations that promote the advancement of Latinos or Hispanics in STEM, and I appreciate the vision laid out by organizations like MAES and SHPE de ASU,” said Osuna.

While she was a student, Osuna received scholarships from donors including the Friendly House, the Armstrong Family Foundation, SHPE de ASU, the National Action Council for Minorities in Education (NACME), the National Science Foundation (NSF), the League of United Latin American Citizens (LULAC), the Motivated Engineering Transfer Students Program (METS), John and Helen Butler, and the Intel Scholars Program.

Now that she is in a position to give back she thinks it is important to do so. “Whether you’re donating time or money, any contribution an alumnus can make will help the next generation of engineers reach their goals,” said Osuna.
Computing programming: the next essential skill for 21st century literacy

If you were to hear that you could start learning a skill with incredible economic opportunity and high social mobility for as little as $50, you might think it was a scam. But today, that’s all you need to take the leap into what is quickly becoming the defining discipline of the century: computer programming.

“Today you can buy a computer for under $50 and learn to develop code with completely free software,” said professor Tim Lindquist, Software Engineering Programs Chair of the Fulton Schools.

In addition to the low financial barrier of entry, coding doesn’t consume resources or materials, making it incredibly easy to continue.

“Where else can you make a mistake and start all over again with it costing no more than your time and create incredibly useful tools with a minimum of raw materials?” asks Lindquist.

By 2024, the U.S. Bureau of Labor Statistics projects that software development jobs will grow an estimated 17 percent, web developing jobs will grow 27 percent and all computer-related job fields will increase by 12 percent. This growth of computing and coding occupations outstrips the mere seven percent increase for all other job fields. As the needs of the economy shift, efforts to prepare the workforce of the future pivot as well.

Earlier this year, President Barack Obama unveiled his Computer Science for All Initiative, which looks to increase access to computer science for K-12 students across the nation. The initiative pledges $4 billion in funding for states to train educators in computer science education and develop high-quality instructional materials to overall expand access to this increasingly vital discipline.

In the private sector, both self-paced learn-to-code websites, such as Codecademy or Treehouse, as well as intensive, brick-and-mortar coding boot camps have seen explosive growth in the last five years alone.

“There are so many free online educational resources for computer science and software engineering,” said J.J. Robertson, computer science and electrical engineering senior and president of the Software Developers Association at ASU.

The growth of the industry comes as no surprise, as more and more aspects of everyday life are dependent on computers and the millions of lines of code telling them what to do.

“Around 2010, we interviewed a faculty candidate who had just returned from a software engineering conference where an engineer from a major auto manufacturer indicated that there were over 350,000,000 lines of source code in a fully optioned SUV that his company had just redesigned,” recalls Lindquist. “When I started working at ASU, there wasn’t a single line of code in an automobile.”

The rapid growth of programming in automotive engineering is one example of how widespread programming has become in a number of industries.

“It’s harder to find an area without computational support than those that do,” adds Lindquist.

As computer programming’s influence on other industries grows, a need for not only dedicated programmers, but also other occupations to know coding has increased as well.

“With the application of software development to other areas such as engineering, medicine, transportation, business and human services, students from other disciplines are increasingly better equipped for their career when they have software development background,” said Lindquist.

This shift toward a workforce where many, if not all, employees have an understanding of basic computer programming aligns with the common belief that coding will become a form of basic literacy in the future.

“Many believe that computer science, more precisely computational thinking and software development will become similar to math or any other foundational discipline,” said Lindquist.

As programming marches steadily toward becoming an essential skill in the 21st century, take the leap into coding today. It may seem daunting at first, but Robertson advises beginning programmers to stick with it.

“It is common for people to get discouraged initially, but it is important to remember that no one’s first program does anything meaningful,” said Robertson. “The more software you write the better you get, I promise.”

With as little as $50, anyone can learn to code. In addition to an impressive projected growth rate, software development is already a rapidly expanding industry. With a multitude of both free and paid resources to learn programming, there’s no better time to learn what’s becoming one of the most vital skills in the workforce of the future.
Inspiring future engineers

CIDSE and the Ira A. Fulton Schools of Engineering host a variety of on-campus activities, after-school programs, summer camps and collaborations with faculty and engineering student organizations in an effort to engage Arizona’s K-12 students and create pathways that encourage them to become technically savvy, prepare for studies in science, technology, engineering and math (STEM)-related fields and pursue careers in engineering. Through creative, hands-on activities, we hope to inspire these young students and show how engineering impacts our lives every day.

**Game Camp**

Game Camp is a unique, hands-on opportunity for middle and high school students to learn intensive video game creation, visualization and production. Campers use the latest software, hardware and development tools to create concepts and prototypes for 2-D and 3-D video gaming.

**App Camp**

App Camp teaches high school students the basics of iPhone app development. Participants learn the skills needed to create and develop smartphone apps. This year, the camp covered Apple Xcode, Objective-C, Javascript, HTML5, user-interface design principles, mobile application design and development considerations, iPhone app construction, advanced debugging techniques, Web application development for portability and more.

**Robotics Camp**

ASU’s Robotics Camps are a summer program series designed for middle school and high school students who intend to pursue a science and engineering career. Camp instructors use component-based robot construction, robotics programming, Web programming and Alice game programming as a vehicle to teach the latest engineering design concepts and computing technologies. The robots built by students enter a robotics challenge and demonstration at the end of the camp.

**Ultimate Technology Boot Camp**

ASU’s Ultimate Technology Boot Camp is a completely residential camp where high school students experience life on the Polytechnic campus for 10 days. Campers learn how to create mobile apps, develop cutting-edge games, design and build robots and more from award-winning faculty and instructors. They work together in teams to learn design, development and content integration for software like games and apps.

**Adventures in Computing Camp**

Adventures in Computing Camp teaches beginners broad object-oriented programming concepts common to modern programming, then building on that foundation with an overview of Python. Campers start by learning how to create programs using Python; how to create easy-to-use graphical interfaces and how to draw pictures from code.
Adolfo Escobedo
Ph.D., Texas A&M University

Adolfo Escobedo, an assistant professor in industrial engineering, is interested in the theory and application of optimization, systematic decision-making frameworks, mathematical programming error reduction and the design, analysis and high-performance computing implementation of algorithms. Escobedo has published his work in IEEE Transactions, IISE Transactions and the INFORMS Journal on Computing.

He earned his Ph.D. in computer science with an arts, media and engineering concentration from Arizona State University in 2016. Gonzalez-Sanchez received the Association for Computing Machinery Senior Member Award in 2014, an honor given to ACM members with more than 10 years of professional experience who demonstrate excellent performance.

Gonzalez-Sanchez is a software engineering lecturer, researches software engineering and human-computer interaction.

He received his Ph.D. in computer science from Texas A&M University in 2016, and earned his B.A. in Mathematics from California State University, Los Angeles, in 2009.

Javier Gonzalez-Sanchez
Ph.D., Arizona State University

Javier Gonzalez-Sanchez, a software engineering lecturer, researches software engineering and human-computer interaction. His dissertation research on computational tools and the underlying mechanisms of robotic manipulation actions has been featured in MIT Technology Review, IEEE Spectrum, Time magazine and the Washington Post.

His research interests include distributed robot systems, human-robot interaction, multi-agent systems, human-aware planning, multi-agent planning and automated planning and scheduling.

Giulia Pedrielli
Ph.D., Politecnico di Milano, Italy

Giulia Pedrielli, an assistant professor in industrial engineering, earned her master’s in industrial engineering in 2009 and her Ph.D. in mechanical engineering in 2013 from the Politecnico di Milano, Italy. Pedrielli previously served as a post-doctoral fellow at the Department of Industrial & Systems Engineering at the National University of Singapore.

Her research interests are simulation methodology, stochastics and learning/statistics related to simulation improvement both for performance evaluation as well as simulation-based control and optimization of complex systems.

Pedrielli is an assistant professor in industrial engineering at Arizona State University. She earned her master’s degree in industrial engineering from Politecnico di Milano in 2009 and her Ph.D. in mechanical engineering in 2013.

She previously served as a post-doctoral fellow at the Department of Industrial & Systems Engineering at the National University of Singapore.

Her dissertation research on computational tools and the underlying mechanisms of robotic manipulation actions has been featured in MIT Technology Review, IEEE Spectrum, Time magazine and the Washington Post.

Yezhou Yang
Ph.D., University of Maryland, College Park

Yezhou Yang, an assistant professor in computer science and engineering, earned his Ph.D. in computer science in 2015 from the University of Maryland at College Park.

His research interests include simulation methodology, stochastics and learning/statistics related to simulation improvement both for performance evaluation as well as simulation-based control and optimization of complex systems.

Zhang's research interests include distributed robot systems, human-robot interaction, multi-agent systems, human-aware planning, multi-agent planning and automated planning and scheduling.

Yu (Tony) Zhang
Ph.D., University of Tennessee, Knoxville

Yu (Tony) Zhang, an assistant professor in computer science and engineering, earned his Ph.D. in computer science from the University of Tennessee, Knoxville. previously, Zhang worked as a post-doctoral research scholar and a research assistant professor at Arizona State University.

His research interests include distributed robot systems, human-robot interaction, multi-agent systems, human-aware planning, multi-agent planning and automated planning and scheduling.

Yuan Zhang
Ph.D., University of Maryland, College Park

Yuan Zhang, an assistant professor in computer science and engineering, earned his Ph.D. in computer science in 2015 from the University of Maryland at College Park.

His research interests include distributed robot systems, human-robot interaction, multi-agent systems, human-aware planning, multi-agent planning and automated planning and scheduling.

Alexandra Mehlhase
Ph.D., Technische Universität Berlin

Alexandra Mehlhase, a software engineering lecturer, comes to Arizona State University from the Technical University of Berlin where she taught for six years.

Mehlhase’s interests involve merging software engineering with other engineering concepts to make modeling and simulation more efficient. At ASU, Mehlhase will apply her expertise in software engineering and the modeling and simulation of physical systems, through the study of computational engineering science, a mix of mechanical engineering and computer science.
Ronald Askin
Computer Science and Engineering
Ph.D., Georgia Institute of Technology, 1979
Research interests: Cybersecurity and digital forensics: security analytics and big data driven security intelligence, vulnerability and risk management, access control and identity management, security-enhanced computing platforms and formal models for computer security
Honors, awards & key activities: DoE CAREER award, 2003; Educator of the Year award, Federal Information Systems Security Educators’ Association, 2005; ACM CODASYL Best Paper Award (2014); CIDSE Best Researcher Award (2012); Associate Editor, ACM Trans. on Info. & Systems Security; Associate Editor-in-Chief, IEEE Trans. on Dependable and Secure Computing; Editorial Board, Computers & Security; Editorial Review Board, Journal of Database Management; Information Dir. ACM SIGSAC; Steering Committee Chair, ACM SACMAT; General Chair for ACM CCS’14; PC Co-Chair for ACM AsiaCCS’15; Director, Center for Cybersecurity and Digital Forensics; Fulton Entrepreneurial Professor

Gail-Joon Ahn
Computer Science and Engineering
Ph.D., George Mason University, 2000
Research interests: Cybersecurity and digital forensics: security analytics and big data driven security intelligence, vulnerability and risk management, access control and identity management, security-enhanced computing platforms and formal models for computer security
Honors, awards & key activities: DoE CAREER award, 2003; Educator of the Year award, Federal Information Systems Security Educators’ Association, 2005; ACM CODASYL Best Paper Award (2014); CIDSE Best Researcher Award (2012); Associate Editor, ACM Trans. on Info. & Systems Security; Associate Editor-in-Chief, IEEE Trans. on Dependable and Secure Computing; Editorial Board, Computers & Security; Editorial Review Board, Journal of Database Management; Information Dir. ACM SIGSAC; Steering Committee Chair, ACM SACMAT; General Chair for ACM CCS’14; PC Co-Chair for ACM AsiaCCS’15; Director, Center for Cybersecurity and Digital Forensics; Fulton Entrepreneurial Professor

Charles Colbourn
Computer Science and Engineering
Ph.D., University of Toronto, 1980
Research interests: Combinatorial design theory and its applications in communications and networking
Honors, awards & key activities: The Euler Medal for Lifetime Achievement in Research (2003); Keynote/invited speaker at numerous conferences internationally; Editor-in-chief of the Journal of Combinatorial Designs; Editorial boards of Designs Codes and Cryptography; Journal of Combinatorial Theory Series A; Discrete Mathematics

K. Selçuk Candan
Computer Science and Engineering
Ph.D., University of Maryland, College Park, 1997
Research interests: Storage, retrieval, and analysis of large scale non-traditional, heterogeneous and imprecise (such as multimedia, web and scientific) data sets; database systems; real-time data management; data clouds; big data
Honors, awards & key activities: Fulton Schools of Engineering (FSE) Exemplar Faculty; FSE “Best Teacher Award” (2013-2015); Director ASU Center for Assured and Scalable Data Engineering (CASCADE), Co-inventor of the CachePortal technology, which received the “Best of CeBIT America” award in the Enterprise Platform Software category, 2004; ACM DC Chapter Samuel N. Alexander Doctoral Fellowship Award (1997), Editorial board of the IEEE Transactions on Multimedia (TMM), IEEE Transactions on Knowledge and Data Engineering (TKDE), IEEE Transactions on Cloud Computing (TCC), ACM Transactions on Database Systems (TODS), and the Journal of Multimedia Review board of the Proceedings of the VLDB Endowment (PVLDB); General co-chair for ACM Multimedia Conference’11, ACM SIGMOD International Conference on Management of Data (SIGMOD’12), and IEEE International Conference on Cloud Engineering (IC2E’15); PC co-chair for ACM Multimedia (MM’08), ACM Conference on Image and Video Retrieval (CIVR’10), Conference on Database Systems for Advanced Applications (DASFAA’17), Group Leader for ACM SIGMOD’10; Member of the Executive Committee of ACM SIGMOD, ACM Distinguished Scientist
James Collofello  
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Vice Dean  
Computer Science and Engineering  
Ph.D., Northwestern University, 1979  
Research interests: Software engineering, software project management, software quality assurance  
Honors, awards & key activities: Daniel Jankowski Legacy Award

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Interim Director  
Computer Science and Engineering  
Ph.D., Ohio State University, 1995  
Research interests: Cyber-physical systems, mobile computing, wireless networking, parallel and distributed computing  

Subbarao (Rao) Kambhampati  
rao@asu.edu  
Computer Science and Engineering  
Ph.D., University of Maryland, 1989  
Research interests: Artificial intelligence, automated planning, machine learning, data and information integration, social media mining  
Honors, awards & key activities: NSF Research Initiation (1992); NSF Young Investigator (1994); College of Engineering Teaching Excellence award (2002); Best Teacher (2012); Last Lecture (2011); Fellow of Association of Advancement of Artificial Intelligence (2004); IBM Faculty Award (2004); Google Research Award (2008, 2010, 2013, 2016); Program Co-chair, ICAPS (2013); Conference Committee Chair, AAAI (2012-14); Program Co-chair AAAI 2005; Trustee, UCAI Inc. (2013-18); Program Chair, UCAI, 2016; President, AAAI, (2016-18)

Baoxin Li  
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(Program Chair)  
Computer Science and Engineering  
Ph.D., University of Maryland, College Park, 2000  
Research interests: Computer vision & pattern recognition, multimedia, image/video processing, assistive technologies, human-computer interaction, statistical methods in visual computing  
Honors, awards & key activities: NSF CAREER Award, 2008/2009; President’s Award, Sharp Labs of America, 2001, 2004; Area Editor, Signal Processing: Image Communications; Area Editor, Journal of Multimedia; Organizing Committee, ACM MM 2011; Area Chair, CVPR 2012; Area Chair, ISVC, 2013; TPC Chair, VPQM 2015; Organizing Committee, ICIP 2016.

Tim Lindquist  
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Software Engineering  
Ph.D., Iowa State University, 1979  
Research interests: Software engineering domain-specific methods, mobile and distributed systems, and emerging programming languages  
Honors, awards & key activities: Professor of the Year, Corporate Leaders Program (2003); ABET Program Evaluator (2004); ABET Computing Accreditation Commission member (2009-2014); ASEE/ Navy Summer Faculty Fellow (1999, 2001); Visiting Professor, CRIN-CNRS-LORIA, Nancy France (1993); Visiting Scientist, Institute for Defense Analyses (1991)
Faculty directory

Professor

Huan Liu
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Computer Science and Engineering
Ph.D., University of Southern California, 1989

Research interests: Data/Web Mining, Machine Learning, AI, Social Computing, Feature Selection

Honors, awards & key activities: 2014 President’s Award for Innovation (ASU); IEEE Fellow; Editorial/Advisory Boards of Journals/Lecture Series; Research Projects for Science and Discovery and for Humanitarian Assistance & Disaster Relief

Sethuraman Panchanathan
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ASU Senior Vice President for Knowledge Enterprise Development
Computer Science and Engineering
Ph.D., University of Ottawa, 1989

Research interests: Human-centered multimedia computing, face/gait analysis and recognition, haptic user interfaces, medical image processing, media processor designs and ubiquitous computing environments for enhancing quality of life for individuals with disabilities

Honors, awards & key activities: Fellow of IEEE and SPIE; Member of Canadian Academy of Engineering; Member, National Science Board (NSB), Appointed by President Barack Obama, 2014; Member, National Advisory Council on Innovation and Entrepreneurship (NACIE); Appointed by U.S. Secretary of Commerce Penny Pritzker, 2014; Fellow, National Academy of Inventors (NAI), 2013; Governor’s Innovator of the Year in Academia Award (2004); Microsoft Imagine Cup Awards (2010, 2011); Editor-in-chief, IEEE Multimedia; Associate Editor, of 12 (past and present) Journals and Transactions; Member, US-India Business Council (USIBC) [President Obama’s Executive Mission to India]; Member, Arizona Governor Napolitano’s Strategic Mission to Canada; Executive Committee Member, Council on Research Policy & Graduate Education, Association of Public and Land-Grant Universities (APLU); Member, Governor of Arizona e-Health Steering Committee

Pitu Mirchandani
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The Avnet Chair in Supply Chain Networks
Industrial Engineering
Sc.D., Massachusetts Institute of Technology, 1975

Research interests: Optimization, decision-making under uncertainty, real-time control and logistics, cyber-physical systems application interests in, transportation, supply chains, homeland security, smart urban cities.

Honors, awards & key activities: Salt River Project Professor of Technology, Public Policy and Markets, 2000-2005 at University of Arizona; recipient of “2007 Member of the Year” by the ITS Arizona Society for contributions to ITS in the State of Arizona; Alan Pritsker’s Outstanding IE Teacher Award at Arizona State University, June 2012; IEEE Lifetime Member (since 2013); AVNET Chair for Supply Chain Networks; INFORMS Fellow, inducted in 2015; publications include 4 books and over 200 journal articles; keynotes and plenaries at several international conferences; editorial boards (current and past) of: Transportation Science, IIE Transactions on Scheduling and Logistics, Journal of Industrial Mathematics, Journal of Technology, Policy and Management, and Journal of Advanced Transportation; Principal Investigator on recent projects in Cyber-Physical System on Real-Time Proactive Traffic Management, Evacuation Traffic Management, and Infrastructure Design and Operations of Electric and Alternative Fueled Vehicles; Director of the Advanced Traffic and Logistics: Algorithms and Systems (ATLAS) Laboratory

Andrea Richa
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Computer Science and Engineering
Ph.D., Carnegie Mellon University, 1998

Research interests: Self-organizing particle systems, programable matter, bio-inspired algorithms; distributed computing and algorithms; theory of wireless communication; graph, randomized, and approximation algorithms; self-stabilizing overlay networks; combinatorial optimization; distributed resource allocation

Honors, awards & key activities: NSF CAREER Award 2000; Founder, IEEE Workshop on Network Science for Communication Networks (NetSciCom); General Chair and Founder, NSF Workshop on Selforganizing Particle Systems, 2014; Associate Editor, IEEE Transactions on Mobile Computing; General Chair, ACM Symposium on Principles of Distributed Computing (PODC), 2010; PC Chair ACM DIALM-POMC 2003 & 2010; SSS 2012; IEEE NetSciCom 2009, 2010, 2011; Publicity Chair, ACM SPAA’08; Guest Editor, ACM Baltzer Journal on Mobile Networks and Applications (MONET), Special Issue on Foundations of Mobile computing, 2004

George Runger
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Industrial Engineering
Ph.D., University of Minnesota, 1982

Research interests: Data science with applications to surveillance, monitoring, and population health management

Honors, awards & key activities: Best Application Paper Award, IIE Transactions, 2007; Brumbaugh Award- American Society for Quality, 1994, 2003; Ellis R. Ott Foundation Award, 1990; IBM Outstanding Achievement Award; Department Editor, Journal of Quality Technology; Associate Editor, Journal of Mathematical and Management Sciences
Arunabha Sen  

Computer Science and Engineering  
Ph.D., University of South Carolina, 1987  

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  

Honors, awards & key activities: Associate Editor, IEEE Transactions on Mobile Computing; Program Committees of IEEE Infocom, Globecom, ICC; ACM Foundations on Mobile  

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Dan Shunk  

Ph.D., Purdue University, 1976  

Research interests: Material/information/ knowledge supply; supply network integration, business development and innovation, enterprise modeling, and the lean/agile enterprise  

Honors, awards & key activities: Franz Edelman Award Finalist, ORSA/TIMS 1992; SME International Manufacturing Education Award, 1996; Chaired the SME Ad Hoc Global Committee on Supply Network Integration and Communities of Common Interest; United States Representative to the Global Intelligent Manufacturing Systems organization; Won a Fulbright Scholarship during 2002-2003 to create a supply network curriculum and research agenda at University College Cork in Ireland; Board of Directors, Value Chain Group, 2006 – 2010; PIMSA Chair, CETYS Universidad, Baja, Mexico; Organizer of colloquia and conference program chair; chair of invited clusters/ sessions for national and international conferences; Referee for academic journals and several textbooks; reviewer in NSF panels; Editorial Board of the Agility and Global Competition Journal, the International Journal of Flexible Automation and Integrated Manufacturing and the International Journal of Product Development  

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Teresa Wu  

Industrial Engineering  
Ph.D., University of Iowa, 2001  

Research interests: Health information system, Imaging informatics, Distributed Decision Support  

Honors, awards & key activities: NSF CAREER Award, 2003; ASU Tenure and Promotion Exemplar, 2006; President Academic Council (2009 – present); Councilor of Institute of Complex Medical Engineering (2013-present)  

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Kurt VanLehn  

The Diane and Gary Tooker Chair for Effective Education in Science, Technology, Engineering and Math  
Computer Science and Engineering  
Ph.D., Massachusetts Institute of Technology, 1983  

Research interests: Applications of AI to education (Intelligent Tutoring Systems; teachable agents; tutorial NL dialogue systems); human learning (student modeling; cognitive modeling); cognitive science  

Honors, awards & key activities: Fellow of the Cognitive Science Society and the Center for Advanced Study in the Behavioral Sciences; nine best paper awards; Former senior editor, Cognitive Science; Honorary Doctorate, Utrecht University; Editorial boards of AI in Education, Cognition and Instruction, Machine Learning, Journal of the Learning Sciences; Senior PC member for ITS, A&Ed, Cognitive Science Conference  

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Sarma Vrudhula  

Director of Center for Embedded Systems  
Computer Science and Engineering  
Ph.D., University of Southern California, 1985  

Research interests: Design automation and Computer-Aided Design for digital integrated circuit and systems, focusing on energy management of circuits and systems. Specific topics include: design of non-volatile logic; energy optimization of battery powered computing systems and wireless sensor networks; system level dynamic power and thermal management of multicore processors and system-on-chip (SoC) focusing on mobile devices; statistical methods for the analysis of process variations; statistical optimization of performance, power and leakage; new circuit architectures of threshold logic circuits for the design of ASICs and FPGAs; circuit and system architectures using emerging device technologies; non Von Neumann architectures  

Honors, awards & key activities: IEEE Fellow for “contributions to low power and energy-efficient design of digital circuits and systems”; Director of NSF IUCRC Center for Embedded Systems (2008-Present); Director of NSF S/IUCRC Center for Low Power Electronics (1996-2004).  

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Guoliang Xue  

Computer Science and Engineering  
Ph.D., University of Minnesota, 1991  

Research interests: Crowdsourcing to smartphones, RFID and Internet of Things, privacy and security, smart grids and smart cities  

Honors, awards & key activities: IEEE Fellow; Fellow Evaluation Committee of the IEEE Communications Society; Vice President for Conferences of IEEE Communications Society; TPC co-Chair of IEEE INFOCOM 2010; Conference co-Chair of IEEE CNS 2014; TPC Member: ACM CCS, ACM MOBIHOC; IEEE ICNP; IEEE INFOCOM. Area Editor of IEEE Transactions on Wireless Communications for the Wireless Networking Area; Keynote Speaker at IEEE LCN’2011 and IEEE ICNC 2014.
Professor

Stephen Yau
\[\text{yau@asu.edu}\]
\text{Computer Science and Engineering}
\text{Ph.D., University of Illinois, 1961}
\text{Research Interests:} Cyber security, information assurance, software engineering, services computing, cloud computing, ubiquitous computing, Internet of Things, human factors
\text{Honors, awards & key activities:} Founding director of Information Assurance Center, designated as National Center of Academic Excellence (CAE), and CAE-Research by NSA and DHS. Overseas Outstanding Contributions Award of the Chinese Computer Federation (2006); Tsutomu Kanai Award of IEEE Computer Society (2002); Fellows of IEEE and AAAS; president of IEEE Computer Society (1974 and 1975), editor-in-chief of Computer magazine. Keynote addresses at many conferences, including IEEE International Conferences on Services Computing; Ubiquitous Computing and Communications; Software Security and Reliability; and Software Reliability Engineering

Rida Bazzi
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\text{Computer Science and Engineering}
\text{Ph.D., Georgia Institute of Technology, 1994}
\text{Research interests:} Computer security, distributed computing, fault tolerance, reliability

Nong Ye
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\text{Industrial Engineering}
\text{Ph.D., Purdue University, 1991}
\text{Research interests:} Data mining and modeling, information and system assurance, data-enabled system engineering
\text{Honors, awards & key activities:} Editor of the CRC book series on data-enabled engineering, Principal Investigator for a NSF award of $490K from the Division of Undergraduate Education on identifying and validating interactive and uncommon characteristics of retention and success in engineering education

Partha Dasgupta
\[\text{partha@asu.edu}\]
\text{Computer Science and Engineering}
\text{Ph.D., University of New York at Stony Brook, 1984}
\text{Research interests:} Computer security, operating systems, distributed and parallel systems
\text{Honors, awards & key activities:} Best Paper Awards PDCS 2004, ICDCS 1995; Short courses for Swiss Exchange Program (HEIG_VD) and IUCEE Consortium (India)

Associate Professor

Robert Atkinson
\[\text{robert.atkinson@asu.edu}\]
\text{Computer Science and Engineering}
\text{Ph.D., University of Wisconsin, Madison, 1999}
\text{Research interests:} Personalized learning, social media, learner analytics, mobile learning, cognitive science, usability testing, human-computer interaction

Hasan Davulcu
\[\text{hdavulcu@asu.edu}\]
\text{Computer Science and Engineering}
\text{Ph.D., State University of New York at Stony Brook, 2002}
\text{Research interests:} Data mining, information extraction and integration, database systems, social network analysis, socio-cultural modeling and analysis, fraud detection
\text{Honors, awards & key activities:} Best Paper Award IEEE Social Computing, 2013; HSCB Focus Exceptional Scientific Achievement Award, 2011; NSF CAREER Award, 2007 – 2012; Editorial Board Member of Journal on Social Computing (USC)
Georgios Fainekos
fainekos@asu.edu
Computer Science and Engineering
Ph.D., University of Pennsylvania, 2008
Research interests: Foundations of cyber-physical systems and algorithmic robotics
Honors, awards & key activities: 2013 NSF CAREER award; 2013 Best Researcher Junior Faculty award; 2008 Frank Anger Memorial ACM SIGBED/SIGSOFT Student Award; Program co-Chair of the 19th International Conference on Hybrid Systems: Computation and Control; Registration chair of Cyber-Physical Systems (CPS) Week 2013

Dijiang Huang
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Computer Science and Engineering
Ph.D., University of Missouri – Kansas City, 2004
Research interests: Network security, mobile cloud computing, privacy preservation techniques, trust management

Kevin Gary
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(Professor Chair)
Software Engineering
Ph.D., Arizona State University 1999
Research interests: Software architecture, agile methods, and open source with applications in healthcare (mHealth, image-guided/robotic surgery) and e-learning. Software Engineering education, particularly assessment, and project/problem-based teaching and learning
Honors, awards & key activities: ASU President’s Award for Innovation, 2011; Nomination, ASU College of Technology & Innovation Excellence in Teaching Award, 2014; Nomination, ASU College of Technology & Innovation Curriculum Innovations Award, 2011; Nomination, ASU Featured Faculty (Student program), 2006; ERCs Foundation Scholar; UPE Honor Society

Joohyung Lee
joolee@asu.edu
Computer Science and Engineering
Ph.D., University of Texas at Austin, 2005
Research interests: Knowledge representation, logic programming, reasoning about actions, reasoning under uncertainty, ontology modeling, context-awareness, cognitive robotics and security
Honors, awards & key activities: AAAI 2004 Outstanding Paper Honorable Mention Award; General Chair of ICLP 2013; Keynote speaker at NRAC 2013; Brain Pool Korea Fellow (2015); ICLP 2013 Test of Time award runner up

Esma Gel
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Industrial Engineering
Ph.D., Northwestern University, 1999
Research interests: Healthcare delivery systems engineering, medical decision-making, revenue management in airline industry, dynamic price and lead time quotation for manufacturing and service systems, building resilience against hazards through cooperative interactions
Honors, awards & key activities: Dr. Hamed K. Eldin Outstanding Young Industrial Engineer of the Year, from the Institute of Industrial Engineers (IIE), 2008; Program Chair of Industrial, Operations and Systems Engineering, CIDSE, since Fall 2011; Member of the Dean’s Executive Committee, 2012-2014; Member of Meetings Committee, INFORMS, since 2013; Associate Editor, OMEGA

Jing Li
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Industrial Engineering
Ph.D., University of Michigan, 2006
Research interests: Medical and health care informatics, quality and reliability modeling, statistical modeling and machine learning
Honors, awards & key activities: NSF CAREER Award 2012; Outstanding Junior Faculty Award, CIDSE, 2013; Former Chair for INFORMS Subdivision on Data Mining; Current Editor-in-Chief for Quality Technology & Quantitative Management.
Associate Professor

Brian Nelson
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Computer Science and Engineering
Ed.D., Harvard University, 2005

Research interests: Learning theory, instructional design, educational technology, game-based learning environments, simulations, multimedia, collaborative learning, embedded assessment


Aviral Shrivastava
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Computer Science and Engineering
Ph.D., University of California, Irvine, 2006

Research interests: Embedded and cyber-physical systems; manycore processors, accelerated computing, reliable computing

Honors, awards & key activities: NSF CAREER Award 2010; CSE ASU Outstanding Junior Researcher 2011; Best Paper Candidate at ASPDAC 2008, LCTES 2012; In organizing committee of ESWeek; In Program Committee of DAC, CASES, CODES+ISSS, EMSOFT, and LCTES

Rong Pan
rong.pan@asu.edu

(Program Chair)
Industrial Engineering
Ph.D., Pennsylvania State University, 2002

Research interests: Reliability engineering, design of experiments, multivariate process control, Bayesian statistics

Honors, awards & key activities: William A. Golomski Award, IIE QCRE Division, 2015; Visiting Faculty Research Award, AFRL/RI Information Institute, 2014; Best Reliability Paper Award, Quality Engineering, 2012 & 2013; Editorial Board Member, Journal of Quality Technology and Quality Engineering

Violet Syrotiuk
syrotiuk@asu.edu

Computer Science and Engineering
Ph.D., University of Waterloo, 1992

Research interests: Protocols for wireless networks especially for medium access control, design and analysis of experiments, experimentation on testbeds such as GENI/FIRE and software defined networking

Hessam Sarjoughian
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Computer Science and Engineering
Ph.D., University of Arizona, 1995

Research interests: Model theory, poly-formalism modeling, collaborative visual modeling, simulation-based science, simulation tools, software architecture

Honors, awards & key activities: DEVS M&S First Place Award; Distinguished Service Award, The Society for Modeling and Simulation International; ACIMS Co-Director; Director of the Modeling & Simulation Masters Online Program; Center for Social Dynamics and Complexity Core Faculty; Complex Adaptive Systems Science Graduate Faculty; Associate Editor, Simulation Transactions

J. Rene Villalobos
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Industrial Engineering
Ph.D., Texas A&M University, 1991

Research interests: Logistics, automated quality systems, manufacturing systems and applied operations research, International Logistics and Productivity Improvement Laboratory (ILPIL)

Honors, awards & key activities: NSF CAREER Award, 1995; Member, Institute for Operations Research and the Management Science; Member, American Society for Engineering Education; Technical Advisory Board Member, Int. Journal of Interactive Design and Manufacturing
Ming Zhao
ming.zhao.1@asu.edu
Computer Science and Engineering
Ph.D., University of Florida, 2008
Research interests: Distributed/cloud computing, big data, high-performance computing, autonomic computing, virtualization, storage systems, operating systems
Honors, awards & key activities: VMware Faculty Award, 2014; U.S. Air Force Visiting Faculty Fellowship, 2014; National Science Foundation (NSF) Faculty Early Career Development (CAREER) Award, 2013; U.S. Air Force Summer Faculty Fellowship, 2013; Best Student Paper Award of 7th International Conference on Autonomic Computing (ICAC), 2007; Program Committee Chair for USENIX FeedbackComputing, 2013; Program Committee Member for ICAC, ICDCS, CLOUD, CCGrid, BigData, BDSE, HPDC, and HPCC; Reviewer for ACM TAAAS, IEEE TC, IEEE TCC, IEEE TCST, ACM TECS, IEEE TPDS, FGCS, JPDC, and Cluster Computing

Henri Ben Amor
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Computer Science and Engineering
Ph.D., Technical University Freiberg, 2010
Research interests: AI, robotics, machine learning, motor skill acquisition, human-robot interaction, virtual reality

Assistant Professor

Ashish Amresh
amresh@asu.edu
Software Engineering
Ph.D., Arizona State University, 2011
Research interests: Serious games research, computer graphics, human-computer interaction, computer science education, K-12 STEM education
Honors, awards & key activities: ASU President’s Award for Innovation, 2012; College of Technology and Innovation Faculty Mentor Award, 2011; Microsoft Outstanding Educator Award, 2009; Founding Faculty, SPARK App League; Session Chair, Special Interest Group in Computer Science Education (SIGCSE), 2013; Director, Ultimate Technology Boot Camp and Camp Game Programs

Srividiya Bansal
srvidya.bansal@asu.edu
Software Engineering
Ph.D., University of Texas at Dallas, 2007
Research interests: Semantic computing, big data integration; linked data generation; semantics-based solutions for outcome-based instruction design in STEM education; delivery models for software engineering education; web service description, discovery, and composition
Honors, awards & key activities: Editorial Board Member: International Journal of Semantic and Information Services; 2014-2018; Editorial Board Member: International Journal of Big Data; 2013-2015; Reviewer for journals: Service Oriented Computing and Applications (SOCA), Knowledge and Information Systems (KIS), IEEE Internet Computing (IC), IEEE Transactions on Services Computing (TSC), Computer Languages, Systems And Structures (COMLAN); Won the Best Paper Award for ‘Universal Service-Semantics Description Language (USDL)’ at the European Conference On Web Services (ECOWS) 2005

Adam Doupé
doupe@asu.edu
Computer Science and Engineering
Ph.D., University of California, Santa Barbara, 2014
Research interests: Cyber security, web security, automated vulnerability analysis, mobile app security, static analysis, program analysis, hacking competitions, software-defined networking security, telephony security, and pentesting
Honors, awards & key activities: 2015 Fulton Schools of Engineering Best Teacher Award — Top 5%; Best Paper Award, “A Large-Scale Study of Mobile Web App Security” at Mobile Security Technologies Workshop (MoST), May 2015; 2013 Outstanding Publication Award in Computer Science, UC Santa Barbara; Co-Chair of Poster Session USENIX Security Symposium, 2015

Adolfo Escobedo
adRes@asu.edu
Industrial Engineering
Ph.D., Texas A&M University, 2016
Research interests: Theory and application of optimization, mathematical programming error reduction/elimination
Honors, awards & key activities: Honorable Mention in the 2015 INFORMS Junior Faculty Interest Group paper competition
Assistant Professor

Ashraf Gaffar
agaffar@asu.edu
Software Engineering
Ph.D., Concordia University, 2005
Research interests:
Software Design, including: Human-Computer Interaction (HCI) and human cognition, Human Centered Design, Human-Car Interaction, Human-Robot Interaction, Software Design Methods, Software concept visualization
Honors, awards & key activities:
NSF, FQRNT (le Fonds Québécois de la Recherche sur la Nature et les Technologies, Canada) Scholarships; Power Corporations of Canada Scholarship; External Grant Holder Scholarship, Concordia University Research Chair Grant; SAP Design Innovation Award; SAP Peer-to-Peer Recognition Award; SAP Field Enablement Award

Feng Ju
fengju@asu.edu
Industrial Engineering
Ph.D., University of Wisconsin-Madison, 2015
Research interests:
Stochastic modeling and control in manufacturing and healthcare systems; battery management systems
Honors, awards & key activities:
Best Student Paper Award Finalist, IFAC Symposium on Information Control Problems in Manufacturing (INCOM), 2015; Best Paper Award, IFAC Conference on Manufacturing Modeling, Management and Control (MIM), 2013; Best Paper Honorable Mention, Industrial and Systems Engineering Research Conference (ISEREC), 2012; Member - Institute for Operations Research and the Management Sciences (INFORMS); Member - Institute of Electrical and Electronics Engineers (IEEE)

Jingrui He
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Computer Science and Engineering
Ph.D., Carnegie Mellon University, 2010
Research interests:
Heterogeneous machine learning, rare category analysis, active learning and semi-supervised learning, with applications in social network analysis, semiconductor manufacturing, traffic analysis, medical informatics, etc.
Honors, awards & key activities:
NSF CAREER Award 2016; IBM Faculty Award 2014; IBM Fellowship 2008, 2009; Publicity Chair for ICML 2015 and ICML 2014; Senior Program Committee for SDM 2015 and IJCAI 2015; Program Co-Chair for Workshop on Heterogeneous Learning at SDM 2015 and SDM 2014; Chair for IEEE BigData 2014 Doctoral Consortium; Program Committee for KDD 2015, ICDM 2015, SDM 2015, ICML 2014, KDD 2014, ICDM 2014, SDM 2014, PAKDD 2014

Ross Maciejewski
rmacieje@asu.edu
Computer Science and Engineering
Ph.D., Purdue University, 2009
Research interests:
Visual analytics, geographical visualization, statistics, social media, crime analytics, healthcare
Honors, awards & key activities:
IEEE Senior Membership (2015), Institute of Electrical and Electronics Engineers; Best Junior Faculty Researcher Award (2014) – CIDSE, ASU; NSF CAREER (Faculty Early Career Development) Award (2014); U.S. National Science Foundation; VAST 2013 Mini Challenge 1 Award: Excellent Visual Analysis of Structured and Unstructured Data; Coast Guard Meritorious Team Commendation (PROTECT); VAST 2010 Challenge Award: Support for Future Detection; IEEE/VGTC EuroVis Organizing Committee Member (STARS Co-Chair); VAST 2015 organizing committee member (Workshop Co-Chair); ASU Global Security Fellow

Sharon Hsiao
sharon.hsiao@asu.edu
Computer Science and Engineering
Ph.D., University of Pittsburgh, 2012
Research interests:
Adaptive technology, personalized learning, interactive educational systems, visual analytics, social visualizations, open user modeling
Honors, awards & key activities:
IEEE TCTL Young Researcher Award (2015); The Allen Kent Award - outstanding contribution to the Graduate Information Science and Technology (2012); ACM Graduate Student Research Competition Finalist (2011); Associate Editor International Journal of Artificial Intelligence in Education - SI AIEDCS; Program Committee & co-chair, AI-Supported Education for Computer Science workshop (AIEDCS) in ITS/AIED, since 2013; Program Committee, Intelligent Support for Learning in Groups (ISLG) in ITS/AIED, since 2013; Program Committee, ACM Conference on Hypertext and Social Media (HT), since 2014; Program Committee, European Conference on Technology Enhanced Learning (ECTEL), since 2014

Paolo Papotti
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Computer Science and Engineering
Ph.D., Universita' degli Studi Roma Tre
Research interests:
Data management, big data curation; data integration, data quality
Honors, awards & key activities:
"Best of the Conference" SIGMOD 2009, VLDB 2016; Best Demo award, SIGMOD 2015; program committee member SIGMOD, VLDB, ICDE, EDBT, WSDM; group leader, SIGMOD 2016; Associate Editor for the ACM Journal of Data and Information Quality (JDQ); 2015 Google faculty research award
Ted Pavlic
tpavlic@asu.edu
Industrial Engineering
Ph.D., The Ohio State University, 2010
Research interests: Distributed algorithms, autonomous systems, decentralized decision making, complex adaptive systems, self organization, hybrid dynamical systems, sustainability in the built environment, behavioral ecology, behavioral economics, operations research, bio-mimicry and bio-inspiration, parallel computation, robotics, energy systems, intelligent control; optimization; game theory; resource allocation; collective behavior
Honors, awards & key activities: Joint appointment with School of Sustainability; editorial board member for Human Computation; Review editorial board member for Frontiers in Robotics and AI, Computational Intelligence; Officer of IEEE Special Technical Community for Human Computation; Associate Director for Research, The Biomimicry Center at ASU; External faculty for Human Computation Institute; Program Committee, 2016 International Symposium on Intelligent Control; Program Committee, 2015 Conference on Complex Systems; Invited participant of 12th Annual National Academies Keck Futures Initiative Conference on Collective Behavior; Organizer or invited participant for a wide variety of interdisciplinary workshops across science and engineering

Mohamed Sarwat
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Computer Science and Engineering
Ph.D., University of Minnesota, 2014
Research interests: Database Systems, Spatial/Temporal Data Management, Large-Scale Data Management and Analytics, Recommender Systems
Honors, awards & key activities: Best Research Paper Award, 16th IEEE International Conference on Mobile Data Management 2015; Doctoral Dissertation Fellowship, Univ. of Minnesota 2013; Best Research Paper Award, 12th International Symposium on Spatial and Temporal Databases SSTD 2011; Best of Conference Citation, 28th IEEE International Conference on Data Engineering ICDE 2012; Registration Chair, ACM SIGMOD 2016; General Co-Chair, ACM SIGSPATIAL PhD Symposium 2014, 2015; PC member, ACM SIGMOD 2016 (Demonstration Track), IEEE ICDE 2015, ACM SIGSPATIAL GIS 2015, IEEE MDM 2015 (industrial track), ACM CIKM 2015; Reviewer: ACM Transactions on Database Systems (TODS), IEEE Transactions on Knowledge and Data Engineering (TKDE), Transactions on Mobile Computing (TMC), Transactions on Information Systems and Technology (TIST), ACM Transactions on Spatial Algorithms & Systems (TSAS), Geoinformatica, Journal

Giulia Pedrielli
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Industrial Engineering
Ph.D. Politecnico di Milano, Italy, 2013
Research interests: Simulation methodology, stochastics and learning/statistics related to simulation improvement both for performance evaluation as well as simulation-based optimization of complex systems

Fengbo Ren
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Computer Science and Engineering
Ph.D., University of California, Los Angeles, 2014
Research interests: Hardware acceleration and parallel computing solutions for data analytics and information processing, with emphasis on compressive sensing, sparse coding and deep learning frameworks
Honors, awards & key activities: Recipient of the 2012-2013 Broadcom Fellowship

Jorge Sefair
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Industrial Engineering
Ph.D., University of Florida, 2015
Research interests: Network optimization, robust optimization, integer programming, applications of optimization in environment, public policy, urban planning and finance
Honors, awards & key activities: Univ. of Florida Department of Industrial and Systems Engineering 2015 graduate student research award; 2013 and 2015 National Science Foundation (NSF) Travel Grant Awards (IE Annual Conference); runner-up for the 2015 INFORMS Computing Society Best Student Paper award

Paulo Shakarian
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Computer Science and Engineering
Ph.D., University of Maryland, College Park, 2011
Research interests: Artificial intelligence, social network mining, cyber-security
Honors, awards & key activities: AFOSR Young Investigator Award (2015); DoD Minerva Award (co-PI, 2015); MIT Technology Review Best of 2013; Mentorship Service Medal (2014); Featured in print edition of Popular Science (2014) and The Economist (2012); DARPA Service Chiefs Fellowship Program (2007); Bronze Star and other awards for military service; Director, Cyber-Socio Intelligent Systems (CySIS) Laboratory; Co-Chair, SI 2014: Workshop on Social Influence (held in conjunction with SocInfo 2014); Co-Chair, Workshop on Cyber Warfare: Building the Scientific Foundation (2014); Best Paper, POSINT-SI (2016); Selected for Innovation Showcase at TechConnect 2016; Defense University Research Instrumentation Program (DURIP) award (2016); Cybersecurity Initiative Fellow, New America (2016)
Assistant Professor

Hanghang Tong
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Computer Science and Engineering
Ph.D., Carnegie Mellon University, 2009
Research interests: Large scale data mining and machine learning, especially for graph and multimedia data with applications to social networks analysis, healthcare, cyber-security and e-commerce

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Computer Science and Engineering
Ph.D., Princeton University, 2012
Research interests: Energy-efficient heterogeneous architecture, energy harvesting for emerging computing devices, performance characterization, analysis and prediction, high-performance and power-efficient LLC designs

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Computer Science and Engineering
Ph.D., Carnegie Mellon University, 2010
Research interests: Intelligent tutoring systems, computer-supported collaborative learning, online learning communities, tangible embodied environments, human-computer interaction

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Computer Science and Engineering
Ph.D., University of Washington, 2002
Research interests: Brain imaging, computer vision, computer graphics, statistical pattern recognition

Yezhou Yang
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Computer Science and Engineering
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The life and career of Gerald Farin, geometric modeling pioneer, generous mentor

Gerald Farin, computer science professor and internationally renowned geometric modeling researcher, passed away Jan. 14, 2016. He pioneered the field of geometric modeling and helped elevate the Ira A. Fulton Schools of Engineering’s computer science program to be one of the best during his 29 years at Arizona State University. He is survived by his wife and collaborator, Dianne Hansford, and left lasting impressions on those who knew him throughout his career.

Farin’s introduction to geometric modeling during his doctoral studies at Technical University Braunschweig was serendipitous. A random assignment to read and present a paper that happened to be about 3D modeling for car design launched a lifelong career.

In his early career he went where the action was for computer graphics in the 1970s: the University of Utah. In the mathematics department there he met Robert E. Barnhill — who later became chair of ASU’s Computer Science Department and ASU Vice President for Research — and helped the field known as Computer Aided Geometric Design rise to prominence.

He put those skills to the test in the automotive industry working in the CAD/CAM development team at Mercedes Benz, who had some of the most advanced tools in the automotive industry. There Farin was able to create complex mathematical tools for designers who had no mathematical training by studying designers’ methods and translating them into mathematics and software tools — a skill that would help him bring geometric design to many scientific disciplines.

Though he worked in industry, Farin remained devoted to his research, and that eventually led him to rejoin Barnhill and his mathematics CAGD research group when it moved to ASU in 1987.

CAGD wasn’t a topic researched or taught much at ASU before the internationally recognized Farin arrived, but as soon as he did, the topic area took off as students flocked to his classes, including current Professor Anshuman Razdan when he was a graduate student.

His reputation as a leader in his field helped encourage more faculty to join and expand ASU’s computer science program. He was influential in growing and improving the academic quality of the graduate program as part of the graduate committee. Today the computer science program is ranked 22nd in the 2015 Academic Ranking of World Universities in the U.S. and 32nd internationally by the Center for World-Class Universities at Shanghai Jiao Tong University.

Farin’s prominence in the CAGD field also was helped by his involvements in leading journals and groups, including “Computer Aided Geometric Design Journal,” “Computer-Aided Design,” “The Visual Computer,” the Arizona Alzheimer’s Research Center, Berlin-based mathematics research center MATHEON and the special interest group in Geometric Design within the Society for Industrial and Applied Mathematics.

His own publishing record is impressive, having published more than 100 papers, and nearly 30 books, of which his “Curves and Surfaces for CAGD” is considered a seminal work.

Farin and Dianne, also a geometric modeling and CAD/CAM researcher, wrote other widely used books together, including “Practical Linear Algebra – A Geometry Toolbox,” “The Essentials of CAGD” and “Mathematical Principles for Scientific Computing and Visualization.”

Farin even held a patent with Razdan and Liyan Zhang for 3D face authentication based on bilateral symmetry analysis.

Farin was committed to passing along his knowledge of CAGD in person as well. He taught many geometric modeling tutorials and gave more than 100 lectures worldwide. At ASU he taught classes on introductory and advanced CAGD, theoretical computer science and informatics.

His ability to translate highly complicated ideas and create tools for designers without computer science or mathematical expertise made him a pioneer in bringing CAGD far beyond the computer science department. Through founding the Partnership for Research in Spatial Modeling research center at ASU with Daniel Collins, he brought geometric modeling to the arts, anthropology, and other scientific disciplines.

Out of the PRISM research lab he was influential in creating the Decision Theater with ASU President Michael Crow. This center helps researchers and leaders to visualize solutions to complex problems.
Colleagues and students at ASU remember Farin fondly as a true visionary and role model who devoted his life to scientific research. He was a mentor who supported those who needed his help with generous advice and encouragement.

And still as he took the time to meet with his students and colleagues for academics and for fun, Farin maintained an international reputation as a geometric modeling leader. People who design cars and many other things through computer-aided modeling in the future will depend on his work.
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