vision leading engineering discovery and innovative education for global impact on quality of life

mission provide an environment rich in transdisciplinary research, education, entrepreneurship, and leadership resulting in successful engineers and technologies that benefit society
message from the dean

ARIZONA STATE UNIVERSITY
IRA A. FULTON SCHOOLS OF ENGINEERING

DEIRDRE R. MELDRUM, PH.D.
ASU’s Ira A. Fulton Schools of Engineering are deeply committed to the ideals of the National Academy of Engineering’s (NAE) “Grand Challenges for Engineering.”

We have put restructuring designs in motion to align our research pursuits and teaching goals more intensively with the University’s role of serving societal needs like those outlined in the academy’s Grand Challenges.

We have organized our academic programs into five unique schools to enable innovative collaboration across disciplines, with faculty and students alike focusing their efforts on developing solutions that will have significant, lasting impact on our local and global communities.

Those endeavors led to our selection as host and organizer of one of five NAE Grand Challenges Summits this year across the country. ASU joined Duke University, the University of Southern California, Northwestern University, the University of Chicago and the University of Washington as Summit series hosts.

The Phoenix Grand Challenges Summit drew business and education leaders, engineers, scientists, teachers and university students. It attracted sponsorship from Intel, Raytheon, First Solar, Salt River Project and Ira A. Fulton. In total, nearly 600 participants convened at the Arizona Biltmore hotel in Phoenix.

The Phoenix Summit focused on four of the NAE Grand Challenges—making renewable energy sources more reliable and affordable, engineering better medicines, managing the nitrogen cycle and advancing personalized learning.

Leading discussions in these areas were four outstanding plenary speakers: Leland Hartwell, Nobel Prize-winning medical research leader and former president and director of the Fred Hutchinson Cancer Research Center; Kristina M. Johnson, under secretary of Energy with the U.S. Department of Energy; Pamela Matson, the Chester Naramore Dean of the School of Earth Sciences at Stanford University; and James Duderstadt, president emeritus of the University of Michigan.

Amid diverse viewpoints expressed by Summit participants, a consensus emerged about the magnitude of the overall challenge. Speakers agreed that beyond technological achievements, it will take transformative changes in prevailing economic, business, political and education cultures to fully meet the world’s most pressing needs.

As we educate the engineers of the future, we will challenge them to drive progress with a watchful eye to their impact on society. We will instill an entrepreneurial spirit alongside technical expertise.

We will further advance our research enterprise with an ever-present focus on addressing the real challenges to the world’s growth and well-being.

The Ira A. Fulton Schools of Engineering will continue to forge a new model for engineering education, maintaining our commitment to teaching and discovery that benefit global quality of life.
vision leading engineering discovery and innovative education for global impact on quality of life

mission provide an environment rich in transdisciplinary research, education, entrepreneurship, and leadership resulting in successful engineers and technologies that benefit society
phoenix grand challenges summit
April 2010 | Hosted by ASU’s Ira A. Fulton Schools of Engineering

highlights

Fulton Schools of Engineering
2007-2010

Total enrollment: 6,343
New freshmen: 774
Research expenditures: $55.5M
NSF CAREER Awards: 3
Deirdre Meldrum takes the helm as dean
Engineering Student Center opens

Total enrollment: 6,401
New freshmen: 881
Research expenditures: $60.0M
NSF CAREER Awards: 5
ASU becomes regional host of the FIRST LEGO League
$4M gift from Gary and Diane Tooker
E² Camp started as foundational experience for all freshman engineering students
Our commitment to achieving these goals goes beyond rallying experts to take up our cause

Leading futurists and technologists working in partnership with the National Academy of Engineering (NAE) and the National Science Foundation (NSF), have identified 14 Grand Challenges for Engineering in the 21st century. The result is a critical grouping of problems that must be tackled in order to maintain our national security, quality of life and sustainable future in an increasingly complex world.

In April 2010, experts and participants gathered at the Phoenix Grand Challenges Summit to address the need to develop new medicines and biomedical technologies, to make solar energy economical, to find better ways to manage and recycle the increasing amount of waste materials produced by growing nations, and to transform education to prepare the next generations for facing these and other challenges.

The Phoenix Summit represented a commitment to sustain critical dialogue and engagement with grand challenge problems and to change the way we educate our students in order to better prepare them for the challenges ahead. Addressing issues this complex requires innovation and cooperation from engineers of all kinds, as well as policy makers, economists, geologists, biologists and sociologists.

As we continue to leverage our resources in pursuit of these goals, our faculty and students are focused on finding solutions to these and other challenges that impact global quality of life.

Left: Summit plenary speaker Leland Hartwell, Nobel Prize-winning medical research leader and director of the Center for Sustainable Health at ASU

Deirdre Meldrum becomes Senior Scientist for Arizona State University on January 1, 2011.
FIRST-TIME FRESHMEN

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RESEARCH EXPENDITURES (millions of dollars)

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FALL ENROLLMENT

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<td>4,091 B.S./B.S.E.</td>
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DEGREES GRANTED

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<th>'09</th>
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<td>458 M.S./Ph.D.</td>
<td>672 M.S./Ph.D.</td>
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message from the dean
advancing university research

Introducing ASU’s Senior Scientist: Meldrum pursuing new frontiers for ASU

Deirdre Meldrum has accepted a new leadership role at Arizona State University. When she arrived at the Ira A. Fulton Schools of Engineering in 2007, she opened a new chapter in the Schools’ 50-year history by becoming the first woman to assume the role of dean. Meldrum’s career reflects key elements of President Michael Crow’s vision of academic and research pursuits that respond to community needs and societal challenges from a global perspective.

As a result of Meldrum’s legacy of positive, dramatic contributions at the Ira A. Fulton Schools of Engineering, she has been promoted to senior scientist for ASU effective January 1, 2011. During her four successful years as dean, she has refocused the Schools’ energy on the grand challenges facing our global community, strengthened the research capacity of the Schools and enhanced the quality of the experience for students.

Meldrum’s experience leading a large research program, the Center for Biosignatures Discovery Automation at ASU’s Biodesign Institute, make her uniquely qualified to lead this new effort for ASU.

As senior scientist for Arizona State University, Meldrum will advise ASU’s president and provost, providing leadership on the scientific direction for the university as well as spearheading major national science and engineering initiatives. Specifically, Meldrum will lead the effort to secure a federally-funded national lab, a key to increasing ASU’s research enterprise and capabilities. In addition, a national lab can positively impact the state and local economy through dissemination of innovation, licensing of new technologies and new patents.
The Fulton Difference

We are building an engineering school for the future: We embrace the aspirations of our profession and the community that we serve.

Our use-inspired research emphasizes impact, agility and connections: We are a diverse research community with strengths in important thematic areas: education, energy, exploration, healthcare, security and sustainability.

The student experience is designed for student success: we emphasize and build on those characteristics that make engineers unique and valuable—the ability to design, build, innovate and solve today’s most important problems.

Our faculty have received the highest awards in their fields: We recognize excellence in all dimensions of academic endeavors.

We are inspiring future engineers: We are creating a pipeline of students to fill the ever-increasing need for engineers.

Faculty Honors

9  Members of the National Academy of Engineering
1  Member of the National Academy of Sciences
2  Members of the National Academy of Construction
8  Arizona Regents’ Professors
1  ASU President’s Professor
3  PECASE recipients
45 National Science Foundation CAREER Award recipients (1995-2010)
6  National Science Foundation Presidential Young Investigators

at a glance

Five schools, 14 programs

Fall 2010 Enrollment 7,015
Undergraduate 4,725
Graduate 2,290
First-Time Freshmen 1,157
ASU Total Enrollment 70,440

Tenured and Tenure-Track Faculty 214

Research $74.2M
(FY 2010)

Alumni 31,000+

NSF CAREER Awards

30 (1995-2006)
15 (2007-2010)

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Tempe, AZ 85287-9309

Academic and Student Affairs: 480-965-1726
Engineering Administration: 480-965-1730

engineering.asu.edu

message from the dean
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investing in engineering 54
education innovation 58
harnessing the sun 61
at a glance

Five schools, 14 programs

Fall 2010 Enrollment: 7,015
Undergraduate: 4,725
Graduate: 2,290
Master’s 1387, Ph.D. 808, Other 95
First-Time Freshmen: 1,157
Largest freshman class in Schools’ history

ASU Total Enrollment: 70,440
Tenured/Tenure-Track Faculty: 214
Research: $74 million (FY 2010)
Alumni: 31,000+
Transcending the traditional

Society’s needs are changing. To produce the engineers and innovations essential to address these needs, engineering schools must move beyond their traditional disciplinary-driven cultures, programs and organizations. Many schools talk about this, but we are doing it, as reflected by our organization, the opportunities we provide for our students, the graduates that we produce, the faculty that we attract and the impact of our research programs.

Focusing on the student experience

Students require more than traditional coursework to be competitive and successful in their engineering careers. Our students pursue degree programs having both strong disciplinary foundations and cross-disciplinary thematic focus opportunities (e.g., energy, sustainability, healthcare). Experiential opportunities—internships, research, student organizations and community service—are integral components of the overall student experience. In combination, these lead to graduates who are uniquely prepared for a diverse range of careers and are highly attractive to employers.

Focusing on student success

E² Camp, our innovative orientation required for new freshmen, together with personalized advising, the engineering residential community, engineering tutoring services and our engineering career center reflect our commitment to the success and retention of our students. About 90 percent of our incoming freshmen are retained within the university.

Leading use-inspired research

Energy, healthcare, sustainability, exploration, education and security are our research emphasis areas, with more than 1,000 faculty and students generating discoveries, innovations and inventions needed to solve society’s challenges in these areas.

Attracting a different kind of faculty

We attract top faculty who are dedicated to student success, embrace change, pursue transdisciplinary collaborations, and measure the success of their research and professional activities by the impact they have locally and globally. Many faculty have received top recognitions in their fields.

Inspiring future engineers

Through collaborations with Arizona’s K–12 teachers, education leaders and ASU engineering faculty and student organizations, the Ira A. Fulton Schools of Engineering offer a full spectrum of creative programming and activities designed to inspire young minds to pursue engineering, thereby creating a pipeline of students to fill the ever-increasing need for engineers.

ARIZONA STATE UNIVERSITY: THE NEW AMERICAN UNIVERSITY

Arizona State University is an institution committed to excellence, access and impact—a new gold standard for the American research university. The New American University is ASU’s vision for transforming higher education.
http://newamericanuniversity.asu.edu
research themes

energy
healthcare
sustainability
exploration
education
security

school of biological and health systems engineering

research foci
- cardiovascular engineering
- synthetic/computational biology
- medical devices and diagnostics
- neuroengineering
- rehabilitation
- regenerative medicine
- imaging
- molecular, cellular and tissue engineering
- virtual reality healthcare delivery systems

degree programs
- biomedical engineering
  (Harrington Bioengineering program)

school of computing, informatics, and decision systems engineering

research foci
- artificial intelligence
- cyberphysical and embedded systems
- health informatics
- information assurance and security
- information management/multimedia/visualization
- network science
- personalized learning/educational games
- production logistics
- software and systems engineering
- statistical modeling and data mining

degree programs
- computer science
- computer systems engineering
- engineering management
- industrial engineering
- informatics

the ira a. fulton schools of engineering

degree programs
- biomedical engineering
  (Harrington Bioengineering program)
school of electrical, computer and energy engineering

research foci
- power and energy systems
- signal processing and communications
- solid state devices and modeling
- wireless communications and circuits
- photovoltaics
- biosignatures discovery automation
- flexible electronics
- nanostructures

degree programs
- electrical engineering

school for engineering of matter, transport and energy

research foci
- electronic materials and packaging
- materials for energy (batteries)
- adaptive/intelligent materials and structures
- multiscale fluid mechanics
- membranes
- therapeutics and bioseparations
- flexible structures
- nanostructured materials
- micro/nano transport

degree programs
- aerospace engineering
- chemical engineering
- materials science and engineering
- mechanical engineering

school of sustainable engineering and the built environment

research foci
- water purification
- transportation (safety and materials)
- construction management
- environmental biotechnology
- environmental nanotechnology
- earth systems engineering and management
- SMART innovations
- project performance metrics
- underground infrastructure

degree programs
- civil, environmental and sustainable engineering
- construction engineering
- construction management
  (Del E. Webb School of Construction programs)
the fulton difference: the student experience
focus on success
Increasing student engagement and retention

Creating community: E² Camp
E² Camp, our innovative orientation required for new freshmen, is central to our student success strategy.

E² Camp was established in 2008 to create a strong sense of community for our incoming engineering class. Held at Camp Sky-Y in Prescott, Arizona, E² Camp continues to be an overwhelming success. First-year engineering students interact with faculty members, student mentors and peers through participation in team projects, physical challenges, competitions and workshops.

Now an integral component of the undergraduate experience, students are introduced to the significant roles that engineers play in shaping our world, and quickly become acclimated to university life through interaction with other engineering students.

Enthusiastic alumni, faculty, staff and student volunteers are present to welcome engineering freshmen to the ASU community, and to the engineering profession. The secret to the E² Camp experience is that it is largely run by our engineering students.

As our freshman enrollment increases, so does the participation in E² Camp: 665 freshmen attended in 2008; 774 attended in 2009; and in 2010, 916 new engineering students attended the camp. Freshmen from the 2008 entering class who participated in E² camp were retained at a rate of 89.1 percent versus 80 percent for non-participants.

Engineering Residential Community
First-year students enrolled in engineering programs have the opportunity to live in a smaller campus community within the larger university. Countless special events, intramural activities and student organizations offer residents opportunities to connect with their academic peers, mentors, faculty and others who share similar interests and classes.

Additionally, the on-campus living and learning environment significantly contributes to a successful transition into the university for freshmen students. It also helps to enrich their academic experience outside the classroom by providing easy access to undergraduate academic support services such as tutoring, workshops, advising and study groups.

Barrett, the Honors College at Arizona State University
Barrett is a selective, residential college that recruits academically outstanding undergraduates from across the nation. Engineering courses with an honors designation provide opportunities for collaboration with faculty on special projects and an expanded understanding of the course subject matter.

In fall 2010, more than 600 engineering students were concurrently enrolled in Barrett—13 percent of all engineering undergraduates, the highest percentage of any school or college at ASU.
Undergraduate research

The Fulton Undergraduate Research Initiative (FURI) has become one of our premier undergraduate experiential opportunities. FURI is designed to enhance and enrich a student’s engineering education by providing hands-on lab experience, independent and thesis-based research and travel to national conferences. Students select, design and complete research projects under the guidance of faculty mentors and present their findings at an annual public symposium.

In 2009, FURI featured 160 research projects attracting more than 125 participants and over 400 visitors. Nearly 25 percent of the school’s faculty mentored FURI students, with female and underrepresented minority students comprising nearly two-thirds of FURI participants.

Students cite FURI experiences as being extremely valuable and rewarding. Students learn to pursue new knowledge outside of the classroom and textbook, develop confidence in their ability to be creative and innovative, and gain insight to what it is like to be a graduate student at a research-intensive university.

Fulton Grand Challenge Scholars Program

The National Academy of Engineering (NAE) has identified 14 Grand Challenges for Engineering in the twenty-first century. These challenges serve to raise awareness and call attention to opportunities to impact and improve our quality of life.

Created in February 2009, the NAE Grand Challenge Scholars program is a combined curricular and extra-curricular program designed to engage and encourage exceptional students.

The Fulton Grand Challenge Scholars Program combines an innovative curriculum and cutting-edge research experiences with global, entrepreneurial and service learning opportunities, preparing students to solve the grand challenges facing society.

The Ira A. Fulton Schools of Engineering have been selected as the first non-founding partner in the program. Founding schools include Duke University’s Pratt School of Engineering, the Franklin W. Olin College of Engineering, and the University of Southern California’s Viterbi School of Engineering.

Fulton students who complete the program achieve the distinction of Grand Challenge Scholar, endorsed by both ASU and the National Academy of Engineering.

Bachelor’s + master’s degrees: 4+1 accelerated programs

In support of a commitment to prepare our students for success in an intensely competitive and global environment, the Ira A. Fulton Schools of Engineering offer high-achieving students an opportunity to earn both a bachelor’s and a master’s degree within five years.

The accelerated curriculum, or 4+1 program, is offered across all engineering academic disciplines and provides eligible students with the option to combine advanced undergraduate coursework with graduate coursework and accelerate graduate degree completion.

Jennifer Gamboa, chemical engineering, class of 2011

152 National Merit Scholars
49 National Hispanic Scholars
4 Goldwater Scholars
3 National Achievement Scholars
3 Flinn Scholars
5 Gates Millennium Scholars

(Fall 2010)
Engineering Projects in Community Service: EPICS Gold

The Engineering Projects in Community Service program, known as EPICS Gold at ASU, organizes teams of undergraduate students to design, build, and deploy systems to solve engineering-based problems for not-for-profit organizations such as charities and schools. Thirty-five students enrolled in the first series of EPICS courses offered fall 2009, and 101 students enrolled in fall 2010. ASU is one of more than 20 university partners in the national EPICS program.

Over 20 project teams have been formed for the 2010-2011 academic year with many projects that address needs in the Phoenix metropolitan area and four projects overseas in Bangladesh, Malawi, El Salvador and Haiti.

ASU’s EPICS program also has a high school outreach component involving three local high schools—Xavier College Preparatory, Phoenix Union Bioscience and Marcos de Niza—in collaborative service-learning projects with ASU students.

EPICS Student Teams: Entrepreneurship for Social Good 2010-2011

- High-Tech Storytelling
  Project C.U.R.E. Multimedia Exhibits

- Idea Factory
  Senior Capstone: Maternity Clinic
  Container design for Malawi
  Container-based Wind Turbine: Low Cost and Lightweight
  SKY-Y Camp – Recycling Program
  Clarkdale Sustainability Park Waste to Energy Project

- Taming Water
  Rio Salado Habitat 7th Avenue SW Drainage Outfall
  Rio Salado Habitat Central Drainage Outfall
  SKY-Y Camp – Stormwater and Erosion Control
  Clarkdale Sustainability Park Water Recharge Wetlands Project

Citizen Science
- eBird Hotspot Wiki Upgrade Birding Website
- Smithsonian Tropical Research Panama – Vidyo© Streaming Link

Skill Building
- Create an iPad App for Social Entrepreneurs using TRIZ
- The Mysterious World of Dr. Biology – Online Comics Builder
- SKY-Y Camp – Leadership Challenge Courses

Changing the World
- Bangla: EPICS Solar Energy and Clean Water (3 projects)
- Doc-In-A-Box Haiti Earthquake Telemedicine Container Upgrade
- Malawi Empowerment Village Maternity Clinic in a Container
- Bridges To Prosperity – Build a Suspended Bridge in El Salvador
There are more than 35 engineering student organizations, ranging from honors and professional associations to groups creating underwater robots, concrete canoes and rocketry.

These academic, professional and social opportunities build on the academic experience at ASU, creating lasting memories and connections.

Award-winning student organizations
- American Indian Science and Engineering Society
- American Institute of Aeronautics and Astronautics
- American Institute of Chemical Engineering
- American Society of Civil Engineers
- Daedalus Astronautics
- Society of Hispanic Professional Engineers
- Society of Mexican American Engineers and Scientists

Student clubs and professional organizations
- American Concrete Institute (ACI)
- American Indian Science and Engineering Society (AISES)
- American Institute of Aeronautics and Astronautics (AIAA)
- American Institute of Chemical Engineers (AIChE)
- American Society of Civil Engineers (ASCE)
- American Society of Heating, Refrigeration, and A.C. Engineers at ASU (ASHRAE)
- American Society of Mechanical Engineers (ASME)
- Associated General Contractors of America Student Chapter (AGC)
- Biomedical Engineers Society (BMES)
- Bridges to Prosperity
- Chi Epsilon (XE)
- Construction Students Abroad
- Daedalus Astronautics
- Engineering World Health
- Engineers Without Borders
- Eta Kappa Nu, International Honor Society for Electrical Engineers
- Fulton Engineering Student Council
- Game Development Studio
- Institute for Operations Research and Management Science (INFORMS)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute of Electrical and Electronics Engineers Computer Society (IEEECS)
- Institute of Industrial Engineers (IIE)
- Linux Users Group
- Material Advantage at ASU
- National Association of Home Builders (NAHB)
- National Society of Black Engineers (NSBE)
- North American Society for Trenchless Technology (NASTT)
- Sigma Lambda Chi, ETA Chapter, International Construction Honor Society
- Society of Automotive Engineers
- Society of Hispanic Professional Engineers (SHPE)
- Society of Mexican American Engineers and Scientists (MAES)
- Society of Women Engineers (SWE)
- Software Developers Association at ASU (SoDA)
- Tau Beta Pi
- Theta Tau
- Women in Computer Science
rocketry club wins a top award at NASA competition

The ASU student rocketry club Daedalus Astronautics took the “closest to altitude” award at the National Aeronautics and Space Administration’s 2009 University Student Launch Initiative rocket competition.

The ASU team, made up of about 20 engineering students, most studying aerospace and mechanical engineering, designed, built and launched a reusable rocket with a scientific payload in an attempt to reach an altitude of one mile. They were evaluated on rocket performance, design and scientific value of the payload. The Daedalus rocket reached one mile and 13 feet, beating teams from 18 other colleges and universities across the country.

The competition is designed to inspire students to pursue careers in science, technology, engineering and mathematics, all areas of expertise deemed critical to NASA’s mission. The team’s participation was made possible by sponsorship from Raytheon Corp., Orbital Sciences Corp., ATK and Freescale Semiconductor.

“We enrolled in this competition to give our new members a chance to take charge in the design, construction and launch of a high-powered sounding rocket.”

James Villarreal, founder of the club
global reach: continuing and executive education

The Office of Global Outreach and Extended Education in the Fulton Schools of Engineering develops partnerships with international academic institutions, governments and corporations providing the professional development opportunities and advanced education that global engineering professionals require to remain competitive. Engineering professionals can access innovative, high-impact curriculum including graduate degrees, certificate programs, custom programs and non-credit short courses.

- Providing distance education delivery for more than 20 years
- Implementing complete online delivery of engineering graduate degrees began in 2003
- Offering customized executive education programs to national and international corporations
- Providing access to online education from an engineering school with nationally ranked on-campus programs
- Working with organizations and students in Malaysia, South Korea, Costa Rica, Mexico, the Philippines, Ireland, Colombia, Vietnam and China
- Leading a three-year, public-private partnership with the United States Agency for International Development (USAID), Intel, the government of Vietnam, and Portland State University, to enhance the quality of engineering education at Vietnam’s top technical universities
- Reaching more than 500 students in noncredit professional programs every year
- Offering online and executive programs in electrical engineering, enterprise systems innovation and management (ESIM), industrial engineering, software engineering, materials science and engineering, embedded systems, modeling and simulation, quality and reliability engineering, systems engineering, transportation, construction, sustainable technology and management and Six Sigma.

Goldwater Scholars

Four ASU undergraduates who already are performing sophisticated, graduate-level research have won Goldwater Scholarships, the nation’s premier awards for undergraduates studying science, math and engineering. Engineering recipients include Tyler Libey, a biomedical engineering major, and Edward Lee, an electrical engineering major.

Libey, who was raised in Chandler, Arizona, by a single mother, is a dedicated student who is studying drug delivery in the treatment of brain cancer. He is using computer modeling to map out and determine how to introduce tumor-reducing drugs to key areas of the brain.

Lee, the son of immigrant parents from Korea, is a talented researcher who works alongside doctoral candidates in ASU’s Flexible Display Center, often taking the lead in programming. He is working on improving medical imaging for both healthcare and detection of radiological weapons.

ASU students have won 47 Goldwater Scholarships in the last 17 years, placing ASU among the leading public universities. All four of ASU’s nominees were selected this year, repeating a sweep that occurred in 2006.
Microsoft Imagine Cup Winners

Touch and Tablet Accessibility Award

Computer science students David Hayden and Andrew Kelley recently returned from Warsaw, Poland, with a first-place trophy from the 2010 Imagine Cup Worldwide Finals by Microsoft for their Note-Taker project.

More than 50 student teams from around the world entered a special category of the competition that challenged them to find creative ways to use Microsoft Windows-based Tablet PCs to improve access to education.

The Note-Taker project began about two years ago when Hayden realized that his visual disability was jeopardizing his pursuit of a bachelor’s degree with a dual major in computer science and mathematics. None of the commercially available assistive technologies allowed him to keep up with note-taking in advanced mathematics coursework, during which instructors often filled more than a dozen whiteboards with theorems and proofs. Left with little recourse, Hayden began working on a solution.

The Note-Taker consists of a portable, custom-designed video camera and a Tablet PC. The camera is able to tilt up and down, and sweep side to side, as well as zoom in on its target. The split-screen tablet display allows one half of the screen to stream live video from the camera, while the other half provides a window for entering notes.

This dual-window interface allows students with visual impairment to quickly glance back and forth between the live view of the classroom whiteboard and their notes. The video window also allows the user to aim and zoom the camera by simply dragging, tapping or pinching within the video window.

The Note-Taker is inexpensive, small enough to fit on a typical classroom desk and easy to set up. Teachers don’t need to adapt their instructional methods and are often unaware it is being used. The project has received a two-year, $400,000 grant from the National Science Foundation in support of further product development.

The team plans to enter the Note-Taker in the 2011 Imagine Cup competition in the Software Development category. They want to expand its capabilities by providing audio/video recording that allows synchronized playback of lectures, along with the corresponding handwritten or typed notes, so students can review lessons after classes.

Other team members include computer science doctoral student Mike Rush, industrial design graduate student Liqing Zhou, electrical engineering undergraduate Michael Austrauskas and postdoctoral research associate Gaurav Pradhan.

Wall Street Journal ranks ASU 5th for recruiting new hires

ASU ranks fifth on a list of the top universities favored by employers for job recruiting, according to a new survey conducted by the Wall Street Journal that aimed to identify “the majors and schools that best prepare students to land jobs that are satisfying, well-paid and have growth potential.”

The top five include ASU, Penn State, Texas A&M, University of Illinois and Purdue.

All five universities were noted for their well-rounded and talented student body, along with their partnerships and close proximity to business communities that result in work-savvy students with a wide array of internship experience.

ASU was especially noted for strong ties between professors and employees.

the fulton difference: our faculty
214 tenured and tenure-track faculty and growing, with many receiving the highest awards in their fields.

Nobel Laureate
Leland Hartwell

National Academy of Engineering
Ronald Adrian
Richard Farmer
Gerald Heydt
Subhash Mahajan
James Mayer (emeritus)
Bruce Rittmann
John Rowell
Della Roy
Vijay Vittal

National Academy of Sciences
Leland Hartwell

National Academy of Construction
William Badger
G. Edward Gibson, Jr.

Arizona Board of Regents’ Professors
Constantine Balanis
David Ferry
Gerald Heydt
Subhash Mahajan
James Mayer (emeritus)
Douglas Montgomery
Bruce Rittmann
Dieter Schroder

ASU President’s Professor
James Adams

Presidential Early Career Awards for Scientists and Engineers (PECASE)
Ying-Cheng Lai
Deirdre Meldrum
Enrique Vivoni

National Science Foundation CAREER Awards
45 Awardees, 1995-2010
(See page 27 for complete list.)

National Science Foundation Presidential Young Investigator
James Adams
Ronald Askin
Yu (Joseph) Hui
Bruce Rittmann
Ronald Roedel
Vijay Vittal

Research Centers and Institutes

Adaptive Intelligent Materials and Systems Center
Arizona Initiative for Renewable Energy
Arizona Institute for Nano-Electronics
ASU Advanced Photovoltaics Center
Center for Adaptive Neural Systems
Center for Applied Nanoionics
Center for Bioelectronics and Biosensors
Center for Biosignatures Discovery Automation
Center for Cognitive Ubiquitous Computing
Center for Computational Nanoscience
Center for Earth Systems Engineering and Management
Center for Environmental Biotechnology
Center for Environmental Fluid Dynamics
Center for Photonics Innovation
Center for Renewable Energy Electrochemistry
Center for Research on Education in Science, Mathematics, Engineering and Technology
Center for Solid State Electronics Research
Center for Sustainable Health
Connection One/ Wireless Integrated Nano Technology
Consortium for Embedded Systems
Construction Research and Education for Advanced Technology Environments
Decision Theater
Flexible Display Center
High Performance Computing Initiative
Housing Research Institute
Information Assurance Center
LeRoy Eyring Center for Solid State Science
National Center of Excellence on SMART Innovations
Partnership for Research in Spatial Modeling
Power Systems Engineering Research Center
Sensor Signal and Information Processing Center
Water and Environmental Technology Center
new faculty 2006-2010

Gail-Joon Ahn, Associate Professor
School of Computing, Informatics, and Decision Systems Engineering
Ph.D. in information technology, George Mason University
Research expertise: Vulnerability and risk management; authentication and access control; security architecture for distributed systems; formal models for computer security; cybercrime analysis.

Soyoung Ahn, Assistant Professor
School of Sustainable Engineering and the Built Environment
Ph.D. in civil and environmental engineering, University of California, Berkeley
Research expertise: Traffic flow theory and operations; intelligent transportation systems applications; traffic operational impacts on safety.

Jean M. Andino, Associate Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in chemical engineering, California Institute of Technology
Research expertise: Atmospheric chemistry and air pollution.

Robert Atkinson, Associate Professor
School of Computing, Informatics, and Decision Systems Engineering
Joint appointment in the Mary Lou Fulton Teachers College
Ph.D. in applied cognitive science, University of Wisconsin, Madison
Research expertise: The intersection of cognitive science, informatics, instructional design and educational technology.

Janaka Balasooriya, Lecturer
School of Computing, Informatics, and Decision Systems Engineering
Ph.D. in computer science, Georgia State University
Expertise: Distributed, internet and grid computing; Web service coordination primitives and system architectures; biological data integration and interoperability; middleware; embedded software.

Kevin Bennett, P.E., Assistant Professor
School of Biological and Health Systems Engineering
Ph.D. in biophysics, Medical College of Wisconsin
Research expertise: Molecular imaging.

Jennifer Blain Christen, Assistant Professor
School of Electrical, Computer and Energy Engineering
Ph.D. in electrical and computer engineering, Johns Hopkins University
Research expertise: Bio-compatible integration techniques for CMOS electronics, microfluidics and soft lithography; 3-D and nontraditional microfabrication techniques and devices.

Kevin Burger, Lecturer
School of Computing, Informatics, and Decision Systems Engineering
Ph.D. in computer science, University of Kansas
Expertise: Embedded systems; introductory programming; data structures and algorithms; computer architecture and organization; Web development.

Linda Chattin, Lecturer
School of Computing, Informatics, and Decision Systems Engineering
Ph.D. in industrial engineering, University of New York
Expertise: Discrete optimization; stochastic processes and probabilistic modeling; emergency service location.

Yinong Chen, Lecturer
School of Computing, Informatics, and Decision Systems Engineering
Ph.D. in computer science, University of Karlsruhe, Germany
Expertise: Service-oriented computing; embedded systems; fault-tolerant computing; distributed computing.

Aaron Cohen, Lecturer
School of Sustainable Engineering and the Built Environment
M.S., DePaul University
Expertise: Heavy construction and underground infrastructure.

Peter Crozier, Associate Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in physics, University of Glasgow, U.K.
Research expertise: Nanomaterials and nanostructures.
William Ditto, Professor and School Director
School of Biological and Health Systems Engineering
Ph.D. in physics, Clemson University
Research expertise: Neuroengineering and synthetic biology.

Georgios Fainekos, Assistant Professor
School of Computing, Informatics, and Decision Systems Engineering
Ph.D. in computer and information science, University of Pennsylvania
Research expertise: Cyberphysical systems; hybrid dynamic systems; real-time and embedded systems; formal methods with applications to automation and control; system testing and verification; formal languages and logic; motion planning in robotics.

Werner J.A. Dahm, Professor
School for Engineering of Matter, Transport and Energy
Director, Security and Defense Systems Institute
Ph.D. in aeronautics, California Institute of Technology
Research expertise: Defense science and technology; fluid dynamics; aerodynamics; turbulent flow; turbulence modeling; combustion science; propulsion; advanced propulsion systems.

Lenore Dai, Associate Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in materials science and engineering, University of Illinois
Research expertise: Nanorheology; surface science; polymers.

Erica S. Forzani, Assistant Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in chemistry, Cordoba National University, Argentina
Research expertise: Chemical and biosensors.

G. Edward Gibson, Jr., P.E., Professor and Interim School Director
School of Sustainable Engineering and the Built Environment
Program Chair, Del E. Webb School of Construction Programs
Ph.D. in civil engineering, Georgia Institute of Technology
Research expertise: Georgia Institute of Technology
Research expertise: Image processing and fluid dynamics.

Tirupalavanam Ganesh, Assistant Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in curriculum and instruction, Arizona State University
Research expertise: Engineering in K-12 education.

Thomas Dory, Lecturer
School for Engineering of Matter, Transport and Energy
Ph.D. in chemistry, University of Oklahoma
Expertise: Semiconductor-focused electroplating.
Academic program: chemical engineering.

Lenore Dai, Associate Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in materials science and engineering, University of Illinois
Research expertise: Nanorheology; surface science; polymers.

David Frakes, Assistant Professor
School of Biological and Health Systems Engineering
School of Electrical, Computer and Energy Engineering
Ph.D. in bioengineering, Georgia Institute of Technology
Research expertise: Image processing and fluid dynamics.

Sherry Feng, Lecturer
School of Computing, Informatics, and Decision Systems Engineering
Ph.D. in computer science, University of Texas at Dallas
Expertise: Algorithm design and analysis; computational biology.

Gennady Gildenblat, Motorola Professor of Electrical Engineering
School of Electrical, Computer and Energy Engineering
Ph.D. in physics, Rensselaer Polytechnic Institute
Research expertise: Physics and modeling of semiconductor devices; semiconductor transport physics; integrated circuit technology.

Michael Goryll, Assistant Professor
School of Electrical, Computer and Energy Engineering
Ph.D. in physics, RWTH Aachen University, Germany
Research expertise: Surface and interface physics; new materials in CMOS processing; fabrication of nanoscale semiconductor devices; silicon processing for biochemical transducer integration; low-noise electronics for single ion channel recording.
new faculty 2006-2010

Rolf U. Halden, P.E., Associate Professor
School of Sustainable Engineering and the Built Environment
Ph.D. in environmental engineering, University of Minnesota
Research expertise: Bioremediation; proteomic mass spectrometry; human exposure assessment; sustainable chemistry.

Amy Hall, Lecturer
Freshmen Engineering Program
M.S. in bioengineering, Arizona State University
Expertise: Clinical research and regulatory requirements; education; neurostimulation.

Leland Hartwell, Professor
School of Biological and Health Systems Engineering; Chief Scientist, ASU Biodesign Institute’s Center for Sustainable Health; and the Virginia G. Piper Chair of Personalized Medicine
Ph.D. in biology, Massachusetts Institute of Technology
Nobel Laureate, Member of the National Academy of Sciences
Research expertise: Biomarkers and enabling personalized, pre-symptomatic diagnoses.

Kory Hedman, Assistant Professor
School of Electrical, Computer and Energy Engineering
Ph.D. in industrial engineering and operations research, University of California, Berkeley
Research expertise: Energy systems; power system economics; mathematical programming; operations and planning; transmission engineering; renewable energy; market design; financial engineering; game theory.

Marcus Herrmann, Assistant Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in mechanical engineering, University of Technology, Aachen, Germany
Research expertise: Modeling and simulation of atomization.

Christiana Honsberg, Professor
School of Electrical, Computer and Energy Engineering
Ph.D. in electrical and computer engineering, University of Delaware
Research expertise: Ultra-high efficiency solar cells; semiconductor devices, including LEDs and photodetectors, and InGaN material systems.

Huei-Ping Huang, Assistant Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in atmospheric science, University of Illinois at Urbana-Champaign
Research expertise: Geophysical and environmental fluid dynamics.

Hanqing Jiang, Assistant Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in solid mechanics, Tsinghua University, China
Research expertise: Solid mechanics and multiscale modeling.

Kanav Kahol, Assistant Professor
School of Biological and Health Systems Engineering
Ph.D. in computer science, Arizona State University
Research expertise: Gaming; virtual reality; simulations movement analysis.

Rosa Krajmalnik-Brown, Assistant Professor
School of Sustainable Engineering and the Built Environment
Ph.D. in environmental engineering, Georgia Institute of Technology
Research expertise: Biotransformation and fate of environmental contaminants; bioremediation of soil, sediments and groundwater; the use of microbial systems for bioenergy production with an emphasis on environmental applications of molecular microbial ecology.

Pat Langley, Professor
School of Computing, Informatics, and Decision Systems Engineering
Ph.D. in cognitive psychology, Carnegie Mellon University
Research expertise: Cognitive architectures for intelligent agents; computational scientific discovery; interactive assistants for complex cognition; computational models of human behavior; computational biology and ecology.

Amy Hall, Lecturer
Freshmen Engineering Program
M.S. in bioengineering, Arizona State University
Expertise: Clinical research and regulatory requirements; education; neurostimulation.

Leland Hartwell, Professor
School of Biological and Health Systems Engineering; Chief Scientist, ASU Biodesign Institute’s Center for Sustainable Health; and the Virginia G. Piper Chair of Personalized Medicine
Ph.D. in biology, Massachusetts Institute of Technology
Nobel Laureate, Member of the National Academy of Sciences
Research expertise: Biomarkers and enabling personalized, pre-symptomatic diagnoses.

Kory Hedman, Assistant Professor
School of Electrical, Computer and Energy Engineering
Ph.D. in industrial engineering and operations research, University of California, Berkeley
Research expertise: Energy systems; power system economics; mathematical programming; operations and planning; transmission engineering; renewable energy; market design; financial engineering; game theory.

Marcus Herrmann, Assistant Professor
School for Engineering of Matter, Transport and Energy
Ph.D. in mechanical engineering, University of Technology, Aachen, Germany
Research expertise: Modeling and simulation of atomization.

Christiana Honsberg, Professor
School of Electrical, Computer and Energy Engineering
Ph.D. in electrical and computer engineering, University of Delaware
Research expertise: Ultra-high efficiency solar cells; semiconductor devices, including LEDs and photodetectors, and InGaN material systems.
Yabin Liao, Lecturer  
School for Engineering of Matter, Transport and Energy  
Ph.D. in mechanical engineering, Arizona State University  
Expertise: structural dynamics and modal analysis.  
Academic programs: aerospace engineering; mechanical engineering.

Mary Laura Lind, Assistant Professor  
School for Engineering of Matter, Transport and Energy  
Ph.D. in materials science, California Institute of Technology  
Research expertise: Environmental nanotechnology.

Jason Lueke, P.E., Assistant Professor  
School of Sustainable Engineering and the Built Environment  
Ph.D. in civil engineering, University of Alberta, Canada  
Research expertise: Infrastructure rehabilitation; sustainable construction and design; trenchless technology.

Brooke Mayer, Lecturer  
School of Sustainable Engineering and the Built Environment  
Ph.D. in environmental engineering, Arizona State University  
Expertise: Evaluation of the removal and inactivation of microbial contaminants in water matrices; detection and quantification of waterborne contaminants.

Deirdre Meldrum, Professor  
School of Electrical, Computer and Energy Engineering  
Dean, Ira A. Fulton Schools of Engineering, 2007-2010  
Director, Center for Biosignatures Discovery Automation, Biodesign Institute  
Ph.D. in electrical engineering, Stanford University  
Research expertise: Automation in life sciences; single cell analyses, automation, micro- and nanotechnologies; microscale systems; lab-on-a-chip; genomics; ecogenomics; robotics; sensors and sensorbots for the oceans.

James Middleton, Professor  
School for Engineering of Matter, Transport and Energy  
Ph.D. in educational psychology and mathematics education, University of Wisconsin, Madison  
Research expertise: Mathematical modeling and cognition in STEM.

Pitu Mirchandani, Professor  
School of Computing, Informatics, and Decision Systems Engineering  
Sc.D. in operations research, Massachusetts Institute of Technology  
Research expertise: Optimization; decision-making under uncertainty; real-time control and logistics; application interests in urban service systems; transportation; homeland security.

Alan C. Nelson, Professor  
Executive Director, ASU Biodesign Institute  
School of Biological and Health Systems Engineering  
Ph.D. in biophysics, University of California, Berkeley  
Research expertise: Transformative biotechnologies.

Brian Nelson, Associate Professor  
School of Computing, Informatics, and Decision Systems Engineering  
Ph.D. in education, Harvard University  
Research expertise: Theory, design and implementation of computer-based learning environments, with a focus on immersive educational games.

David Nielsen, Assistant Professor  
School for Engineering of Matter, Transport and Energy  
Ph.D. in chemical engineering, Queen’s University, Canada  
Research expertise: Biochemical and metabolic engineering.

Cun-Zheng Ning, Professor  
School of Electrical, Computer and Energy Engineering  
Ph.D. in physics, University of Stuttgart, Germany  
Research expertise: Nanophotonics, nanowires, surface plasmons and nanolasers; nanomaterials-based detectors and solar cells; physics of nanostructures and many-body effects.

Sule Ozev, Associate Professor  
School of Electrical, Computer and Energy Engineering  
Ph.D. in computer science and engineering, University of California, San Diego  
Research expertise: Testing and design automation for radio frequency and mixed-signal circuits; analysis of process variations; variation-tolerant architectures.
new faculty 2006-2010

**Rong Pan, Associate Professor**  
School of Computing, Informatics, and Decision Systems Engineering  
Ph.D. in industrial engineering, Penn State  
Research expertise: Industrial statistics; reliability analysis; and time series modeling.

**Ram Pendyala, Professor**  
School of Sustainable Engineering and the Built Environment  
Ph.D. in civil and environmental engineering, University of California, Davis  
Research expertise: Development and application of new methods for modeling and forecasting transportation demand and system performance under a variety of socioeconomic, modal and land use scenarios.

**B.L. Ramakrishna, Associate Professor**  
School for Engineering of Matter, Transport and Energy  
Ph.D. in solid state chemistry, Indian Institute of Technology, India  
Research expertise: Biomineralization and science education.

**Kaushal Rege, Assistant Professor**  
School for Engineering of Matter, Transport and Energy  
Ph.D. in chemical engineering, Rensselaer Polytechnic Institute  
Research expertise: Molecular and cellular engineering.

**Israel Salvador, Lecturer**  
School for Engineering of Matter, Transport and Energy  
Ph.D. in aeronautical engineering, Rensselaer Polytechnic Institute  
Expertise: Hypersonics and aerothermodynamics.  
Academic programs: aerospace engineering; mechanical engineering.

**Marco Santello, Professor**  
School of Biological and Health Systems Engineering  
Ph.D. in neurophysiology of motor control, University of Birmingham, U.K.  
Research expertise: Motor control; neurophysiology; biomechanics.

**Veronica Santos, Assistant Professor**  
School for Engineering of Matter, Transport and Energy  
Ph.D. in mechanical engineering, Cornell University  
Research expertise: Biomechanics and neural control.

**Marco Saraniti, Professor**  
School of Electrical, Computer and Energy Engineering  
Ph.D. in physics, Technische Universität München, Germany  
Research expertise: Computational electronics and biophysics.

**Thomas P. Seager, Associate Professor**  
School of Sustainable Engineering and the Built Environment  
Ph.D. in civil and environmental engineering, Clarkson University  
Research expertise: Environmental decision analysis; sustainability theory; engineering ethics; environmental impacts of alternative energy.

**Praveen Shankar, Lecturer**  
School for Engineering of Matter, Transport and Energy  
Ph.D. in aerospace engineering, Ohio State University  
Expertise: Nonlinear dynamics of flight vehicles.  
Academic programs: aerospace engineering; mechanical engineering.

**Aviral Shrivastava, Assistant Professor**  
School of Computing, Informatics, and Decision Systems Engineering  
Ph.D. in information and computer sciences, University of California, Irvine  
Research expertise: Compilers; processor architectures; embedded systems; low-power design; thermal-aware design; compilers for embedded systems; error tolerant architectures and software.

**Henry Sodano, Associate Professor**  
School for Engineering of Matter, Transport and Energy  
Ph.D. in mechanical and aerospace engineering, Virginia Polytechnic Institute and State University  
Research expertise: Adaptive materials and structures.
César I. Torres, Assistant Professor  
School for Engineering of Matter, Transport and Energy  
Ph.D. in environmental engineering, Arizona State University  
Research expertise: Bioenergy.

Steven Trimble, Professor of Practice  
School for Engineering of Matter, Transport and Energy  
Ph.D. in business administration—program/operations management, Union Institute and University  
Research expertise: Energy systems.

Kurt VanLehn, Professor  
School of Computing, Informatics, and Decision Systems Engineering  
Ph.D. in computer science, Massachusetts Institute of Technology  
Research expertise: Learning science; cognitive science; artificial intelligence; intelligent tutoring systems; cognitive modeling; embedded assessment.

Enrique Vivoni, P.E., Associate Professor  
School of Sustainable Engineering and the Built Environment  
Joint appointment with the School of Earth and Space Exploration  
Ph.D. in hydrology, Massachusetts Institute of Technology  
Research expertise: watershed hydrology and its linkages with ecological, atmospheric and geomorphological processes.

Bryan Vogt, Assistant Professor  
School for Engineering of Matter, Transport and Energy  
Ph.D. in chemical engineering, University of Massachusetts  
Research expertise: Materials synthesis and polymer films.

Chao Wang, Lecturer  
Freshman Engineering Program  
Ph.D. in electrical engineering, University of Wisconsin, Madison  
Expertise: Wireless sensor networks; signal processing; distributed computing.

Xiao Wang, Assistant Professor  
School of Biological and Health Systems Engineering  
Ph.D. in bioinformatics and computational biology, University of North Carolina, Chapel Hill  
Research expertise: Synthetic and systems biology.

Yalin Wang, Assistant Professor  
School of Computing, Informatics, and Decision Systems Engineering  
Ph.D. in electrical engineering, University of Washington, Seattle  
Research expertise: Computer vision with emphasis on medical imaging, geometric modeling and brain mapping.

Edwin Weaver, P.E., Lecturer  
School of Sustainable Engineering and the Built Environment  
M.C.E. in civil engineering—construction management, North Carolina State University  
Expertise: Contracts and specifications for concrete construction; concrete paving for airfields and roadways; safety during concrete and masonry construction operations.

Eric Williams, Assistant Professor  
School of Sustainable Engineering and the Built Environment  
Joint appointment with the Global Institute of Sustainability  
Ph.D. in physics, State University of New York, Stony Brook  
Research expertise: Life cycle assessment; industrial ecology; e-waste; information technology; energy and water systems.

Hongyu Yu, Assistant Professor  
School of Electrical, Computer and Energy Engineering  
Joint appointment with the School of Earth and Space Exploration  
Ph.D. in electrical engineering, University of Southern California  
Research expertise: Wireless sensing and communication; microfluidic analysis systems; acoustic transducers; microseismometer, accelerometer and mass spectrometer.

Claudia E. Zapata, Assistant Professor  
School of Sustainable Engineering and the Built Environment  
Ph.D. in geotechnical engineering, Arizona State University  
Research expertise: Characterization and modeling of fluid flow and volume change behavior in unsaturated soils and lab/field instrumentation.

Muhong Zhang, Assistant Professor  
School of Computing, Informatics, and Decision Systems Engineering  
Ph.D. in industrial engineering and operations research, University of California, Berkeley  
Research expertise: Integer programming; robust optimization; computational optimization; network optimization.

Yanchao Zhang, Associate Professor  
School of Electrical, Computer and Energy Engineering  
Ph.D. in electrical and computer engineering, University of Florida, Gainesville  
Research expertise: Network and distributed system security; wireless networking; mobile computing.
our faculty

APPOINTMENTS

Ranu Jung, an associate professor in the School of Biological and Health Systems Engineering and co-director of ASU’s Center for Adaptive Neural Systems, was appointed to the Arizona Biomedical Research Commission by Governor Jan Brewer. The commission is the primary resource for advancing and connecting bioscience and clinical research assets and capabilities throughout Arizona, contributing to the state’s leadership in key bioscience fields.

Ron Adrian, the Ira A. Fulton Professor of Mechanical and Aerospace Engineering in the School for Engineering of Matter, Transport and Energy, was awarded the Fluids Engineering Award by the American Society of Mechanical Engineers (ASME), and was selected for a fellowship at the University of Melbourne in Australia. Adrian is being honored for his work in the understanding of turbulence and the development of laser Doppler velocimetry, particle image velocimetry and stochastic estimation techniques as well as for his leadership in the field of fluid dynamics.

Terry L. Alford was named one of three Outstanding Graduate Mentors for 2009 by ASU’s Graduate College. Alford, a professor in the School for Engineering of Matter, Transport and Energy, mentors students from several disciplines, including materials science, electrical engineering, chemical engineering, physics and chemistry. He has also served as an advisor for the ASU Chapter of the National Society of Black Engineers for the past 10 years. His former doctoral students commend him for inspiring creativity and motivation, support and encouragement in research paper publication, help with finding research funding, mentoring skills for a diverse student population, particularly international students, and the fact that his students frequently get prestigious job offers prior to graduation.

Paul Westerhoff, a professor in the School of Sustainable Engineering and the Built Environment, was appointed to a three-year term on the U.S. Environmental Protection Agency’s Science Advisory Board. Board members provide expertise on technical issues to help guide the agency in policy and decision-making.

AWARDS

Mary Anderson-Rowland, an associate professor in the School of Computing, Informatics, and Decision Systems Engineering, won the 2009 Women in Engineering Proactive Network (WEPAN) Educator’s Award. The annual honor recognizes an engineering educator for exceptional achievement in increasing the participation and retention of women in engineering.

Since becoming the first woman on the engineering faculty at ASU in 1974, Anderson-Rowland has been an influential advocate for women engineering students. In 1975, she helped establish ASU’s student chapter of the Society of Women Engineers (SWE), and in 1982, she started a Graduate Career Change program that increased the percentage of female industrial engineering graduate students.

Richard Farmer, a National Academy of Engineering member and research professor in the School of Electrical, Computer and Energy Engineering, won a top teaching honor from one of the world’s leading international engineering and technology organizations. Farmer is the 2010 Outstanding Power Engineering Educator Award winner, selected through a highly competitive process by the Power and Energy Society of the Institute of Electrical and Electronics Engineers (IEEE).

Jerry Y.S. Lin was selected as a fellow of the American Association for the Advancement of Science (AAAS). Lin, a professor in the School for Engineering of Matter, Transport and Energy, was chosen for fellow status for his achievements in inorganic membrane science and technology for chemical separation and membrane reactor applications. Earlier this year, his leadership in the field also earned Lin a prestigious Award for Excellence from the American Institute of Chemical Engineers.

Subhash Mahajan, a National Academy of Engineering member, Regents’ Professor and Technical Fellow in the Ira A. Fulton Schools of Engineering, received one of the highest honors in materials science and engineering. ASM International, the materials information society and one of the
leading professional societies in the field, will present Mahajan, a professor in the School for Engineering of Matter, Transport and Energy, the ASM Gold Medal at the 2011 Materials Science and Technology Conference and Exposition in Columbus, Ohio. The award recognizes outstanding knowledge and versatility in the application of science to the field of materials science and engineering, and exceptional ability in the diagnosis and solution of materials problems.

**Douglas Montgomery** received the Greenfield Industrial Medal from the Great Britain-based Royal Statistical Society in June 2010. Montgomery is a professor in the School of Computing, Informatics, and Decision Systems Engineering. The Greenfield Medal recognizes his contributions “to the effective industrial application of statistical methods, particularly monitoring and optimization, quality improvement and design and analysis of experiments, and for his influential and accessible expository work.” Montgomery has developed statistical engineering methods used by industry and taught in universities throughout the world, and has authored, or co-authored, 10 textbooks on the field.

**Sethuraman Panchanathan**, ASU’s chief research officer and professor in the School of Computing, Informatics, and Decision Systems Engineering, was inducted into the Canadian Academy of Engineering (CAE). The prestigious academy is an active member of the International Council of Academies of Engineering and Technological Sciences.

**Bruce Rittmann**, a National Academy of Engineering member and Regents’ Professor in the School of Sustainable Engineering and the Built Environment, won the 2009 Award for Research Excellence from the Arizona BioIndustry Association. Rittmann is an international leader in using microbes found in nature for the benefit of the environment or human health. His research team tackles some of the world’s leading problems related to water, waste and energy.

**Henry Sodano**, an associate professor in the School for Engineering of Matter, Transport and Energy, was named the 2010 Outstanding Young Alumnus from Virginia Tech’s College of Engineering. Sodano joined ASU in 2007 after a stint at Michigan Technological University. He has published roughly 90 technical articles since 2002, and serves as an associate editor of two journals: Smart Materials and Structures and the Journal of Intelligent Material Systems and Structures.

**Enrique Vivoni** was named a winner of a Presidential Early Career Award for Scientists and Engineers (PECASE) in 2009. Vivoni is an associate professor in the School of Sustainable Engineering and the Built Environment and the School of Earth and Space Exploration in ASU’s College of Liberal Arts and Sciences. His research and teaching foci are hydrologic science, water resources and the emerging field of ecohydrology. PECASE is one of the nation’s highest honors given to professionals in the early years of their science and engineering research careers.

The award includes up to five years of funding for research in support of critical government missions.

**Paul Westerhoff**, professor in the School of Sustainable Engineering and the Built Environment, has been awarded the Excellence in Review Award by the journal Environmental Science and Technology. The peer-reviewed online and print journal focuses on reports and analyses of major advances, trends and challenges in environmental science, technology and policy.

**IN MEMORIAM**

**Donald Miller and Rustum Roy** have left an indelible print on our schools, fellow faculty and staff and our students. Their knowledge, passion and generosity of spirit contributed greatly to establishing the Ira A. Fulton Schools of Engineering as one of the top in the nation.

**Donald Miller**, an associate professor in the School of Computing, Informatics, and Decision Systems Engineering, joined ASU in 1980 and the next year became one of the first on the faculty of a fledgling computer science and engineering department.

Over the next three decades, Miller shared his expertise in distributed operating systems and architecture for multiprocessor systems, interactive graphics and microprogramming.

Bringing both his expertise and research into the classroom, Miller’s long-time dedication helped both build a thriving new department and produced well-trained graduates that are now part of the computer systems development community.

**Rustum Roy**, Distinguished Research Professor of Materials came to ASU part-time a decade ago after a 50-year teaching and research career at Penn State University. An internationally recognized leader in materials engineering and science, Roy’s early work helped set the stage for today’s advances in nanotechnology research, and other efforts that contributed to advances in agriculture, healthcare, and science and engineering education.

In his work at ASU, he continued to provide thought leadership on science policy as well as share his vast knowledge of public policy, business, ethics and theology.

**RESEARCH**

Led by the School of Arts, Media and Engineering (AME), an interdisciplinary team awarded a more than $2.5 million grant from the National Science Foundation’s Discovery Research K-12 (DR K-12) program. AME is a collaborative initiative between the Herberger Institute for Design and the Arts and the Ira A. Fulton Schools of Engineering. The DR K-12 program supports projects with the potential to significantly advance STEM (science, technology, engineering and math) education through innovative methods.

**Yong-Hang Zhang**, David J. Smith and **Shane Johnson** will combine expertise in electrical engineering, materials science and physics to contribute to a project in which they will collaborate with colleagues at University of Illinois at Urbana-Champaign, the Georgia Institute of Technology and the University of North Carolina on research awarded a grant of $6.25 million over five years. ASU’s team has been awarded $2.34 million for its part of the effort.

Zhang is a professor and Johnson is a senior research scientist in the School of Electrical, Computer and Energy Engineering. Smith is a Regents’ Professor in the Department of Physics in ASU’s College of Liberal Arts and Sciences. The work will be funded by an Army Research Office grant through the defense department’s Multidisciplinary University Research Initiative (MURI) program.
Junseok Chae (2009), an associate professor in the School of Electrical, Computer and Energy Engineering, is using a new concept based on nature’s “smart system” to design highly-selective biosensors and improve instruments for biological testing and research. By using micro-electro-mechanical systems (MEMS) technology, his protein proposed probe-less biosensor has high selectivity and is packaged in a way that makes it resistant to environmental changes. This $400,000 award also funds education programs on his research designed for K–12 students and teachers, as well as for college students and groups underrepresented in science and engineering, including women.

Yi Chen (2009), an assistant professor in the School of Computing, Informatics, and Decision Systems Engineering, was awarded $445,000 to develop a single interface that can search both HTML documents and databases using simple keyword searches. Chen’s work is potentially transformative because it would allow universal access to high-quality databases not readily available on the Internet, unlocking the potential for deeper wells of data and improving findings, collaborations and quality of research and discovery.

Hanqing Jiang (2009), an assistant professor in the School for Engineering of Matter, Transport and Energy, is focusing research on carbon nanotubes macroscopic assembly—specifically carbon nanotubes macro-films—that promises to deepen fundamental understanding of how nano-scale structures can be made to function and improve the effectiveness of various mechanical systems on a macro-scale. His work, supported by a $400,000 award, forms the basis for a new undergraduate mechanical and aerospace engineering course.

Baoxin Li (2009), an associate professor in the School of Computing, Informatics, and Decision Systems Engineering, is working in the areas of computer vision, multimedia processing and statistical methods in visual computing.

His award provides $404,000 for research into technology to aid people with visual impairments.

Initially, Li is focusing on heavily illustrated science, technology, engineering and mathematics (STEM) education material that present unique challenges for students with visual impairments.

This research will have a broad range of applications in the areas of computer vision and pattern-recognition research.
Veronica Santos (2010), an assistant professor in the School for Engineering of Matter, Transport and Energy, is developing a robot hand that will not only simulate the performance of the human hand—with 2,000 tactile sensors in each fingertip—but also demonstrates dexterity within the framework of the sense-think-act loop through which humans control their movements.

The award will provide her research team more than $550,000 over five years to improve robotic manipulation capabilities and educate students about the latest robotic technologies.

Henry Sodano (2009), an associate professor in the School for Engineering of Matter, Transport and Energy, is developing a process using a nanowire interface to increase the strength of fiber-reinforced composite materials, providing higher strength per weight than other structural materials, such as metals. The improved strength-to-weight ratio is typically capitalized upon in high-performance devices, vehicles and sporting equipment such as military aircraft, golf clubs, tennis racquets and high-performance automobiles.

Sodano’s award of more than $400,000 will help to pave the way for designs for improved biological implants and prosthetics that can better mimic the naturally occurring interfaces in the human body.

Jieping Ye (2010), an associate professor in the School of Computing, Informatics, and Decision Systems Engineering, researches new types of machine learning methods that are important to advanced research in biology, genomics, health sciences, finance, statistics, signal processing and other areas involving voluminous amounts of high-dimensional data. Through dimensionality reduction, Ye develops methods to help researchers analyze these large, complex data sets by developing algorithms that identify and remove irrelevant attributes and extract only the specific information required by researchers.

Ye’s award of $400,000 over five years recognizes and supports the development of new types of frameworks for such multi-label dimensionality reduction.

45 National Science Foundation CAREER awardees (1995-2010)

Nobel Laureate Leland “Lee” H. Hartwell was appointed to lead an expansive effort addressing two of today’s top concerns: improving the effectiveness of healthcare while reducing its costs and advancing science education.

Hartwell is the first Nobel Prize recipient in physiology or medicine with a faculty appointment at an Arizona university. As ASU’s second Virginia G. Piper Chair of Personalized Medicine, Hartwell established and co-directs the Center for Sustainable Health at the Biodesign Institute. The new center is the latest step in the evolution of the Arizona-based Partnership for Personalized Medicine, launched by Virginia G. Piper Charitable Trust.

Hartwell’s new Biodesign center will identify biomarkers—early indicators of disease—to enable personalized, pre-symptomatic diagnoses, and it will develop tools for providing the intelligence needed for better patient outcomes. It will interface with other Biodesign centers working on complementary aspects of these goals.

Hartwell’s interest in advancing science education will be further served as a tenured professor in the Mary Lou Fulton Teachers College, the School of Life Sciences and the School of Biological and Health Systems Engineering, areas critical to his sustainable health initiative.

Hartwell earned a B.S. at the California Institute of Technology and a Ph.D. from the Massachusetts Institute of Technology under the mentorship of Dr. Boris Magasanik.

Hartwell is the recipient of many national and international scientific awards, including the 2001 Nobel Prize in physiology or medicine. Other honors include the Albert Lasker Basic Medical Research Award, the Gairdner Foundation International Award and the Alfred P. Sloan Award in cancer research. He is also a member of the National Academy of Sciences.

Recognizing outstanding contributions to undergraduate education

James Adams, chair of the undergraduate materials science and engineering degree program in the School for Engineering of Matter, Transport and Energy, was named a President’s Professor in 2009.

The award, bestowed by ASU President Michael Crow, recognizes tenured faculty who have demonstrated mastery of subject matter, enthusiasm and innovation in the learning and teaching process, the ability to engage students in and outside the classroom, innovation in course and curriculum design, and scholarly contributions, among other criteria.

Adams has had years of success in recruiting, retaining and advising students, and providing them with research opportunities. His work in developing courses and teaching materials has had a national impact on engineering education methods.

He has implemented a high school recruiting program that is credited in large part for tripling the undergraduate enrollment in the materials program over the past several years. He led a restructuring of many materials science and engineering programs, including transforming the once unpopular required introductory courses which lost nearly one-third of the students each year. The program retained 90 percent of freshmen in the following two years. In the senior design course, he puts students to work on real-world materials design problems faced by industry. Results include several patents shared by students and companies, funding for students’ projects from companies such as Honeywell, Orbital Science and Allied Signal, and job offers.

The materials program also boasts one of the highest concentrations of honors students in any ASU program—24 percent are also in ASU’s Barrett, the Honors College.
Rittmann brings big things to fruition by manipulating the smallest organisms

Bruce Rittmann is living large and small at the same time: he’s tackling some of the world’s biggest and most critical technological challenges with some of the tiniest tools.

Rittmann directs the Center for Environmental Biotechnology in ASU’s Biodesign Institute and is a professor in the School of Sustainable Engineering and the Built Environment.

He and his research partners are using microorganisms to develop ways of providing the world more abundant and clean energy, ensuring the quality of water resources and improving human health.

Progress in the laboratory, along with the knowledge of advances in biotechnology that Rittmann brings to the classroom, earned him a Regents’ Professor title in 2009. It is the highest honor bestowed on faculty by Arizona’s state universities.

When he earned a Ph.D. in environmental engineering from Stanford University three decades ago, the areas in which Rittmann specializes were only just emerging. Today, he says, these fields are exploding—giving engineers a sense of exhilaration but also intensifying their challenges.

Schroder continues history of leadership in teaching and research excellence

Dieter Schroder, an electrical engineering professor in the School of Electrical, Computer and Energy Engineering, jokingly expresses suspicion that his selection as a 2009 Regents’ Professor may be a way to coerce him to stay beyond the nearly 30 years he’s already been at ASU.

More seriously, Schroder says he remains motivated by the same kinds of goals he set for himself when he came to the university in 1981.

He wanted to publish 100 articles in science and engineering research journals, give 100 presentations at engineering conferences and see at least 100 of his students go on to earn master’s and doctoral degrees.

He has exceeded each objective.

Along the way he has earned five engineering teaching excellence awards and helped make ASU a leader in solid-state electronics research.

In addition, he has given hundreds of students valuable experience participating in his semiconductor technology research.

Despite a typically full schedule of research pursuits and classes to teach, Schroder has frequently answered the call over the years to help guide the development of engineering education at ASU.

The Regents’ Professor title is conferred on faculty who have made pioneering contributions in their areas of expertise, who have achieved a sustained level of distinction, and who enjoy national and international recognition for these accomplishments.
facilities and infrastructure

The Ira A. Fulton Schools of Engineering have more than one million square feet of space, providing room for our growing faculty to advance use-inspired research.

ASU’s Biodesign Institute includes 350,000 square feet of state-of-the-art research facilities, and houses nearly 700 faculty, staff, students and collaborators whose expertise spans engineering, the biosciences, medicine, computing, economics, public policy and management. Research efforts include creating biotechnology to produce alternatives to fossil fuels and to provide clean water supplies, automating the collection of biosignature data to advance personalized medicine, and inventing new biosensors and bioelectronic systems. Biodesign was the first facility in Arizona to earn platinum-level LEED certification from the U.S. Green Building Council for environmentally-friendly design.

The Brickyard complex on Mill Avenue houses engineering classrooms, the School of Computing, Informatics, and Decision System Engineering, ASU’s Decision Theater and the Engineering Dean’s Office.

The Engineering Center is an interconnected research and instruction complex. It houses labs, classrooms and administrative offices for the Fulton Schools of Engineering.

The Engineering Research Center houses research on advanced semiconductor and material technologies, power systems and electronics and computational sciences.

The 7,500 square feet Engineering Student Center, in the Engineering Center G wing, features several study pods, a wireless access facility, a conference room, loaner laptop computers and meeting areas that can accommodate small groups for lectures and video presentations.

The Goldwater Center for Science and Engineering houses wireless communications, school offices, the Fulton High Performance Computing Initiative, and materials growth and analysis research areas.

The Interdisciplinary Science and Technology Building I houses laboratories and collaborative spaces in biomedical engineering, neural engineering and molecular, tissue and cell engineering.

The Interdisciplinary Science and Technology Building II is a high-bay research facility supporting research in advanced pavement materials, transportation planning, geotechnical engineering, fluid dynamics and sustainable materials.

MacroTechnology Works is a large world-class research facility in ASU’s Research Park that houses research programs in flexible electronics and flexible systems, solar energy and photovoltaics, and related collaborative research between the federal government, ASU and industry.

Urban Systems Engineering houses administrative and faculty offices as well as classrooms and labs for construction management, aerospace engineering and mechanical engineering degree programs.
**Interdisciplinary Science and Technology Building IV** (ISTB IV, estimated completion date 2012) will be the single-largest research building at ASU with about 300,000 gross square feet.

ISTB-IV will be home to large multi-investigator research projects, and will bring together faculty in the Fulton Schools of Engineering, the College of Liberal Arts and Sciences, the School of Earth and Space Exploration and the School of Life Sciences.
The School of Biological and Health Systems Engineering truly represents innovation in education. Founded in 2009, we continue to push toward more efficient, effective and engaging ways to deliver results.

One of the most significant changes is our new curriculum. Technology is changing every minute. Curriculum at universities continues to evolve, but we are clearly not fast enough. We have developed a skills-based modular curriculum which is unique to ASU. Rather than taking years to implement changes, we can modify or even start a new major over a weekend. This keeps us on the leading edge with a highly efficient way of presenting and changing materials.

Implicit in our curriculum is that design starts first day. Everything culminates in capstone design senior year, but we start from day one pairing freshmen with seniors to involve them in engineering design. For example, students in the introduction to biomedical engineering course are constructing and then building prototypes of 3-D printers. We want our graduates to present future employers with not just a degree on a piece of paper, but a list of skills they have mastered—the ability to manipulate cells, signal processing in the brain, construction of artificial tissue. Our students receive both core engineering expertise and very specific skills such as bio-signal processing for measuring heart rhythm.

We also have many new highly accomplished faculty members, including Lee Hartwell, the only Nobel Laureate in the bioengineering department and Alan Nelson, who has numerous academic, entrepreneurial and technical successes, including a landmark technology that dramatically improved detection of cervical cancer.

Nature has given us billions of years of evolution of biological systems. Our research initiative in synthetic biology, a relatively new field, looks at how we can reprogram these cells to do new things based on engineering principles. The impact is far-reaching—medicine, stem cells, biocomputing and more.

Also on the research side, the number of invention disclosures has grown dramatically in the last year to 17 per month. All students and faculty are involved in this process. We are implementing a fundamental entrepreneurship model where every student will have the opportunity to seek out investors and spin off a business.

Innovation in education, new frontiers in research and more efficient methods to deliver skills—that is the cornerstone of what we do. Our faculty, students and staff are out to change the world and better the human condition.

William Ditto
Olin Professor of Harrington Biomedical Engineering
Director of the School
enrollment
- total 587
- undergraduate 501
- graduate 86

faculty
- tenured and tenure-track 20
- full-time lecturers 1
- research expenditures $4,063,731 (FY2010)

degree programs
- biomedical engineering

faculty
- School Director
  - William Ditto
- Nobel Laureate
  - Leland Hartwell
- National Academy of Sciences
  - Leland Hartwell

- James Abbas
- Kevin Bennett
- Chris Buneo
- Michael Caplan
- William Ditto
- David Frakes
- Antonio Garcia
- Jiping He
- Stephen Helms Tillery
- Leon Iasemidis
- Ranu Jung
- Kanav Kahol
- Stephen Massia
- Jit Muthuswamy
- Alan C. Nelson
- Vincent Pizziconi
- Marco Santello
- Bruce Towe
- Brent Vernon
- Xiao Wang
new device makes health diagnosis simpler, quicker

ASU biomedical engineering research produces a design for a new device to help detect diseases quickly and at lower costs

Engineers at Arizona State University have demonstrated a way to dramatically simplify the testing of patients for infectious diseases and unhealthy protein levels.

New testing instrumentation, called an Integrascope, developed by Antonio Garcia and John Schneider promises to make the procedure less costly and with faster results.

Current testing is slow and expensive because of the complications of working with blood, saliva, urine and other biological fluids, says Garcia, a professor in the School of Biological and Health Systems Engineering.

Garcia and Schneider, a biomedical engineering graduate student researcher, have come up with a testing method that enables the patient sample itself to act in concert with a rudimentary, low-cost testing device.

The method uses common light-emitting diodes (LEDs) and simple microelectronic amplifiers rather than more technologically intensive and costly lasers and robotics.

Fluids and light working together

Garcia and Schneider have demonstrated that superhydrophobic surfaces can shape blood, saliva, urine and other fluids into round drops. The drops can focus light and quickly mix and move microparticles and nanoparticles that can be examined to reveal a specific infectious agent or protein.

Superhydrophobicity is a property of materials that repel water, such as ducks’ feather or leaves of the lotus plant. Such materials are used commercially in textiles, building materials and surface coatings.

The new device operates by placing a drop of nanoparticles or microparticles on top of a drop of a patient fluid sample on a superhydrophobic surface. The surface has a small depression that holds the liquid sample in place so that it forms a spherical drop.

The drop acts as a lens due to surface tension. An LED is shined on the drop and the drop shape focuses the light into an intense beam measured by a second LED.

Because the drop is slowly evaporating, Garcia explains, nanoparticles or microparticles quickly begin to stick together when the patient fluid sample contains the infectious agent or protein being targeted. The infectious agent or protein migrates to the center of the drop, leaving the particles that have not yet stuck together to move to the surface.

This leads to the self-mixing action that speeds up the diagnostic process so that detection can occur in less than two minutes, he says.

The goal is to translate this technology and design into a rugged and easy-to-use device that would be given away for free to clinics. The only costs involved with using the Integrascope would be nano- or microparticles and a small piece of a superhydrophobic surface—about $1 to $2 dollars.

Interdisciplinary partnership, international collaboration

With the repeated and more frequent spread of infectious diseases around the globe, it is becoming more critical to have good diagnostic systems in poor countries so proper treatment can be provided rapidly—and so that there is a global early-warning system to alert the public if new and significant outbreaks of disease emerge, Garcia says.

To help accomplish that, Garcia and Schneider are teaming with nanotechnology experts Vladimiro Mujica, a professor in the Department of Chemistry and Biochemistry in ASU’s College of Liberal Arts and Sciences, and Manuel Marquez, an adjunct professor in the School of Biological and Health Systems Engineering. They hope to establish collaborations with Latin American universities, government leaders and entrepreneurs to develop the new diagnostic device.

Mujica believes that a joint U.S.-Latin America technology development effort will spark economic activity that will benefit both regions and prevent disease outbreaks and social unrest in our part of the world.
biomedical engineering students use research talents to aid Africans with disabilities

Mona Aoufe wants whatever endeavors she pursues in her future career to be as fulfilling as her final major assignment to earn an undergraduate engineering degree at Arizona State University.

She joined about 20 biomedical engineering students enrolled in senior-year research projects to design and assemble medical devices for villagers with disabilities in a poverty-stricken, south-central region of the African country of Malawi.

“We put a lot of passion into it,” Aoufe says. “It wasn’t your typical class project. We were working for more than a good grade, we wanted to provide things for people to make their lives better.”

Customized wheelchairs, orthopedic braces and therapeutic instruments are among the devices delivered to the village of Njewa in the summer of 2009. It was the second shipment in the past three years of devices designed and built by ASU engineering students to be brought to Malawians under the supervision of Jan Snyder, a science education program manager in the School for Engineering of Matter, Transport and Energy. For Snyder, it’s part of a family project undertaken with his wife, Clarice, that he intends to expand in coming years.

Witnessing deprivation

Snyder first visited Africa as an undergraduate biology student in the 1960s. He was drawn by the continent’s plants and animals, but “became equally interested in the people,” he says.

That concern intensified years later when one of his three daughters, Jessi Jean, spent a semester in Kenya in 1997 as part of her college studies, and from 2003 to 2005 worked with the Peace Corps in Malawi. During that time, Snyder, his wife and their three other children visited Jessi Jean and lived for six weeks in a village in the Nkhotakota region of central Malawi.

There they witnessed a disadvantaged and even dangerous way of life. “We saw life in the raw and death in the raw,” he says.

The family saw firsthand the problems of poor sanitation, the severe lack of healthcare and resulting health problems. AIDS, tuberculosis, malaria and polio still afflict many, and estimates are that seven to 10 percent of the more than 13 million Malawians are physically disabled in some way, Snyder says.

Vincent Pizziconi, an ASU associate professor in the School of Biological and Health Systems Engineering, learned of Snyder’s desire to help the Malawians and suggested Snyder videotape interviews with villagers about their disabilities when he again visited Africa in 2006.

Pizziconi showed the videos in his class and then challenged students with assignments for their senior-year capstone research projects to produce devices for those individuals.

“When we saw the people on the videos we began to feel a connection to them,” recalls Leila Kabiri, who earned her biomedical engineering degree in 2008. “It made us want to be successful for them.”

Engineering challenges

Kabiri helped design and build a wheelchair for a Malawian woman named Ida, who had been partially paralyzed at age 20 from a condition that was never diagnosed.

She and fellow students had to manufacture the devices not only to fit the conditions of the individuals, but had to construct them with materials that will enable the Malawians to repair or rebuild devices in the future using the limited materials available in their country.
2009-2010 has been an exciting year as we kicked off the new School of Computing, Informatics, and Decision Systems Engineering. By combining our existing robust programs in Computer Science, Computer Systems Engineering and Industrial Engineering, we have constructed a school that spans the spectrum from data to decisions.

We begin with a goal of envisioning, creating and implementing transformational technologies that improve our everyday life through secure, timely, assured and ubiquitous access to reliable and relevant information. For the business analyst, that means a better understanding of the competitive landscape and supply chain. For the blind individual, that means artificial sensory perception to enable self-reliance. Our faculties of Computer Science and Engineering and Industrial Engineering are coalescing into an integrated academic unit that is reshaping the information driven society through internal cooperation and transdisciplinary external collaborations.

The School is making significant strides—growing in breadth while simultaneously strengthening our core disciplines and individual program size. We now have over 1,500 on-campus students and many more participating in our online programs. Particularly gratifying is the continued advancement in the quality and quantity of our research. Our funded research and number of graduate research assistants continue to grow.

Our faculty and students have been honored with numerous awards and achievements throughout the past year. One student group won the Microsoft Imagine Cup earlier this year, our junior faculty are winning CAREER Awards, our senior faculty are being noted as most highly-cited authors, and our people are being honored with best paper awards at all levels. Our activities can be classified into four central themes: computational intelligence and algorithms, data management and information assurance, network science and systems and software and systems engineering. However, many of the activities transcend multiple areas and frequently involve faculty from other Schools as well. This is by intent. We pride ourselves in being the home for computing and decision technologies, but our mission is to reach out and employ these technologies for advancing the social condition. Seeing these opportunities also helps keep us focused on meaningful avenues for our theoretical research.

We welcome new partnerships and ideas to expand existing collaborations. Please contact us if you see a project of interest or the ideas herein suggest a new possibility to you. And, as always, we welcome you to visit us in the Valley of the Sun.

More information is available on our website: engineering.asu.edu/cidse.

Ronald G. Askin. Ph.D.
Professor of Industrial Engineering
Director of the School
enrollment
- total 1603
- undergraduate 1070
- graduate 533

faculty

School Director
Ronald G. Askin

Regents’ Professor
Douglas Montgomery

Computer Science and Engineering
Gail-Joon Ahn
Robert Atkinson
Janaka Balasooriya
Chitta Baral
Rida Bazzi
Kevin Burger
Winslow Burleson

Debra Calliss
Kasim Candan
Karamvir Chatha
Yi Chen
Yinong Chen
Charles Colbourn
James Collofello
Partha Dasgupta
Hasan Davulcu
Georgios Fainkos
Gerald Farin
Xuerong Feng
John Fowler
Sandep Gupta
Dijiang Huang

Subbarao Kambhampati
Seunghan Kim
Pat Langley
Joohyung Lee
Yann-Hang Lee
Baoxin Li
Huan Liu
Mutsumi Nakamura
Brian Nelson
Gregory M. Nielson
Sethuraman Panchanathan
Andrea W. Richa
Hessam S. Sarjoughian
Arunabha Sen
Aviral Shrivastava

Hari Sundaram
Violet R. Syrotiuk
Farideh (Faye) Tadayon-Navabi
Wei-Tek Tsai
Kurt VanLehn
Sarma Vrudhula
Peter Wonka
Guoliang Xue
Stephen S. Yau
Jieping Ye

Industrial Engineering
Mary Anderson-Rowland
Ronald G. Askin
Linda Chaitin

John Fowler
Esma Gel
Jing Li
Pitu Mirchandani
Rong Pan
George Runger
Dan Shunk
J. René Villalobos
Yalin Wang
Teresa Wu
Nong Ye
Muhong Zhang

research expenditures
- $10,299,787 (FY2010)

degree programs
- computer science
- computer systems engineering
- engineering management
- industrial engineering
- informatics
Navy supports mobile communications research

Development of cloud-computing is seen as a promising step for improving information networks for defense operations. More security, reliability, and mobility are the big targets in the realm of wireless communication technologies.

Dijiang Huang’s research in computer and communications networks—specifically in the emerging area of secure, mobile cloud computing—has earned him a grant from the Office of Naval Research (ONR) Young Investigator Program to help take aim at those goals.

Huang, an assistant professor in the School of Computing, Informatics, and Decision Systems Engineering, is one of 17 researchers to win one of the ONR program’s 2010 Young Investigator awards—from among more than 200 who applied—and the only one to earn such a grant in the area of secure networking and communication.

Beyond communications and computing, his expertise extends to areas of cryptography, attack analysis, privacy preservation and attack-resilient networking protocol design.

The ONR grant will provide up to $510,000 over three years to support Huang’s effort to develop a framework for advanced mobile wireless computing and communication systems that will employ cloud-computing techniques.

Research combining environmental and health data can help protect people with asthma

A deeper understanding of the impact of air pollutants on children with asthma is arising from research by faculty in the School of Computing, Informatics, and Decision Systems Engineering.

Led by professor George Runger, researchers in the school have teamed with the Arizona Department of Environmental Quality, the Arizona Department of Health Services, and researchers from ASU’s Center for Health Information and Research and the Center for Environmental Fluid Dynamics.

The project’s studies have revealed a significant link between levels of specific particulate matter in the air and asthma incidents in central Phoenix.

Death rates from asthma are higher in Arizona than the overall rates throughout the United States and are particularly high in Maricopa County, especially in the Phoenix area.

Asthma is among the most common chronic diseases among children in many countries and rates continue to increase in some countries, including the United States.

The team’s findings predict peak concentrations of particulate matter in the air. Such information can be used to alert individuals with asthma to unsafe environmental conditions that could increase the risk of asthma incidents.

Researchers measured concentrations of PM10 (particulate matter under 10 micrometers in size) using a five-site network, along with mobile monitoring sites, to provide a spatial distribution that was mapped onto census tracts.

The data was then correlated with a large volume of health records from the state’s health services department and Arizona Health Query, a database managed by the Center for Health Information and Research.

After extensive data pre-processing and preparation, a spatial and temporal map correlating air quality and various locations was developed.

In modeling the data, researchers had to take into account seasonal effects for both air quality and asthma, variables such as day of the week and patient-level covariates such as age, gender and lifestyle, and the presence of other air pollutants.

The studies detected a significant association between PM10 in central Phoenix and childhood asthma incidents.

The project demonstrates the viability of these methods for use as a predictive tool to warn asthma sufferers in central Phoenix.

Beyond those results, Runger says, the project shows the ability of ASU researchers and state organizations to collaborate on developing effective methods for gathering meaningful health data and generating related environmental models.

It also demonstrates a high proficiency in devising methods for spatially and temporally linking models of environmental conditions to models for predicting health impacts, while at the same time accounting for the effects of many uncontrolled factors.
Winslow Burleson is convinced that budding engineers and scientists could be better educated if colleges and universities gave them more opportunities to fail. He encourages “failing early and often.”

He also thinks students would be better served by pushing them to strive for solutions to the most complex and difficult problems, rather than letting them settle for taking small steps toward easy goals.

Burleson is incorporating that philosophy into his development of “motivational environments,” interactive educational technologies that foster “intrinsically motivated mixed-reality cyberlearning experiences.”

Such innovative work and unconventional ideas earned Burleson an invitation to the first Frontiers of Engineering Education Symposium, organized by the National Academy of Engineering (NAE). He was chosen to participate from a highly competitive pool of applicants nominated by fellow engineers or deans.

Burleson is an assistant professor of computer science and engineering in the School of Computing, Informatics, and Decision Systems Engineering.

He is integrating engineering, science, design, entrepreneurship and industry collaboration in developing a learning-by-doing approach that couples classroom education with students’ exposure to research pursuits.

He sees his work as one example of the transformation of engineering. It’s about broadening of minds and making the next generation of engineers capable of facing society’s biggest technological challenges—and succeeding.

“We want the young engineers involved in the Frontiers of Engineering Education program to become forceful agents of change in exploring and inventing new and effective teaching and learning approaches.”

— Winslow Burleson
school of electrical, computer and energy engineering

recovery and reinvestment

Our School has emerged from the budget stresses of the last two years stronger than ever. ASU has protected our core academic mission from budget cuts and has even made new investments through two new faculty hires this past year. This investment continues with several faculty searches in the current academic year. Of particular note are the positions in photovoltaics and in flexible electronics. These positions support key investment areas for ASU which have led to two NSF ERC proposal site visits this year. ASU is the lead institution and ECEE faculty play key roles in each of these ERC proposals.

Our research expenditures continue to grow at an impressive rate nearly tripling in the past five years from $9.9M in the fiscal year ending in 2005 to $28.8M in the fiscal year ending in 2010. Our new research awards are even higher totaling more than $32.5M and predicting continued growth in expenditures. Our program enrollments are growing with more than 550 undergraduates and more than 750 graduate students, including more than 250 Ph.D. students. Our class of entering freshmen includes more than 100 students and our transfer student enrollment at all levels remains strong.

Our School name reflects the strong academic and research programs in the areas of Computer Engineering and Energy Engineering that have been led by Electrical Engineering degree program faculty for many years. We are launching new graduate degrees in Computer Engineering (pending formal university approval). These programs will be jointly administered by ECEE faculty and faculty from the Computer Science and Engineering program.

Our EE program has also been recognized through our strong showing in the recently released NRC rankings of ECE Ph.D. programs. In both the “R” and “S” rankings we have placed in the top-20 group (see table from http://graduate-school.phds.org/rankings/electrical-engineering). While the debate continues about the methodology and accuracy of these rankings it is rewarding to see the accomplishments of our faculty, staff and students recognized by this prestigious national organization. These and other new developments and accomplishments are detailed on our website, engineering.asu.edu/ecee.

Stephen M. Phillips, Ph.D., P.E.
Professor of Electrical Engineering
Director of the School
enrollment
total 1347
undergraduate 571
graduate 776

faculty
School Director
Stephen Phillips
National Academy of Engineering
Richard Farmer
Gerald Heydt
Vijay Vittal
Regents’ Professors
Constantine Balanis
David Ferry
Dieter Schroder
Electrical Engineering
James Aberle
David Allee
Raja Ayyanar
Bertan Bakkaloglu
Hugh Barnaby
Jennifer Blain Christen
Yu (Kevin) Cao
Junseok Chae
Chaitali Chakrabarti
Lawrence Clark
Douglas Cochran
Rodolfo Diaz
Tolga Duman
Gennady Gildenblat
Stephen Goodnick
Ravi Gorur
Michael Goryll
Kory Hedman
Keith Holbert
Christiania Honsberg
Joseph Hui
Bahar Jalali-Farahani
George Karady
Lina Karam
Sayfe Kiaei
Michael Kozicki
Ying-Cheng Lai
Deirdre Meldrum
Cun-Zheng Ning
Sule Ozev
Joseph Palais
George Pan
Antonia Papandreou-Suppappola
Stephen Phillips

research expenditures
$28,817,861 (FY2010)

degree programs
electrical engineering

faculty
tenured and tenure-track 56

Gang Qian
Martin Reisslein
Armando Rodriguez
Ronald Roedel
Marco Saraniti
Jennie Si
Brian Skromme
Andreas Spanias
Nongjian Tao
Cihan Tepedelenlioglu
Trevor Thornton
Konstantinos Tsakalis
Daniel Tylavsky
Dragica Vasileska
Hongbin Yu
Hongyu Yu
Junshan Zhang
Yanchao Zhang
Yong-Hang Zhang
ASU engineers improve chip memory by stacking cells

Engineers at Arizona State University have developed an elegant method for significantly improving the memory capacity of electronic chips.

Led by Michael Kozicki, a professor in the School of Electrical, Computer and Energy Engineering and director of the Center for Applied Nanoionics, the researchers have shown that they can build stackable memory based on “ionic memory technology,” which could make them ideal candidates for storage cells in high-density memory. Best of all, the new method uses well-known electronics materials.

Kozicki outlined the new memory device in a technical presentation he made in November at the 2009 International Electron Devices and Materials Symposia in Taiwan. He worked with Sarath C. Puthen Thermadam, an electrical engineering graduate student.

Kozicki says that given current technology, electronics researchers are fast reaching the physical limits of device memory. This fact has spurred research into new types of memory that can store more information into less and less physical space. One way of doing this is to stack memory cells.

This opens the door to inexpensive, high-density data storage by ‘stacking’ memory layers on top one another inside a single chip.

This could lead to hard drive data storage capacity on a chip, which enables portable systems that are smaller, more rugged and able to go longer between battery charges.

The concept of stackable memory is akin to storing boxes in a small room. More boxes (each representing a memory cell) can be stored by stacking, taking advantage of three dimensions of the room, rather than only putting each box in a single layer on the floor.

Kozicki says stacking memory cells has not been achieved before because the cells could not be isolated. Each memory cell has a storage element and an access device; the latter allowing each storage cell to be read, written or erased individually.

The new approach uses silicon, but not single crystal silicon, which can be deposited in layers as part of the three-dimensional memory fabrication process. Kozicki said his team was wrestling with how to find a way to build an electrical element, called a diode, into the memory cell. The diode would isolate the cells.

Kozicki says this idea usually involves several additional layers and processing steps when making the circuit, but his team found an elegant way of achieving diode capability by substituting one known material for another, in this case replacing a layer of metal with doped silicon.
Making battlefield communications better

Junshan Zhang is working to improve wireless communications technology with support from a Multidisciplinary University Research Initiative (MURI) grant from the U.S. Department of Defense.

Zhang is a professor in the School of Electrical, Computer and Energy Engineering. He also works in the Sensor, Signal and Information Processing Center (SenSIP).

The grant of more than $600,000 will fund Zhang’s efforts to improve the reliability of communications networks under battlefield conditions.

“Battlefield wireless networks often operate under hostile conditions that include adverse radio frequency environments, interference, bursts of traffic and changing network topology,” Zhang says. “As a result, network management of information flows in such a hostile environment often faces a number of challenges, such as network failure and compromised and intermittent connectivity.”

There is an “urgent need to develop fundamental network science for identifying, representing and controlling information dynamics” in Department of Defense networks, Zhang says.

Advances in this area of research also promise to provide more reliability for various types of airborne and ground-based communications networks.

Microscopic Mascot

An ASU engineering student may have found the tiniest—and cleverly the most inventive—way to show school spirit.

Adam Burke, a doctoral student in the School of Electrical, Computer and Energy Engineering, created “Micro Sparky,” a microscopic etching of Sparky, the ASU Sun Devil mascot. Micro Sparky measures slightly less than five microns in height. That’s smaller than a human red blood cell, which typically measures at six to eight microns—too small be seen without a microscope.

He fashioned the image by using electron beam lithography to etch it into a material called indium arsenide placed on top of another material called indium aluminum antimonide. Electron beam lithography was used to create the Sparky pattern by drawing it onto the surface on the materials with a directed beam of electrons.

His accomplishments at ASU have helped Burke earn a position as a senior research assistant in the College of Physics at the University of New South Wales in Australia.

Opening doors to discoveries about human cells

Deeper insights into how the cells of the human body work and how they react to pharmaceuticals are essential to advances in health practices and medical treatments.

Jennifer Blain Christen, an assistant professor in the School of Electrical, Computer and Energy Engineering, is earning recognition for her work to improve cell research. For several years, she has helped develop and improve circuitry systems that maintain the health of cell samples outside the body so that scientists and biomedical engineers can study them more directly.

Blain Christen’s report on this research recently won the 2010 Best Paper Award from the Institute of Electrical and Electronics Engineers (IEEE) Circuits and Systems Society. Her article in the IEEE Transactions on Biomedical Circuits and Systems was recognized as the best published in the journal over the past three years.
The School for Engineering of Matter, Transport and Energy brings together outstanding faculty from four disciplines—aerospace engineering, chemical engineering, materials science and engineering, and mechanical engineering. This combination feels as new and unusual to us as I am sure it is does to many of our colleagues across the country. But this innovative entity helps create the critical mass necessary to maximize the impact of our use-inspired research. It creates numerous new opportunities for the cross pollination of ideas that advance both teaching and research.

In our school, we are leveraging the synergy of engineering and science to develop new knowledge and technologies, and create innovative solutions to society’s most pressing problems in energy, security, human health and sustainability. The applications of our research span an immense range of scales, from the atomic structure of new materials to models of global ocean circulation.

ASU is making significant investments that are advancing our school, with new facilities and more than 70 new hires since 2006: 21 of these new hires have been into our school. Our strength is evident in the excellence of our faculty and the high quality of their scholarship. Three of our new hires are among the last seven NSF CAREER Award recipients in the Fulton Schools of Engineering for 2009 and 2010.

Our undergraduate programs position students for roles as professional engineers or advanced studies beyond the baccalaureate degree. At the graduate level, we provide rigorous, cross-disciplinary training and a rich research environment, immersing our students in diverse research topics that have broad interactions among disciplines, both within and beyond the school.

One of the highlights of the past year is the hire of Werner Dahm, former chief scientist for the U.S. Air Force, who has recently joined the faculty to lead an initiative dedicated to finding solutions to national and global security challenges. Under Professor Dahm’s leadership, the initiative will address issues in security and defense science, including those related to national defense, cyber warfare and homeland security. Collaborative efforts of this size and scope are enabled by the unique structure that exists at ASU and is typified by our school.

Our structure is also creating new opportunities for students and enriching their experience both in the classroom and the laboratory. As the individual academic programs continue to advance our mission, each will also maintain distinctive approaches to teaching, research and ties to industry that strengthen and continue to shape the trajectory of the school.

Kyle D. Squires, Ph.D.
Professor of Mechanical and Aerospace Engineering
Director of the School
enrollment
- total 2017
- undergraduate 1645
- graduate 372

faculty
- tenured and tenure-track 49
- full-time lecturers 4
- research expenditures
  - $17,274,287 (FY2010)

degree programs
- aerospace engineering
- chemical engineering
- materials science and engineering
- mechanical engineering

faculty
President's Professor
- James Adams
- Al B. Day

Aerospace Engineering
- Ronald Calhoun
- Aditi Chattopadhyay
- Werner Dahm
- Marcus Herrmann
- Huei-Ping Huang

Mechanical Engineering
- Henry Sodano

Chemical Engineering
- Hanqing Jiang
- Taewoo Lee
- Yabin Liao
- James Middleton
- Marc Mignolet
- Pedro Peralta
- Patrick Phelan
- Jonathan Posner
- Ramendra Roy
- Israel Salvador
- Veronica Santos
- Jami Shah
- Praveen Shankar
- Kyle Squires
- Steven Trimble
- Ampere Tseng
- Valana Wells
- Lun-Shin Yao
- Chemical Engineering
  - Jean Andino
  - Lenore Dai
  - Thomas Dory
  - Erica Forzani
  - Jerry Y.S. Lin
  - Mary Laura Lind

Regents' Professors
- Subhash Mahajan
- James Mayer

Aerospace Engineering and Mechanical Engineering
- Ronald Adrian
- Subhash Mahajan
- James Mayer
- John Rowell
- Della Roy

National Academy of Engineering
- Ronald Adrian
- Subhash Mahajan
- James Mayer
- John Rowell
- Della Roy

Research Expenditures
- $17,274,287 (FY2010)

Faculty
- tenured and tenure-track 49
- full-time lecturers 4

Degree Programs
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- chemical engineering
- materials science and engineering
- mechanical engineering

Enrollment
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- undergraduate 1645
- graduate 372

Research Expenditures
- $17,274,287 (FY2010)
leading the quest for sustainable energy

Arizona State University researchers, including Cody Friesen, an associate professor in the School for Engineering of Matter, Transport and Energy, will work on projects with the potential to change the way the nation generates and consumes energy.

The projects are being funded through two grants from the U.S. Department of Energy (DOE) that are part of the agency’s larger program to develop alternative energy strategies.

The goals of the DOE’s Advanced Research Projects Agency-Energy (ARPA-E) program is to develop nimble, creative and inventive approaches to transform the global energy landscape while advancing America’s technology leadership.

In announcing the awards, U.S. Energy Secretary Stephen Chu said “ARPA-E is a crucial part of the new effort by the U.S. to spur the next Industrial Revolution in clean energy technologies, creating thousands of new jobs and helping cut carbon pollution.” The program is generally considered as an effort to “hit a home run” in advanced alternative energy research.

ASU’s grants total more than $10 million. The funding will support research on a new class of high-performance metal-air batteries and the use of photosynthetic bacteria to produce automotive fuel from a combination of sunlight, water and carbon dioxide.

“ASU is the only university to be heading up two of these highly competitive projects,” says Sethuraman “Panch” Panchanathan, ASU’s chief research officer.

A grant of $5.1 million over two years will help support pursuit of advances in battery technology and energy storage led by Friesen. His team will work with researchers from Fluidic Energy Inc.

Friesen is developing a new type of ultra-high-energy metal-air batteries that use advanced ionic liquids, and promise to provide low-cost, long-range power for all-electric and hybrid vehicles. In the long run, this advance could significantly reduce the need for the United States to import oil since more of the energy to power transportation could be drawn from the nation’s electrical grid.

“This has the potential to dramatically decrease the cost of energy-storage,” Friesen says. “An electric-vehicle powered by these types of batteries would have a distance range comparable to that of a gasoline-powered vehicle. A cell phone could remain powered for as long as a month without recharging.”

Friesen’s co-leaders for the project are Karl Sieradzki, a materials engineering professor, and Dan Buttry, a professor in the Department of Chemistry and Biochemistry in ASU’s College of Liberal Arts and Sciences.

Friesen sees the combination of efforts at the university to advance solar power and energy storage technologies “demonstrating a holistic approach to energy research that is making ASU a global leader in renewable energy.”

“We need to come up with new, imaginative and elegant ways of generating energy, and smarter ways of consuming that energy so we are not depleting resources and harming our environment,” adds Panchanathan. “These projects strive to achieve all of that.”
Lin wins prestigious chemical engineering award

Only one chemical engineer in the world is selected each year to receive the American Institute of Chemical Engineering award for outstanding contributions to the theory and practice of chemical separation technologies.

This year the Institute’s Award for Excellence in Industrial Gas Technology went to Jerry Y.S. Lin. It’s the first time an ASU chemical engineer has received the prestigious honor from the Institute.

Lin is a professor of chemical engineering in the School for Engineering of Matter, Transport and Energy.

The award recognizes Lin’s achievements in fundamental research that is advancing inorganic membrane science for gas separations and his pioneering work on high-temperature adsorption separation technologies.

These technologies are also used in processes that have a direct impact on human health, including purification of drinking water and clarification of beer and other drinks.

Lin wins prestigious chemical engineering award

ASU research revealing clues to autism causes

ASU President’s Professor James Adams is advancing research to better understand the causes of autism and to develop more effective treatments for the developmental disorder.

Adams is a professor in the School for Engineering of Matter, Transport and Energy. He’s also president of the Autism Society of Greater Phoenix.

Adams is studying the role of exposure to toxic metals as a factor in the cause of autism, as well as what metabolic problems common to children with autism indicate about causes or possible treatment options.

He and other ASU researchers are also involved in a new study that will use DNA-based techniques to analyze the amount and types of bacteria present in children with autism compared to the amount and types of bacteria in children without autism.

Up against the walls of turbulence

Better methods of measuring fluid motion would improve understanding of our atmosphere and oceans—and how they affect us.

In the July 9, 2010, issue of Science, Professor Ronald Adrian introduced the advances in methods to more accurately model the buildup of wall turbulence and predict its movement and effects.

Science, published by the American Association for the Advancement of Science, is one of the most prestigious science journals.

Adrian is a professor of mechanical and aerospace engineering in the School for Engineering of Matter, Transport and Energy and a member of the National Academy of Engineering.

What engineers and scientists call “wall turbulence” is a key factor in determining the environmental impacts of the movement of atmospheric components.

Wall turbulence also causes drag on aircraft and ships, and in pipelines, and is important in the flows critical to many other engineered systems.
The built environment is the physical infrastructure and integrated systems that includes housing, business and commerce, transportation, power systems and water services. When the built environment is highly functional, civilization prospers. Our School is a unique blend of civil and environmental engineering and construction management programs. This combination of programs and expertise increases our capacity to focus on sustainable engineering and train students who can impact the entire lifecycle of the built environment from planning to design to construction.

As director, I have had the great privilege to work closely with our faculty, staff and students in setting the course for our future. For us, sustainable engineering is about applying traditional and developing new analysis techniques for complex systems such as life cycle assessment; risk and uncertainty analysis; and redefining design boundaries between infrastructure, natural and social systems. But ultimately, sustainable engineering is about furthering the long-lasting improvement of the human condition.

We are preparing a new generation of stewards and innovators to sustain our built environment and we are creating new pathways for our students—a curriculum that offers a customizable educational experience and one that prepares them to address the great challenges of our time. We are fortunate to have many industry partners who provide outstanding opportunities and support for our students. Our students go on to become leaders who positively impact the state and the region. A few of their service activities are expounded in this report.

We are excited about the success of our faculty members in attracting research funding. As of November 2010, our 12-month research project expenditures total over $8.3 million from a variety of sources. This represents a 40 percent increase over the past three years. We are hiring new faculty members to support teaching and research initiatives.

In this report, we also showcase just a few of the many research projects underway in our School. The link between research and teaching is direct. We literally have hundreds of graduate students and a number of undergraduates involved in this effort, learning as they assist faculty in performing research. Subsequently, research findings are quickly translated into state-of-art learning in the classroom.

We continue to work diligently to offer the best undergraduate teaching programs possible and our programs are considered among the very best in the nation. We offer a sustainable engineering concentration and recently added a new construction engineering undergraduate degree.

If you are in Tempe, please contact me and come by for a visit.

G. Edward Gibson, Jr., Ph.D., P.E.
Professor of Construction Management and Engineering
Interim Director of the School
enrollment
- total 1172
- undergraduate 938
- graduate 234

faculty
tenured and tenure-track 33
full-time lecturers 5

research expenditures
$7,166,505 (FY2010)

degree programs
civil, environmental and sustainable engineering
construction engineering
construction management

School Director
G. Edward Gibson, Jr.
Interim

National Academy of Engineering
Bruce E. Rittmann
Della Roy

National Academy of Construction
William W. Badger, P.E.
G. Edward Gibson, Jr., P.E.

Regents’ Professor
Bruce E. Rittmann

Morteza Abbaszadegan
Soyoung Ahn
Braden R. Allenby
Samuel T. Ariaratnam, P.E.
Howard H. Bashford, P.E.
Allan D. Chasey, P.E.
Aaron Cohen
James J. Ernzen, P.E.
Apostolos Fafitis, P.E.
Peter Fox, P.E.
G. Edward Gibson, Jr., P.E.
Rolf U. Halden, P.E.
Sandra L. Houston, P.E.
Paul C. Johnson
Kamil Kaloush, P.E.
Dean T. Kashiwagi, P.E.
Edward Kavazanjian, P.E., G.E.
Kraig Knutson
Rosa Krajmalnik-Brown
Chris Lawrence
Brooke Mayer
Jason S. Lueke, P.E.
Michael S. Mamlouk
Larry W. Mays
Panagiotis Mitropoulos, P.E.
Barzin Mobasher, P.E.

Ram M. Pendyala
Subramaniam D. Rajan, P.E.
Della Roy
Thomas Seager
Kenneth T. Sullivan
Enrique Vivoni, P.E.
Edwin Weaver, P.E.
Paul Westerhoff, P.E.
Avi Wiezel, P.E.
Eric D. Williams
Matthew Witczak, P.E.
Claudia E. Zapata
ASU water researchers in the spotlight

Arizona State University faculty members and researchers played significant roles in the first International Water Association Leading Edge Technology conference in North America. The recent conference in Phoenix brought together experts from around the world to address challenges facing countries and communities in finding sustainable solutions to water and wastewater treatment needs.

“This is a very high-prestige international conference, and it is being held in Phoenix in large part because of the leading water research being done at ASU,” says Bruce Rittmann, Regents’ Professor and conference president.

Representatives from research institutions, utility industries and governments focused this year on exploring new technologies to minimize negative impacts that water supply and treatment operations can have on the environment, particularly in consideration of climate change. They also examined water reuse and nutrient recovery issues.

Rittmann gave a key presentation on microbial photobiorenewable energy, highlighting work at ASU in the use of photosynthetic bacteria to produce renewable energy from sunlight and carbon dioxide.

Dan Childers, a professor in ASU’s School of Sustainability and associate director for research development for the university’s Global Institute of Sustainability, spoke about ASU’s new Phosphorous Initiative.

The initiative has been established to draw public awareness to the potential impacts of an emerging scarcity of phosphorous, a critical nutrient mineral.

“We depend on it for the fertilizers we use to grow our food crops, but it’s going to be increasingly scarce in the next few decades,” Childers says.

His presentation focused on the sustainability challenges we face with phosphorus availability and potential solutions to the problem related to urban wastewater systems.

Building bridges, changing lives

ASU’s Bridges to Prosperity team, B2P ASU, is one of the national organization’s few university teams that take on a bridge project every year.

B2P ASU completed a bridge in a remote village in San Lucas, Guatemala during 2009–10, replacing a simple board over a waterway that could be impassable during the rainy season.

The B2P ASU team of Erick Ponce, Sergio Sanchez and Edgar Maya completed the bridge designs while also raising funds to buy the materials for the bridge and cover travel costs. In addition to corporate and personal donations, critical funding for the project was provided through the Engineering Schools’ Ira A. Fulton endowment.

The team traveled to Guatemala in May 2010 to work with the San Lucas community and coordinate the final steps in completing the project. In July, the bridge was officially opened to the public, providing a new structure that enabled safe passage for the entire community.

In 2010–11, one of the Engineering Projects in Community Service (EPICS) project teams will build a bridge in El Salvador.
Engineering landfills to save money, resources

Being able to determine precisely how much solid waste can be safely contained in the landfills where much of our trash is deposited is critical to protecting the environment—and a big money saver.

For more than a decade, Edward Kavazanjian, a professor in School of Sustainable Engineering and the Built Environment, has been working on ways to make landfills more economically and environmentally sustainable by bringing a high degree of precision to the assessment of such capacity and safety factors. Some of his findings are detailed in a technical paper that won the 2010 Thomas A. Middlebrook Award, a top honor from the American Society of Civil Engineers for research papers in the geotechnical engineering field.

Kavazanjian and his co-authors will be presented the award in March 2011 at Geo-Frontiers, a national conference showcasing significant advances in geotechnical engineering.

The research paper focuses on what professionals call municipal solid waste: the garbage we typically put in containers and take out to the curb each week for pickup. Most of this kind of waste ends up in municipal landfills.

Knowing how high and how steeply the waste can be safely piled in landfills helps reduce the need for—and the costs of—new or expanded landfills. Using landfills at full capacity helps keep costs for public waste disposal from increasing, thus keeping our monthly waste-hauling bills down. The paper Kavazanjian co-wrote with several colleagues provides information essential to maximizing landfill capacity.

The research was conducted as part of project funded by the National Science Foundation that brought together engineers at ASU, the University of California, Berkeley and the University of Texas, Austin. The award-winning research paper represents the culmination of 15 years of study by Kavazanjian and his colleagues.

Construction students contribute to a life-changing home makeover

A group of construction students from the Associated General Contractors of America (AGC) student chapter in the School of Sustainable Engineering and the Built Environment teamed with Rebuilding Together, Gilbane Building Company and Ryan Companies to provide a home makeover for a Phoenix-area family.

Rebuilding Together works to preserve affordable home ownership—especially for veterans with disabilities. They provide free home modifications and repairs.

Between 15 and 20 ASU construction students contributed to the makeover, providing the necessary labor to complete the eight-day project in spring 2010. With additional contributions from the contractors and the subcontractors, the volunteers were able to completely rebuild this 1,000 square-foot house for a Phoenix-area family of four.

ASU’s AGC student chapter does four significant community service projects each semester. Projects like the ones done with Rebuilding Together provide students with valuable field experience and the chance to make a difference in the community.

In the fall semester, the AGC chapter participates in Rebuilding Together’s Paint-a-Thon, a service project to paint the exterior of owner-occupied housing for low-income homeowners.

Edward Kavazanjian

Scope of Work:
New roof
Ceiling replacement
New evaporative cooler system
Kitchen and bathroom renovation
New water heater
Landscaping and dust remediation
Flooring replaced
New windows and doors
Plumbing repaired
Removal of aluminum siding
Interior and exterior painting

Photos courtesy of Rebuilding Together
inspiring future engineers
ensuring a bright future for the engineering profession

Assistant Professor Veronica Santos (at right) instructs preschool students how to use a sensor glove to control the fingers on a robot hand at the Biomechatronics Lab.
Creating a pipeline of students to fill the ever-increasing need for engineers

Through collaborations with Arizona’s K–12 teachers, education leaders, and ASU engineering faculty and student organizations, the Fulton Schools of Engineering offer a full spectrum of creative programming and activities designed to inspire young minds to pursue degrees and careers in engineering, computer science and construction management.

In supporting programs to excite passion for engineering, computer science and construction management in young students, we also seek to increase the diversity of our students and strive to achieve a student population that reflects the demographics of our community.

By providing role models and rich educational experiences, we continue to help these future leaders to envision, create and successfully realize their academic and career aspirations.

The ExxonMobil Bernard Harris Summer Science Camp

For the second consecutive year, ASU was one of 30 universities in the United States selected by veteran astronaut Bernard Harris to host a two-week summer camp that challenges fifth-, sixth- and seventh-grade students from Arizona schools to expand their horizons in engineering and science.

FIRST LEGO League

FIRST LEGO League (FLL) brings theory and practice together in a revolutionary program. It empowers young students to combine what they’ve learned in the classroom with the latest technologies in order to solve a challenge. ASU operates the league for the state of Arizona; over 200 teams of middle school students from across the state participate in the competition.

A team of eight young students from Peoria, Arizona, won the FLL Arizona State Championship Tournament for a third straight year, and gave a stellar performance at the FLL World Festival. Representing Arizona in robotics competitions against the best student FIRST LEGO League teams from more than 30 countries, the Peoria students—who call their team Get Smart—won the second-place Champion’s Award, a third-place Robot Performance Award and the Adult Mentor Award for coach Scott Gray.

Girls Have IT Day

Girls Have IT Day, a collaboration between Xavier College Preparatory and the Ira A. Fulton Schools of Engineering, is designed to interest, engage and empower girls to pursue careers in STEM fields. It brings together women from the STEM industry, faculty, undergraduate students, high school and middle school girls to engage in dialogue, hands-on learning activities, collaborative exploration and STEM-related activities.

CampGame and Robotics Camp

These programs are designed to foster engineering interest in middle and high school students through work with video games and robotics.

Robotics Camp provides high school students with hands-on experience building an operational robot that can perform tasks on command.

CampGame challenges middle and high school students to build a well-designed video game employing the fundamentals of video game creation, visualization and production. This program introduces students to the production side of the video game industry.

Summer Bridge

This five-week summer session is designed to assist first-semester freshmen in making a successful transition from high school to college. Through Summer Bridge, students become acclimated to campus life at ASU, gain access to student support programs and services and learn effective academic skills.

SEE@ASU

The SEE@ASU Summer Program offers highly motivated high school seniors an immersion into the world of engineering. The one-week residential summer experience introduces 30 students to the academic expectations of college, university life and the opportunities offered by the Fulton Schools of Engineering. The participants visit labs, build rockets, work with faculty and actively investigate the many facets of engineering and construction.
investing in engineering

all great cities need great universities—and great engineers
Ira A. Fulton’s investment

In 2003, Ira A. Fulton, founder and CEO of Arizona-based Fulton Homes, established an endowment of $50 million in support of ASU’s College of Engineering and Applied Sciences.

Since receiving his transformational gift, the Ira A. Fulton Schools of Engineering have seen tremendous growth, both in scale and in quality of people and programs. Fulton’s investment has served as a catalyst for this advancement, enabling the development of a dynamic portfolio of strategic initiatives that benefit our students and faculty and the communities where they live and work.

Throughout, Ira A. Fulton has remained an active supporter of the school that bears his name. He is a familiar face to students, and a regular presence at events such as the semi-annual Fulton Undergraduate Research Initiative Symposium and engineering convocation ceremonies.

We are grateful for the ongoing support provided by Ira A. Fulton.
The largest in-kind gift in the university’s history was made to ASU’s Ira A. Fulton Schools of Engineering through the Siemens PLM Software Global Opportunities in Product Lifecycle Management program—called GO PLM™. The gift, with a commercial value of nearly $245 million, includes engineering software, student and instructor training and specialized software certification programs.

This gift enables ASU to enrich its engineering education and provide students more advanced preparation to enter the work force. The academic license program allows students to use sophisticated software packages to perform critical engineering tasks such as stress and failure simulation, vibration and dynamics analyses and thermal analyses. “Today’s leading manufacturing and technology companies compete on the basis of time to market, product cost, quality and innovation,” says Helmuth Ludwig, President, Siemens PLM Software. “It’s quite clear that today’s best students in top programs, such as the program at ASU, must benefit through opportunities to gain experience with technology that supports these objectives.”

After years in the construction industry, Raymond B. Gonzales used $1,500 to launch his own company from a small room in his home. Today, RBG Construction Company, LLC, has successfully grown into one of the most recognized construction companies in the valley.

Never forgetting his humble beginnings, Ray’s company has pledged $28,000 over the next five years in support of the recruitment and retention efforts for underrepresented students, particularly Hispanics, to the Del E. Webb School of Construction programs.

This Advancing Minorities in Construction (AMIC) program was launched in spring 2009 with the help of two ASU alumni, Frank Rivera (construction, ’68) and Marty Alvarez (business, ’72). Building on the success of Advancing Women in Construction (AWIC), the first group of nine AMIC students received RBG Construction scholarships in fall 2009. Each student was assigned an individual mentor from the construction industry and eight of the nine students were retained for fall 2010.

Ray Gonzales and RBG Construction were awarded Entrepreneur of the Year in 2007 from the Arizona Hispanic Chamber of Commerce and AMCA’s Minority General Contractor of the Year in 2006.
Steve and Judy Puthuff have proved they know something about building value.

Steve, who earned a degree in electrical engineering at Arizona State University in 1963, has been a founding member of 11 successful start-up companies and holds an equal number of patents for new technologies.

Judy has contributed to increasing the family’s assets by managing the couple’s real estate investments for three decades.

However, the Puthuffs hope that the endeavor that will eventually prove the most valuable springs from their contributions to the Ira A. Fulton Schools of Engineering.

Last year they donated $50,000 along with a gift of equal value in the form of computer software for interactive educational programs.

The software comes from Information Communication and Education, or ICE, a nonprofit enterprise Steve Puthuff helped establish to develop online technologies for education. Together, the gifts will strengthen ASU’s partnerships with K-12 schools to improve high school graduation rates and students’ success in college.

The contributions will bolster resources for providing educational summer camps and workshops for teachers, developing new approaches to teaching and curriculum content and establishing more industry-school partnerships.

“I decided to help the cause through ASU, not because it’s my alma mater, but because the university is showing it is serious about innovation in education.”

— Steve Puthuff

Brenda and John McCaffrey joined the Dean’s Club in 2009, pledging $25,000 over the next five years to help support and promote student success at the Ira A. Fulton Schools of Engineering. As a proud engineering alumnus of Arizona State University, Brenda knows exactly what it takes to achieve success in today’s competitive market.

She developed her skills in semiconductor testing at Motorola before returning to ASU to obtain a Ph.D. in electrical engineering. In 1999, she established White Mountain Labs, based on the conviction that a systematic approach to highly technical, “niche” semiconductor testing could produce clear data, enabling engineers to be successful in developing innovative products.

The business experienced 125 percent growth in sales from 2004–2007 and was soon acknowledged as a technical leader in the area of ESD and ATE testing.

In 2007, she sold the company to Evans Analytical Group, but continued on as vice president of marketing for several months before retiring. Currently, as founder and president of Kolea Technology, her goal is to “bring ideas, engineers and resources together to bring innovative products and services to light.”

Her generous gift to the school is not the only way that she is giving back. For the past two years, Brenda has been a guest lecturer in Michael Kozicki’s senior electrical engineering course, discussing how engineers can be successful entrepreneurs.

She was an active member of the Dean’s Corporate Advisory Board, and supported the mission of the K–12 STEM Education group.

Brenda was awarded the Distinguished Achievement Award in 2008-09.
Four of Arizona State University’s leading education innovators have joined the Ira A. Fulton Schools of Engineering to help deepen the schools’ commitment to cutting-edge engineering education.

“We are building a community of faculty who are intensely engaged in advancing the ways we educate engineering students,” says James Collefello, associate dean of Academic and Student Affairs. “These four will strengthen that core group and bolster the educational research aspect of our mission.”

Professor of mathematics education James Middleton and assistant professor of engineering education Tirupalavanam Ganesh have joined the School for Engineering of Matter, Transport and Energy. Robert Atkinson and Brian Nelson, associate professors of educational technology, have joined the School of Computing, Informatics, and Decision System Engineering.

They will provide significant expertise in learning methods, cognitive theory and best teaching practices, Collofello says, as well as contribute to curriculum development and instruction planning.

In addition, the Schools’ K-12 science, technology, engineering and math (STEM) education outreach and student recruiting are also expected to benefit from the work of these faculty members.

“They bring new expertise, ideas and energy to our engineering schools,” says Executive Dean Paul Johnson. “The timing is perfect. There’s a lot of excitement about our efforts to expand educational outreach, redesign the engineering student experience and pursue more major projects for our research centers. These additional faculty will be able to contribute immediately and have a significant impact.”

James Middleton’s research focuses on motivational processes in education, mathematical modeling and cognition in STEM subject-matter, and student mathematical thinking.

He is a past director of ASU’s Center for Research on Education in Science, Mathematics, Engineering, and Technology (CRESMET), which works to improve K-12 STEM education.

Middleton is the author of a book on changing mathematics teaching. He has authored or co-authored more than 50 articles based on his research, and written a book on motivation to be published in spring 2011.

He has garnered more than $20 million in external funding to support STEM education research and improvement, and served as chair of the National Council of Teachers of Mathematics Research Committee.

Middleton earned a Ph.D. in educational psychology and mathematics education from the University of Wisconsin in 1992.

Tirupalavanam Ganesh, the former assistant dean of information systems for the Mary Lou Fulton Institute and Graduate School of Education, has been at ASU for four years. He now is the coordinator for the engineering education concentration in the Curriculum and Instruction Ph.D. program.

His research focuses primarily on studying K-12 curricula, integrating engineering in K-12 education and teaching and learning processes. He has led, or been part of, several ASU outreach and research projects to improve learning methods in Arizona schools.

Ganesh is the principal investigator of the ongoing National Science Foundation (NSF) project Learning through Engineering Design and Practice, which involves designing, implementing and systematically studying the impact of an informal middle-school engineering education program.

He earned his Ph.D. in curriculum and instruction from Arizona State University.
in 2003. He has a bachelor’s degree and a master’s degree in computer science and engineering.

Robert Atkinson’s research explores the intersection of cognitive science, informatics, instructional design and educational technology.

His scholarship involves the design of instructional material according to our understanding of human cognitive architecture and how to leverage its unique constraints and affordances. His current research focus is on the study of engagement and flow in games.

Atkinson is the principal investigator for a project supported by a Navy research grant for the evaluation of interactive tutoring systems and game-based environments on learning and engagement.

He is also the co-principal investigator for a project funded by an NSF grant for the development and evaluation of interactive, multimodal Web-based environments that provide resilience training for women pursuing doctoral degrees in STEM fields.

Atkinson earned an a Ph.D. in applied cognitive science from University of Wisconsin-Madison with a minor in statistics and research design in 1999, and has been at ASU since 2002.

Brian Nelson’s research involves theory, design and implementation of computer-based learning environments, focusing on immersive educational games. He has published and presented extensively on the viability of educational virtual environments for situated inquiry learning and assessment.

Nelson was recently co-principal investigator on two projects supported by MacArthur Foundation grants: 21st Century Assessment, investigating new models for assessment in digital media-based learning environments, and Our Courts, creating and assessing an immersive game to promote civic engagement.

Nelson earned a doctorate in education from Harvard University in 2005.
gifts to the ira a. fulton schools of engineering

July 1, 2009 through June 30, 2010

$1,000,000 and above
Siemens PLM Software

$250,000 to $499,999
Anonymous
Intel Corporation and Intel Foundation

$100,000 to $249,999
American Concrete Institute
Anonymous
Arizona Materials LLC
Arizona Portland Cement Company
The Boeing Company
CTI Inc.
ExxonMobil Corporation and ExxonMobil Foundation
Fort McDowell Yavapai Materials
Hanson Aggregates of Arizona, Inc.
Lehigh Southwest Cement Company
M & P Contracting, Inc.
Maricopa Readymix, LLC
NRMCA National Steering Committee
PCA Education Foundation
Judith and Steven Puthuff ’63
Rinker Materials
Rock Solid
Salt River Materials Group
Sika Corporation
Smith Pre-Cast
Southwest Patrons-Concrete Industry Management
TechAmerica
The Vinnell Foundation
Vulcan Materials Company
W. R. Grace

$5,000 to $24,999
ATK
Adolfson & Peterson Construction
American Subcontractors Association of Arizona Inc.
Ames Construction, Inc.
Anonymous
Anonymous
Anonymous
Anonymous
Anonymous
Arizona Community Foundation
Arizona Society of Civil Engineers
Arizona Tribal CDFI
Arviso – Okland Construction JV
Bechtel Group Foundation
Black & Veatch Corporation
The Bragg Companies
Broadcom Corporation
Lois and John Butler ’62 ’64 ’71
Cabot Corporation
Cannon & Wendt Electric Co., Inc.
Center Theatre Group
Chanen Construction Company, Inc.
Chapter 15 Assoc Facilities Engineering
Combs Construction Company, Inc.
Concord General Contracting, Inc.
Corbin Revocable Living Trust
Core Construction
DPR Construction, Inc.
Delta Diversified Enterprises, Inc.
DeTommaso Family Foundation
Larry Donelson
Dynamic Systems, Inc.
Janie Eslick Johnson Trust
FFKR Architects/Planners II
Faithful & Gould
Jodie and Albert Filardo
First Fisher Sand & Gravel Co.
Google Inc.
Granite Construction Company
HACI Mechanical Contractors
Henkel
Richard Herman
R.M. and Joseph Hui
Hunter Contracting Company
ITT Water & Wastewater
J. Banicki Construction, Inc.
JKF Electrical Contracting Enterprises
Edward Kavazanjian
Kinetic Systems, Inc.
Kitchell
Klondyke Construction LLC
George Lee
Linthicum Custom Builders, LLC
Lockheed Martin Corporation
Lovitt & Touche, Inc.
M. R. Tanner Construction
Markham Contracting Co., Inc.
Brenda McCaffrey ’93 ’99 and John McCaffrey
McCarthy Building Companies, Inc
Meadow Valley Contractors, Inc.
Nano and Giga Solutions, Inc.
Navajo Nation Gaming Enterprise
Navajo Nation Oil & Gas Company, Inc.
Nokia Corporation
PBS&J
PCL Civil Constructors, Inc.
PCL Construction, Inc.
Vicki and John Panhuise
Raytheon Company
Recurrent Energy
Resolution Copper Company
Ricor, Inc.
Rosendin Electric, Inc.
Bill Smith
Southwest Solar Technologies, Inc.
Stanley Consultants Charitable Foundation
Robert Stephens
The Sundt Companies, Inc.
Sunland, Inc
Swengel-Robbins
United Metal Products
Weyerhaeuser
Yahoo! Incorporated

thank you

Every effort has been made to ensure the accuracy of this list. If an error or omission has occurred, please contact the Ira A. Fulton Schools of Engineering Development Office at 480-965-9646 so that we may acknowledge your support.
harnessing the sun
leading the fast-paced solar race

Within the next decade, solar panels that today seem scattered and scarce may be widespread, perhaps as common as the power lines that deliver energy to your doorstep.

That is, if the Ira A. Fulton Schools of Engineering researchers Christiana Honsberg and Stuart Bowden have any say. The team is leading the fast-paced solar race, working in ASU’s Solar Power Lab, a unique center that partners with industry and universities worldwide.

The biggest challenge is keeping pace with industry growth. “The solar industry is experiencing 40 to 50 percent compound annual growth,” explains Honsberg, director of the lab. “That means, within 10 years, if those growth rates are maintained, it is possible to meet new U.S. electricity demands by photovoltaics alone.”

The fast growth presents its own issues. Every month, factories must figure out how to squeeze out more devices.

Honsberg and Bowden are world-recognized experts in understanding which solar cell components need to be controlled in order to achieve higher efficiency. They’re investigating new production techniques, including lower-temperature processing and heterojunction passivation, a process that allows for control of surface properties.

“Our research lab has a demonstration pilot line,” explains Bowden, co-director of the Solar Power Lab. “That means we can produce full-size and thin silicon solar cells right here. It also means we can exchange samples and machinery directly with industry and make an immediate impact.”

Part of that impact will come from the lab’s emphasis on nanostructure technology. “We focus on the entire research path—from today’s technology to technology that may be 20 years away,” says Honsberg. “It’s important that both are occurring in the same lab because, as we develop new advances, we can figure out how to apply them to commercial technology.”

But not to be overlooked, the team says, is an emphasis on education. “To keep up with industry growth, we need to produce PV graduates at the same rate,” says Honsberg. “We are working hard to develop courses and programs that target photovoltaics.” They’ve also created an electronic solar cell textbook viewed worldwide by 400,000 undergraduate engineers and industry professionals annually.
Arizona State University is one of the nation’s largest and most comprehensive urban-serving research universities. Located in the beautiful Southwest in the Phoenix metropolitan area, ASU is boldly pursuing its vision of a New American University, striving for student access and success, research and discovery that benefit the public good, and assuming responsibility for the economic, social and cultural vitality and health and well-being of the community.