

Squeezing 50 extra horses from a Mini Cooper

Pushing lots of air isn't enough. It has to be done at just the right moment.

The stock Mini Cooper has 115 horses under the hood. The Cooper S has 168 and if you add the John Cooper Works GP kit, that's boosted to 214.

But over at Fireball Tim Racing in California, the movie-car maker has built the MEGA MINI, a 500-horsepower, turbocharged screamer that revs to 9,000 rpm — well above the stock Mini's 6,800 rpm red line.

"Obviously, we've taken the car to a level where we are pushing the envelope and that required us to redesign some items," said Hubie Fuh, president of Fireball Tim Racing. "We're almost tripling the output of this motor. So the other components have to be optimized to work with it."

New intake manifold needed

One of those components is the engine's intake manifold, which brings the air/fuel mixture to the cylinders.

Enter a team of UA Mechanical Engineering (ME) students. They were looking for a senior design project at the same time that Fireball Tim Racing was looking for a racing intake manifold.

The result: An intake manifold that squeezes an additional 50 horsepower from the engine, and top prize in UA's annual Engineering Design Day.

"The problem was that the factory intake manifold was optimized for the lower rpm range, while this engine does most of its racing between 6,000



Matt Bailey Photo

Kuang Liu, a mechanical engineering senior, shows off the racing manifold that his team designed and built for their senior design project. His team won the top award at the spring 2006 edition of Engineering Design Day.

and 9,000 rpm," said ME senior Seth Crozier.

So that meant getting into the subtle aerodynamics of wave action theory, which deals with the compression and expansion of waves inside the manifold.

"The difficult thing for us was that none of the theory dealing with this project was taught in our classes because it's such a specialized field,"

Crozier said. "So we had to do a lot of research and studying to be able to analyze the problem and design a solution."

"We started slowly by checking on books about the design of internal combustion engines," said ME senior Kuang C. Liu. "Eventually, we found a book published by SAE (the Society of Automotive Engineers) that was

Continued on Page 11



© UA/Robert Walker

Faculty, facilities and endowments

They combine to continue UA Engineering's long history of excellence

There have been many exciting developments regarding faculty, facilities and financial support in the College during recent months, and I'd like to update you on the highlights.

First, the new Materials Research Building — to be built north of Speedway and east of the Aerospace and Mechanical Engineering Building — is now in the planning stages. This location is ideal, as it is a physical nexus between Engineering and UA's Health Sciences Center.

We have some exciting preliminary drawings, and UA has committed \$30 million to the building. We're now raising the additional \$30 to \$45 million required for the project.

The building will house researchers from chemical engineering, environmental engineering, materials science and engineering, and biomedical engineering related to materials.

Endowments fund faculty

The Brown Family Foundation has established a \$1 million endowment to support recruitment of National Merit Scholars, which has been incredibly successful.

While engineering has about 10 percent of the undergraduates in the university, 40 percent of the National Merit Scholars on campus are engineers. This is evidence of our ability to attract the best and the brightest students, and the Brown endowment is helping us do that.

There also are exciting developments in Mining and Geological Engineering (MGE):

- Phelps Dodge has endowed a \$2.5 million professorship, and we're recruiting a new faculty member for that position.

- Alum Jack Thompson and his wife, Linda, have established a \$1 million endowment that supports the Thompson Family Professor of MGE, who will teach the design/practice

courses in the curriculum.

In Electrical and Computer Engineering (ECE):

- We are very close to completing the \$1 million endowment for the Ogelthorpe Chair, funded by Ray and Jean Ogelthorpe.

- The International Foundation for Telemetry has established a \$500,000 distinguished professorship.

In Bioengineering:

- We're recruiting for the Brown Chair in bioengineering, funded by the Brown Family Foundation.

These endowments are allowing us to attract and retain the high-quality faculty who have been a cornerstone of this program for many years.

Faculty members honored

A number of our faculty members have been recognized with local, national and international awards:

- Professor Farhang Shadman, of Chemical and Environmental Engineering (ChEE), has been named a Regent's Professor, the highest distinction accorded by UA to faculty members on behalf of Arizona.

- Two faculty members have been named to the National Academy of Engineering, the highest honor bestowed on engineers in this country. They are Professor Emeritus Kenneth Jackson, of Materials Science and Engineering, and Professor Spencer Titley, who holds a joint appointment in Engineering and Geosciences.

- Professor Jim Shuttleworth, of Hydrology and Water Resources, has received the International Hydrology Prize, sometimes referred to as the "Nobel Prize for hydrological science and engineering."

- The da Vinci Circle, the Engineering College giving society, has selected three faculty as this year's da Vinci Fellows: Anthony Muscat, of ChEE; Achintya Haldar, of Civil Engineering and Engineering Mechanics; and Charles Higgins, of ECE.

Each year, exceptional faculty are named to the da Vinci Fellows

program, based on their teaching or research achievements. Each receives a one-time grant to support his or her research or teaching activity.

These fellowships result from the generosity of da Vinci Circle members. I am very grateful to this group of individuals and companies, whose financial support has opened up so many exciting possibilities in research and teaching in the college.

Using 'More info'

At the end of several stories in *Arizona Engineer*, you'll find a word or phrase under "More info." You can use this phrase to search for a longer version of that story at <http://uanews.org/engineering>. Type the word or phrase into the "Engineering Article Finder" box at the top left of the web page and click on "search."

The ARIZONA

Engineer

Fall 2006

Vol 29 • No. 2

Arizona Engineer is published twice yearly for alumni and friends of The University of Arizona College of Engineering.

Editor/Writer: Ed Stiles

Photos: Photos on pages 19 and 20 courtesy of alumni and friends.

Engineering Offices: 520-621-6594

E-mail: stiles@u.arizona.edu

The University of Arizona is an equal opportunity, affirmative action institution. The University prohibits discrimination in its programs and activities on the basis of race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, or gender identity and is committed to maintaining an environment free from sexual harassment and retaliation.

All contents ©2006 Arizona Board of Regents. All rights reserved.

Students and local engineer develop water system in Ghana

A handful of UA students and a Tucson engineer are improving life for 10,000 people in Ghana West Africa through UA's newly established chapter of Engineers Without Borders (EWB).

The students and UA alum Ty Morton are working with community leaders in the North Tongu District of Ghana's Volta Region on a water supply system that eventually will serve 30 villages.

Morton, the group's professional engineer mentor, is a UA Agricultural and Biosystems Engineering graduate and a water resources specialist at CH2M Hill.

He and four EWB students made a site visit to Ghana. "Now we've come up with a list of things we want to solve and are generating a report and some construction drawings," Morton said.

The UA EWB members hope to address several problems during the project's three-year lifespan.

"This is such a great project," said UA EWB President Amanda Plourde, a master's student in Civil Engineering. "We're working in a developing country in a community that really wants this to work. It's going to benefit them tremendously. That's the drive and motivation for us to keep working and being dedicated to it."



UA EWB Photo

Members of UA's chapter of Engineers Without Borders join Tor Bjornesen (third from right) for a photo during their site visit to villages in Ghana. Bjornesen is the local NGO AMURT (Non Governmental Organization representative for the Ananda Marga United Relief Team.) The UA EWB members are (from left) Samantha Treese, Amanda Plourde, John McEligott, Dave Newman, and Ty Morton.

EWB-USA organizes projects in which professional and student engineers contribute engineering expertise to communities in developing nations.

•
More info: EWB

Scholarship donors, recipients honored

About 85 people attended the sixth annual Scholarship Donor Appreciation Reception to honor individuals and companies that contribute scholarships to engineering students at UA.

The reception also gives donors a chance to meet the students who benefit from their support.

Each year, one donor speaks on behalf of the donors and one student speaks for the scholarship recipients.

This year, Sarah Smallhouse represented the donors. She is the president of the Thomas R. Brown Family Foundation and an MBA graduate of UA's Eller College of Business.

"Burr-Brown, which was the company that my Dad started and grew in Tucson, did very well," she said. "The company hired a lot of very competent engineers who were educated at the University of Arizona. It's exciting for us to have that come back around and to be able to support some of the present students, who I'm sure will go out and do amazing things in their careers."



Ed Stiles

Scholarship donors and recipients from UA Civil Engineering got a chance to meet one another at the sixth annual Scholarship Donor Appreciation Reception.

Jeff Goodhue, a senior in Systems Engineering and the Outstanding Senior in UA's Honors College for spring 2006, spoke for the students.

"The donors in this room are allowing the students here to live their dreams and not worry about financial responsibilities," he said. "You're allowing us to do so much more than we could without your support."

•
More info: Donors

Shuttleworth wins hydrology's top prize

Professor Jim Shuttleworth has been awarded what is sometimes referred to as the "Nobel Prize for hydrological science and engineering."

The International Hydrology Prize (IHP) is awarded each year to a hydrologist "who has made an outstanding contribution to hydrology such as confers on the candidate universal recognition of his or her international stature."

Shuttleworth is a professor of Hydrology and Water Resources and director of UA's center for Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA).

The IHP has been awarded for 25 years and has been given to just five U.S. hydrologists in that time.



Jim Shuttleworth

Courtesy of Jim Shuttleworth

•
More info: IHP

Students win \$6,500 in cash at Engineering Design Day

Student engineers won a total of \$6,500 in 10 award categories at UA's 2006 Engineering Design Day in May.

Design Day 2006 included 64 projects from ten engineering departments and from UA's multidisciplinary senior design course.

The projects were judged by 54 practicing engineers from more than 30 companies.

Lockheed Martin is the primary sponsor of Engineering Design Day, and several other companies also sponsor awards, including: Advanced Ceramics Research, Ventana Medical Systems, Honeywell, Northrop Grumman, Texas Instruments, PADT, and Raytheon.

•
More info: [Design Day](#)



Ed Stiles

Engineering Design Day judges and faculty who organized the event posed for a group shot during lunch break. The judges determine the winners in several categories including Overall Design, Overall Software Design, Team Leadership, Aerospace Design, Optics Design, Interdisciplinary Design, Mechanical Design, and several other award categories.

6,000 students + 300 engineers and scientists = noise, fun & excitement



Photo Courtesy of MSTFF

Honeywell Corp. gave students a chance to ride hovercraft during the Tucson Math, Science, and Technology FunFest.

More than 6,000 students in grades 4 through 8 got to meet more than 300 scientists and engineers from a broad range of disciplines during the three-day Tucson Math, Science, and Technology FunFest (MSTFF) in March.

Many engineers and scientists from UA were part of the show, including Chemical Engineering professor Paul Blowers, one of the MSTFF organizers. UA's team came from the Lunar

and Planetary Laboratory, College of Medicine, Biochemistry program, College of Engineering, and Flandrau Science Center.

Despite all the fun, MSTFF has an important, serious side. It's particularly important to convince middle-school and grade-school students that science and engineering are fun, exciting and accessible to almost anyone who wants to learn about them, Blowers said. These students need to be encouraged to continue taking science and math to be ready for science and engineering courses in college.

"If I want to have good students in my classes ten years from now, we need to get middle school students interested in science, math and engineering today," he said.

MSTFF was started by Raytheon engineer Sharon O'Neal, UA Chemical Engineer Anthony Muscat, and Caryl Jones, a librarian at Ventana Vista. Raytheon, IBM, Honeywell, and several other Southern Arizona companies participate.

•
More info: [MSTFF](#)

Smerdon wins John C. Park Award

Professor Emeritus Ernest T. Smerdon, former dean of UA Engineering, has been named the John C. Park Outstanding Civil Engineer for 2005 by the American Society of Civil Engineers (ASCE).



Courtesy of Ernest T. Smerdon

The award was given to Smerdon "for substantial contributions to the status of the civil engineering profession through distinguished service and outstanding achievement."

The award is named for John C. Park, who was a professor of civil engineering at UA from 1926 to 1958. Park also served as dean of UA Engineering from 1951 to 1957.

Smerdon was dean of the UA College of Engineering from 1988 to 1998.

•
More info: [Smerdon](#)



This year's da Vinci Circle Fellows are (from left) Anthony Muscat, Chemical and Environmental Engineering; Achintya Haldar, Civil Engineering and Engineering Mechanics; and Charles Higgins, Electrical and Computer Engineering.

Ed Stiles

Fellows introduced, college lauded at da Vinci Circle Event

About 150 friends of the College of Engineering attended the second annual da Vinci Circle dinner and lecture in April at Tucson's Arizona Inn.

The da Vinci Circle is the Engineering College giving society, which is named for Leonardo da Vinci. It benefits engineering faculty and students while directly engaging patrons in the discovery process.

Professor Michael Marcellin, of Electrical and Computer Engineering, spoke on "JPEG2000 and Digital

Cinema."

Marcellin is one of the leaders in developing and applying JPEG2000. He also consults with a consortium of movie studios regarding distribution of movies in JPEG2000 format.

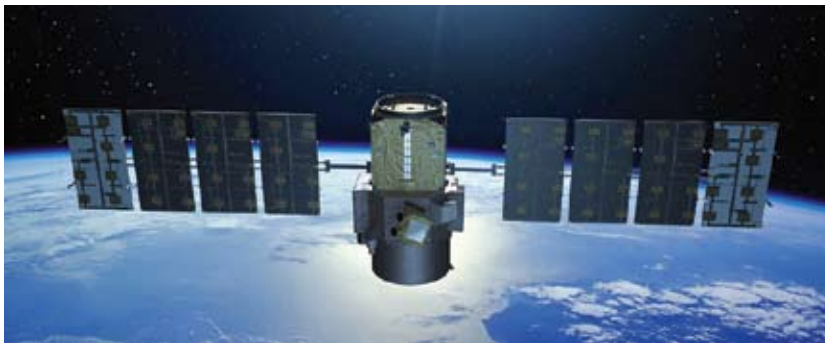
Tom Peterson, Dean of UA Engineering, also spoke. He highlighted new developments in the college and introduced this year's da Vinci Fellows.

Each year, exceptional faculty are named to the fellows program. This recognition is based on their teaching

or research achievements. They each receive a one-time grant to support their work and also received recognition plaques at the annual dinner.

Da Vinci Circle members either contribute to the Dean's Fund or support a favorite department or program within UA Engineering. In return, the college is creating programs and events for da Vinci Circle members that reflect the diversity and richness of the pursuit for academic excellence at UA.

•
More info: [da Vinci](#)



Artist's conception of CALIPSO in orbit. (NASA image by P. Carril)

NASA image by P. Carril

Reagan is co-investigator on CALIPSO mission

John A. Reagan, professor emeritus in Electrical and Computer Engineering, is a co-investigator on CALIPSO (the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations) satellite, which will explore the contributions of clouds and airborne particles (aerosols) to regulating Earth's weather, climate, and air quality.

Lidar (Light Detection And Ranging) is similar to radar. But unlike radar, which uses radio waves, Lidar

transmits and receives laser light.

CALIPSO, which combines lidar with infrared and visible-light imagers, will help scientists improve their understanding of the effect of human activity on the atmosphere.

Reagan has been working on calibration of CALIPSO's lidar instrument and on how to best retrieve information on aerosol distribution.

•
More info: [Reagan](#)

Outstanding grad student award

Otakuye Conroy received UA's Centennial Achievement Graduate Award during the fall commencement ceremonies for her outstanding achievements as a Ph.D. student in environmental engineering.



Otakuye Conroy

The Centennial Awards recognize the achievements of students who are members of traditionally underrepresented groups.

The award includes a \$500 cash prize from UA's Division of Campus Life and the UA Graduate College, as well as an engraved plaque from UA's Alumni Assoc.

•
More info: [Conroy](#)

Ed Stiles

Michelin Award

Mining Engineering student wins \$3,000 essay contest

Angela Noon, a junior in Mining Engineering, won \$3,000 and an engraved plaque in the first Michelin Mining Essay Contest. She is one of two winners in the contest, which is sponsored by the Michelin Earth-mover Group.

Three Michelin executives were on hand to present the award on campus: Jim Griese, director of mining sales for North America; Kaan Demirel, market segment manager for North America; and John Funke, director of sales for North America.

Mary Poulton, department head in Mining and Geological Engineering, and several other faculty members also attended the award ceremony.

Noon's essay was one of 23 submitted. The essays were evaluated by a panel of judges from throughout the mining industry.

Demirel said that Noon's essay contained several ideas that will be valuable to Michelin and that the essay has been distributed to several of the



Ed Stiles

Mining Engineering junior Angela Noon (left) received the engraved plaque for her winning essay in the Michelin Mining Essay Contest from Michelin's Jim Griese, director of mining sales for North America. The ceremony took place in front of UA's historic engineering building.

company's executives.

Students were asked to write essays about what they believe will be the major advancements in surface mining methods and technology during the next 10 years, especially those related to safety and productivity.

•
More info: [Michelin](#)

UA student wins first Prince Fellowship



Ed Stiles

Zhen Zhou (left) with Martha Prince, wife of the late John L. Prince.

Zhen Zhou, a Ph.D. student in Electrical Engineering, has received the first SRC/John L. Prince Fellowship from the Semiconductor Research Corp. (SRC).

The fellowship honors UA Profes-

sor John L. Prince, who died on Dec. 16, 2005. Prince was a pioneer in the electrical characterization of packaging structures for microchips and other semiconductors. He helped establish the strong ongoing partnership between UA and SRC that dates back more than 20 years.

Zhou received the award at the SRC Integration and Packaging Sciences Spring Review, which was held at UA. Prince's wife, Martha Prince, and Harold Hosack, SRC's director for Interconnect and Packaging Sciences, presented the award to Zhou.

The Prince Fellowship is designed to stimulate non-traditional thinking and to encourage exploratory, high-risk research. SRC hopes this will lead to novel, high-payoff solutions to problems in the semiconductor industry.

•
More info: [Prince](#)

Wang Roveda wins NSF PECASE award

Janet M. Wang Roveda is one of 20 PECASE (Presidential Early Career Award for Scientists and Engineers) award winners, and one of four in the area of computer and information science.

Wang Roveda, an assistant professor in



Janet Wang Roveda

Electrical and Computer Engineering, received the award during a ceremony at the White House.

PECASE is the highest honor bestowed on investigators in the early stages of promising research and education careers by the United States government.

Wang Roveda is creating Electronics Design Automation (EDA) tools that will help engineers design nanometer-scale integrated circuits.

Integrated circuits are the building blocks behind today's amazingly complex and tiny electronic devices such as cell phones, MP3 players, and desktop computers.

•
More info: [PECASE](#)

Courtesy of J. Wang Roveda

Engineering Physics senior wins NASA fellowship

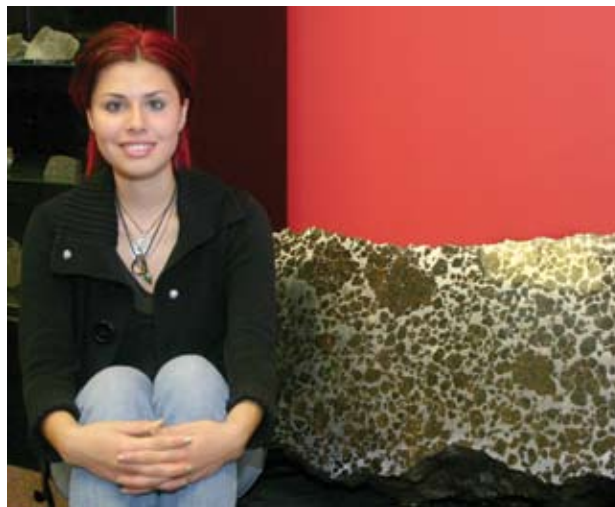
Engineering Physics senior Daniella Della-Giustina is one of two UA students to receive a NASA fellowship to investigate revolutionary ideas for space exploration. Only five such fellowships were awarded nationwide.

She has received a \$9,000 NASA Institute for Advanced Concepts (NIAC) Student Fellows Prize to study the use of near-Earth asteroids to shield astronauts from radiation as they travel to Mars.

“The biggest obstacle facing manned space exploration is the threat of biologically hazardous cosmic radiation,” Della-Giustina said. “If we don’t develop an effective solution to this issue, the threat of cosmic radiation will prevent a manned mission to Mars.”

During the journey to Mars, astronauts will be exposed to dangerous space radiation that could cause serious medical problems. Currently proposed shielding systems are prohibitively expensive or impractical, Della-Giustina said.

She will investigate whether spacecraft could hitch a ride on asteroids whose orbits cross both Earth and Mars orbits. Many asteroids have regolith that could shield space-



Daniella Della-Giustina sits next to a slice of meteorite at the UA Southwest Meteorite Center, where she conducts her research.

Ed Stiles

craft. Astronauts could mine natural resources from the asteroids during their journey, she said.

More info: Della-Giustina



Faculty honored for their recent achievements at an Engineering College reception were (from left) Spencer R. Titley, Kenneth A. Jackson, and Farhang Shadman.

Tom Peterson Photo

Award-winning faculty honored

Three faculty members were honored at a College of Engineering reception in April in recognition of their recent achievements.

Professor Emeritus Kenneth A. Jackson and Professor Spencer R. Titley were recently elected to the National Academy of Engineering (NAE), and Professor Farhang Shadman was named a UA Regents Professor.

Election to NAE is one of the highest distinctions for an engineer and honors those who have made important contributions to engineering theory, practice and education.

The title of Regents Professor is reserved for faculty whose exceptional achievements have gained national or international recognition.

Jackson, of Materials Science and Engineering, is an expert on crystallization kinetics, thin film growth and characterization, ion beam processes and semiconductor processing.

Titley holds a joint appointment in Engineering and Geosciences. He is a mining and resource geologist whose research has led to a better understanding of metal concentrations.

Shadman, of Chemical and Environmental Engineering, applies chemical reaction engineering to semiconductor manufacturing, advanced materials processing and environmental contamination control. He directs the NSF/SRC Engineering Research Center for Environmentally Benign Semiconductor Manufacturing.

Eric Case earns top IT certification

Eric Case, principal support systems analyst for UA’s Chemical and Environmental Engineering Department and Materials Science and Engineering Department, has been named a Certified Information Systems Security Professional (CISSP).



Eric Case

Case is the only IT person at UA to earn this certification and only one of 13 in Tucson. CISSP is awarded by the International Information Systems Security Certification Consortium, Inc. (ISC)².

Our heavy reliance on electronic and wireless communications makes us vulnerable to cyber thieves, said ISC President and Interim CEO Rolf Moulton.

Highly trained information security specialists are critical to protecting us against the cyber attacks, he said.

More info: Case

Courtesy of Eric Case



The award winners and representatives from The University of Arizona at TMAL included (from left) Tom Peterson, dean of the College of Engineering; Paul Portney, dean of the Eller College of Management; UA President Peter Likins; William D. Mensch, Jr., founder, chairman and CEO of The Western Design Center; J. Steven Whisler, chairman and CEO of Phelps Dodge Corp.; Bruce T. Halle, chairman of Discount Tire Co.; Donald V. Budinger, chairman and founding director of Rodel, Inc.; and J. Burgess Winter, former president and CEO of Magma Copper Corp.

TMAL facts

The annual Technology & Management Awards Luncheon (TMAL) honors selected individuals who have made significant contributions to the economic development of Arizona and the nation.

TMAL also highlights the partnership between business and engineering at The University of Arizona. Close collaboration between the two disciplines is important at both the university and corporate levels for the United States to remain competitive in today's global marketplace.

J. Steven Whisler named Technology & Management Executive of the Year

J. Steven Whisler has been named the 2005 Technology & Management Executive of the Year by UA's College of Engineering and the Eller College of Management.

Whisler is chairman and CEO of Phelps Dodge Corp., a Fortune 500 company based in Phoenix, Ariz.

Whisler is one of six business and technology leaders who were honored at the seventh annual Technology & Management Awards Luncheon (TMAL) in December at The Arizona Biltmore Resort & Spa in Phoenix.

TMAL celebrates the contributions of high-tech enterprises and entrepreneurial ventures to the economic development of Arizona and the nation.

Whisler joined Phelps Dodge in 1981 and was named CEO in 2000. He has served in various posts including attorney for the company's exploration group, president of the company, and as its chief operating officer.

He developed the "Zero and Beyond" program, which is designed

to eliminate workplace injuries at Phelps Dodge. He also initiated "Quest for Zero," a program to eliminate environmental problems, waste, and product defects. The program also aims to create consistent quality in Phelps Dodge production processes.

Whisler serves as a director for Phelps Dodge; Burlington Northern Santa Fe Corp.; the US Airways Group, Inc. and its principal subsidiaries, America West Airlines, Inc. and US Airways, Inc.; the National Mining Assoc.; and the National Cowboy and Western Heritage Museum.

He also has received the Colorado School of Mines Distinguished Achievement Medal for his career accomplishments.

Whisler earned his bachelor's degree in business (accounting) from the University of Colorado and a J.D. degree from the University of Denver College of Law (with emphasis on natural resources law, business planning, and taxes). He also earned a master's degree in mineral economics and a Ph.D.

degree in engineering (Hon.) from the Colorado School of Mines. In addition, he attended the Advanced Management Program at Harvard University. Whisler is a member of the bar in Colorado, various federal courts and the United States Supreme Court. He also is a Certified Public Accountant in Arizona.

He was selected to receive the Technology & Management Executive of the Year Award because of his leadership role in the mining industry and for continuing the company's long-time support of The University of Arizona's education and research programs.

Others who were honored at TMAL included:

Lifetime Achievement Award, College of Engineering

• William D. Mensch, Jr.,

founder, chairman and CEO of The Western Design Center. Mensch designed the 6502 microprocessor, which drove some of the earliest PC systems. COMDEX honored the 6502 as the first of seven defining products in the 25-year history of the microprocessor. Mensch also is listed in the book, "Leaders of the Information Age," as one of 250 people who — in the past 500 years — laid the foundations for today's information technology industry.

Distinguished Service Award, Eller College of Management

• Patricia and J. Burgess

Winter, former president and CEO of Magma Copper Corp. Patricia and Burgess Winter have long supported The University of Arizona through the Winter Scholarship Program and The Magheramorne Foundation, which they founded. Burgess Winter has received the "Financial World" CEO of the Year Award and was elected to the Mining Hall of Fame in 1994. He continues to actively support UA educational efforts. Patricia Winter works with the Children in the Wilderness program, helping children in need in Southern Africa. Unfortunately, she was not able to attend the TMAL pre-



Ed Shiles

UA President Peter Likins (left) hoists the award he received from TMAL organizers for his continued support of the event. Likins has played a key role in TMAL's success since the event was organized six years ago. He also has attended every year. Tom Peterson (right), dean of Engineering, presented the award to Likins, who retired in June.

sentations because of a family illness.

Distinguished Service Award, College of Engineering

• Donald V. Budinger, chairman

and founding director of Rodel, Inc. Rodel is the world's largest manufacturer of high-precision surface-finishing chemicals used in manufacturing computer chips and other specialty products. Budinger founded Rodel and the Rodel Foundations. He is a board member of Thunderbird, The Garvin School of International Management; the Greater Phoenix Leadership organization; and The University of Arizona Foundation.

Lifetime Achievement Award, Eller College of Management

• Bruce T. Halle, chairman of

Discount Tire Co. In 1960, Halle started Discount Tire Co. in Ann Arbor, Mich. Today, the Scottsdale-based company is the largest independent tire dealer in North America, with more than 10,000 employees and more than 600 stores. New stores are being added monthly. Halle is a long-time supporter of community organizations. He received the American Academy of Achievement's prestigious Golden Plate Award and has been honored by many other organizations.

TMAL History

Past winners of the Technology & Management Executive of the Year Award include:

1999 — Craig Barrett
President and CEO
Intel Corp.

2000 — Michael R. Bonsignore
Chairman and CEO
Honeywell International

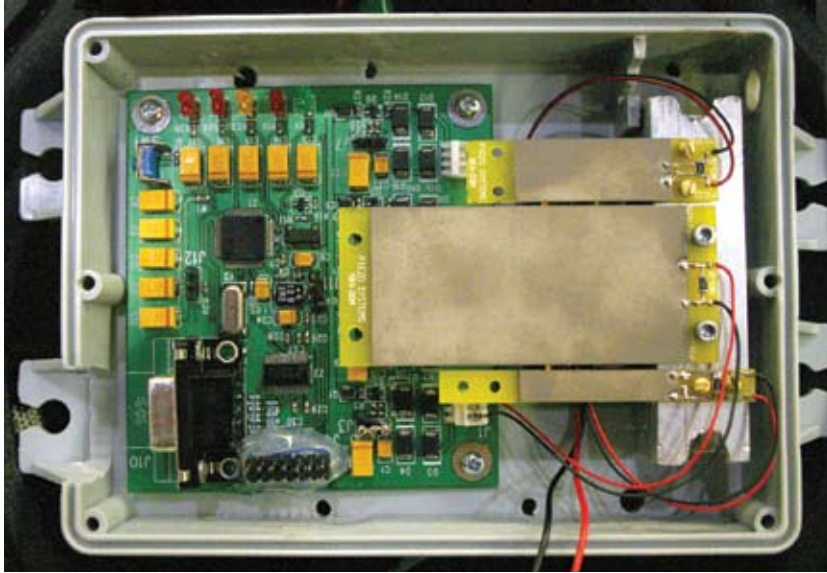
2001 — Tom Brown
Founder & Chairman Emeritus
Burr-Brown Corp.

2002 — Louise Francesconi
President
Raytheon Missile Systems
Vice President
Raytheon Co.

2003 — Nicholas M. Donofrio
Senior Vice President
Technology & Manufacturing
IBM Corp.

2004 — Vance D. Coffman
CEO & chairman of the board
Lockheed Martin Corp.

Student Projects



Electricity is generated when piezoceramic sheets (tan sheets at right) flex. The electrical charge is stored in capacitors (yellow, rectangular boxes) until it is transferred to the battery-charging circuitry.

Ed Stiles

Shake, Rattle and Recharge

It's like getting something for nothing — electricity from the vibrations that naturally occur in ships, planes, trucks and trains.

A team of Electrical and Computer Engineering (ECE) seniors has designed a device that converts these vibrations to electricity for trickle charging batteries in GPS tracking units made by ARGO Tracker.

“Companies can put these tracking units in their shipments and then log

onto the Internet to see the progress of their shipment in real time,” said Electrical Engineering senior David Tinnin. “The tracking unit has a lithium-ion battery that lasts 2 to 4 weeks. And after that it has to be hooked to an external power source and recharged. We want to eliminate the external power source and make these tracking units self-sufficient, so they can be deployed indefinitely.”

The secret to turning free, low-fre-

quency vibrations into electricity is a device called a piezoceramic sheet. The students anchored three sheets of different sizes at one end of their portable power system. Vibrations cause these cantilevered sheets to bend and crystals in the sheets generate electricity when they're stressed by bending.

Only a small amount of electricity is produced. It would take the students' device 40 days to fully charge the lithium-ion battery, said Electrical Engineering senior Kyle Zukowski. “But the batteries start out fully charged,” he added. “So we just have to produce enough electricity to recharge them.”

The piezoceramic sheets generate a random sinusoidal voltage, said Electrical Engineering student Asher Kells. This AC voltage is converted to DC and charges a small capacitor. When the voltage reaches a threshold, the circuit's microcontroller turns on a transistor that transfers the charge from the capacitor to a larger capacitor that can be used as part of the system to recharge the battery.

In addition to Tinnin, Zukowski and Kells, the team also included Computer Engineering seniors Victor Mendez and Daniel Burillo.

•
More info: piezo

RFID system helps non-profit group

A group of Electrical and Computer Engineering (ECE) seniors has developed a computerized system based on RFID bracelets and laptop computers that allows an after-school day-care program to easily track children and the services provided to them.

The system was developed for Child and Family Resources, Inc. to streamline their attendance record keeping and to record the services they provide to each child during daily activities.

RFID (Radio Frequency Identification) bracelets and an electronic RF reader are key to the system.

Each child is given a bracelet when they arrive at the day-care center.



The “K-5th Grade After-School Student Tracking System” team included Electrical and Computer Engineering seniors (from left) Christina Wright, Amuche Okeke, Sara Ramirez, and Nkiru Ameng.

Ed Stiles

Later, as they go from one activity to another they pass the bracelet within 20 mm of the RFID reader and their name is recorded along with the activity. The reader transmits a radio signal that excites a circuit in the bracelet, which then transmits a unique code to the reader.

The ECE students designed the computer screen display so that it looks like the paper record sheets teachers now use. This will make it easier to learn to use the computerized system.

•
More info: RFID

Student Projects

Wind Tower Uses Sun's Heat to Generate Electricity

Wind generators are great for producing electricity — unless there isn't any wind.

But lack of wind isn't an insurmountable problem, according to a group of UA Engineering students. They've been experimenting with a design that doesn't depend on the vagaries of natural wind. Instead, their design produces its own airflow by trapping heat from the sun and then allowing the heated air to escape through a chimney-like tower to an area of lower pressure and cooler air.

The students built a scale model to test their theories and to develop a set of scaling laws to accurately predict the power output of a "wind tower," depending on its diameter, collector area, height and many other factors.

"Wind towers are not like solar cells, where you power a house," said Mechanical Engineering senior Andy Lovelace. "We're talking about competing with a gas- or coal-fired power plant."

In 1982, engineers built a small-scale wind tower in Spain that ran for eight years. It had a 640-foot-tall tower, and a maximum output of about 50 kilowatts.

"My friend, Rudi Bergemann, developed the plant in Manzanares, Spain and brought this concept to my attention," said Professor Hermann Fasel, who sponsored the UA wind tower project. "He got me excited about doing serious research on this concept." Fasel is a professor in the Aerospace and Mechanical Engineering Department.

In addition to funding the project, Fasel was the team's faculty advisor and spent many hours mentoring the group. "This is one of the best teams I've advised in a long time, as well as the photovoltaic power unit team that won the PDAT Best Mechanical Design Award at Engineering



Ed Stiles

The Wind Tower design team displayed their scale-model wind tower at Engineering Design Day on May 2.

Design Day, he said."

In addition to Lovelace, the wind tower team included Mechanical Engineering seniors Dave Klawon, Oscar Rueda and Gabriel Secrest.

More info: wind tower

Mini Cooper

Continued from Page 1

specifically about designing intake manifolds for optimizing wave action."

How it Works

When a piston in an internal combustion engine goes down on the intake cycle, air is drawn into the engine, Crozier explained. As a result, a compression wave travels back through what's called the "runner." The runner is the tube that connects the intake manifold's main tube to the cylinder. There are four runners on the four-cylinder Mini.

"Depending on the length of the runner, the wave gets reflected back at a certain time," Crozier said. "So you

want it reflected back at precisely the time when the valve opens, maximizing the mass flow into the cylinder head. Power is optimized in a particular rpm range, based on the runner geometry and length."

The team built a prototype manifold, tweaked it and then built the final version.

Tripling the horsepower output might seem like a prescription for very short engine life, but Fuh says that isn't the case if it's done right with a robust engine. "It's a stout motor," he said. "It's a low-compression, iron block that's pretty strong." Since the racing manifold was added, the car has driven to California and back with no problems.

An added bonus for the team was



Kuang C. Liu Photo

This intake manifold, which squeezes an additional 50 horsepower from the Mega Mini's engine, won top prize in UA's annual Engineering Design Day on May 2.

the \$1,000 Lockheed Martin Best Overall Design Award they won at Engineering Design Day.

In addition to Liu and Crozier, the intake manifold design team included ME seniors Chad Brueggemann, Gary Tang, and Kyle Nath.

Fighting cyberspies with bio-mimicking software

UA's Electrical and Computer Engineering Department (ECE) has received \$1 million to fund research and development of security software for military computer networks.

The software will mimic biological immune systems by screening a computer network for abnormalities; isolating the infectious computer viruses, worms and other attack agents; and developing software "antibodies" to fight them.

Professors Jerzy W. Rozenblit and Salim Hariri received the grant from the Army Research Office to collaborate on the project with Arizona's Ft. Huachuca Network Command Center.

The research is vital to national security because military and other government computers are under constant attack from both freelance hackers and those working for foreign governments.

The research will focus on self-detecting, self-healing computer-protection software that mimics biological systems. This new approach is necessary because conventional methods used to protect computers from attack have failed.

•
More info: [Cyberspies](#)



© 2005 iStock International Inc. All rights reserved



© 2005 iStock International Inc. All rights reserved

Putting hard numbers on global warming

There's a lot of talk about global warming, but not much hard data on the chemicals that cause it.

In fact, engineers who design environmentally friendly manufacturing processes often are stymied because data on a chemical's global warming potential just isn't available.

In most cases, the measurements have never been made and the data

simply doesn't exist.

For instance, toxicity data — cancer-causing potential and other harmful effects — isn't known for 95 percent of the chemicals in use today, said Paul Blowers, an assistant professor in Chemical and Environmental Engineering

There's a good reason for this, he added. Gathering the experimental data is expensive and time consuming.

So Blowers is working on computationally based methods to get past the cost and time-constraint problems.

His method should produce the hard numbers needed by both engineers and policy makers who are trying to curb global warming.

"Once I have the method perfected, it should apply to any chemical," Blowers said.

"I want this to be a robust method where I just go and say, 'Here's a new chemical. I'm going to go through this mechanical series of calculations and I'm going to get a global warming potential that's going to be right.' That's my goal."

•
More info: [Blowers](#)

Combining biology and electronics

UA's nanotechnology research group is using proteins from living cells to "grow" wires on microchips.

Their work promises to revolutionize the way microchips are made by combining biology and electronics — leading to smaller, faster and more efficient circuits for cell phones, computers, MP3 players and a thousand other microelectronic devices.

But that's only one of the benefits of this research.

The work holds promise in several areas, such as improving testing methods for anticancer drugs, connecting molecule-sized transistors to the outside world, and extracting electricity from highly efficient photosynthesis proteins that could be used to replace today's far less efficient solar cells.

•
More info: [Blowers](#)

Philanthropy

Brown Family Foundation provides \$1 million scholarship endowment

The Thomas R. Brown Family Foundation has established a \$1 million endowment in the College of Engineering that will fund scholarships for National Merit Scholars.

The endowment will support annual scholarships, renewable for four years, to qualified National Merit Scholars and continues in perpetuity the support that the Brown family initiated in 2002 in UA's College of Engineering and Eller College of Management.

The Brown Foundation has made annual gifts of \$50,000 to each college since 2002 to fund students who are studying both technology and management.

Kara Monsen, a senior in Civil Engineering and a Brown Scholarship recipient since 2003, says support from the Brown family has allowed her to enrich her education. "I decided to take a minor in Spanish and that is requiring another year of school," she said. "I wouldn't be able to afford that last year if it weren't for the scholarships I've had for four years." Besides the Brown Scholarship, Monsen has qualified for other scholarship support.

More info: Thomas R. Brown



Brown Scholarship recipient Kara Monsen (left) and Ken Kuehl, a senior in Materials Science and Engineering, discuss their homework.

Ed Stiles

Caterpillar donates \$100,000 to MGE

UA's Mining & Geological Engineering (MGE) Department has received a \$100,000 unrestricted gift from Caterpillar Inc.

The gift resulted from a three-way partnership between MGE, Caterpillar and Phelps Dodge Corp.

The strength of the U.S. education system is a critical factor in the success and strength of the U.S. economy, said Gerry Shaheen, group president for Caterpillar.

The United States can continue to lead the world in mining technology and education, he said. But that will happen only if the industry continues to support and invest in education.

Contributions like those made by Caterpillar and Phelps Dodge are critical to developing the next generation of mining innovators, said MGE Department Head Mary Poulton.

More info: Caterpillar

Alums contribute \$1 million to MGE

UA alums Jack and Linda Thompson have established the \$1 million Jack E. Thompson Family Fund for Mining Education Curriculum Support in Mining and Geological Engineering (MGE).

Jack Thompson, former CEO of Homestake Mining Co. and former vice chair of Barrick Gold Corp., now serves on the Phelps Dodge Corp. board of directors and several other mining company boards. He is a 1971 UA MGE graduate.

Linda Thompson graduated from UA in 1971 in Public Administration.

"The nice thing about this endowment is that Jack and Linda gave us the flexibility in how we could use the money," said MGE Department Head Mary Poulton. "It gives us the flexibility to use it for teaching or operations."

The department has initially decided to use the endowment to support the Thompson Family Professor. The faculty member holding this profes-

sorship will have extensive industry experience and will teach the design/practice courses in the curriculum. Adjunct Assistant Professor Terril Wilson is the first Thompson Family Professor and will begin serving in that position starting in the fall semester.

"If we get to the point where we can fill that teaching need through some other means, then we have the flexibility to use that money for operations support," Poulton added.

In addition to the endowment, Jack Thompson has been working on the department's \$16.5 million fundraising campaign and in helping UA MGE secure support from Phelps Dodge for a mineral processing chair. "He has continued to be a big champion for the program," Poulton said.

Named Alumnus of the Year

Thompson was named the 2006 Alumnus of the Year in engineering by the College of Engineering and the Arizona Alumni Assoc. and was one of 18 Alumni of the Year award winners honored at a dinner and reception.

More info: Jack Thompson



Jack Thompson

Courtesy of Jack Thompson

Philanthropy

The UA College of Engineering is fortunate to have many companies, organizations and individuals who enthusiastically support its research and education mission.

Here is the list of those who have contributed to UA Engineering during the Fiscal Year 2004-2005.

Their support is vital. Without this help, some students would be unable to complete their education. Many other students would not have access to resources that give UA Engineering a margin of excellence in educating tomorrow's engineers.

Similarly, the research effort in the college, which directly supports the economies of Arizona and the nation, would not be as strong nor as diverse without this continued support.

We want to take this opportunity to say, "Thank You!" from the students and faculty who have benefited from the generosity of those listed on these pages.

We have made every effort to list all those who contributed to the college and sincerely apologize if anyone has inadvertently been left off the list.

If you donated to UA Engineering during 2004-2005 and don't see your name, please let us know and we will recognize you in the next issue of *Arizona Engineer*.



Mary Poulton, department head in Mining and Geological Engineering (MGE) holds a \$100,000 check that Caterpillar, Inc. donated to MGE. Those attending a luncheon at the Arizona Inn to celebrate the gift included (from left): Janpeter Bekkering, Caterpillar Global Mining account manager for Phelps Dodge; Gerald L. Shaheen, Caterpillar group president; Chris Curfman, president Caterpillar Global Mining; Mary Poulton, MGE department head; Tim Snider, president and COO, Phelps Dodge; and Richard Munday, Caterpillar Global Mining regional manager.

\$100,000 OR MORE

Arizona Public Service Foundation
Thomas R. Brown Family Foundation
Foundation for Arizona Universities
Honeywell International
Intel Corp.
Delbert & Sharron Lewis
Raymond & Jean Oglethorpe
Raytheon Co.
Salt River Project

\$50,000 TO \$999,999

Information Storage
Intel Foundation
National Semiconductor Corp.
Tucson Electric Power Co.

\$40,000 TO \$49,999

Sun Microsystems

\$20,000 TO \$39,999

Analog Devices, Inc.
Arizona Power Authority
ASML
Craig & Nancy Berge
The Boeing Co.
The Denver Foundation
Honeywell Engines
IBM Corp.
Lockheed Martin Corp.
The Magheramorne Foundation
Northrop Grumman Space Tech.
Random Network
John Toomey
Robert & Jane Whitenack
Burgess & Patricia Winter

\$10,000 TO \$19,999

3M Optical Systems Division
BAE Systems
Therese Berg
Alan Boeckmann
Exxon Mobil Corp.
ExxonMobil Foundation
General Instrument Corp.
Joseph Gervasio
David Hall
Kenneth Head & Jamie Cain
Marguerite Hesketh
Hewlett-Packard Co.
Helmut & Ellen Hof
Barbara Keevan
The Melsa Foundation
Genevieve Morrill
Lucille E. Williams Foundation

\$5,000 TO \$9,999

Castro Engineering Corp.
The Fluor Foundation
Leston & Thelma Goodding
H.D.R. Engineering Inc.
Hom Brothers
The Industrial Co.
George P. Johnson Co.
Mr. & Mrs. Alan Kehlet
Kiewit Western Co.
Komatsu America Corp.
Pinnaduwa Kulatilake
Patricia & Robert Littlewood
M3 Engineering & Technology
Mattel Inc.
Ernest & Sally Micek Family Foundation
Microsoft Corp.
Mintec, Inc.
MineSeal, LLC

Sargent & Lundy
Brice W. Schuller
Ernest & Joanne Smerdon
Spectra-Physics, Inc.
Jeffrey Stein
Sundt Construction, Inc.
Ann Wilkey
Woodson Engineering, Inc.

\$1,000 TO \$4,999

Advance Wire Forming, Inc.
AIAA Foundation, Inc.
Anton Anderson
David & Dede Areghini
Jennifer & Enrique Aviles
Ayco Charitable Foundation
Baybridge Dental Clinic
John Edward & Karen Paulson Belt
Kenneth & Victoria Boyd
Herb & Sylvia Burton
Ruth & Joseph Campbell
Marie Carrel
Casas Family Trust
Caterpillar Foundation
Ceramatec
CH2M Hill, Inc.
Richard Chartoff
City of Tucson
Computer Associates Int'l
Debra & Thomas Corbett
Louis & Mary Demer
Docomo Communications Laboratories
Jake & Beverly Doss
William Dresher
Bette Drummond-Oliver
Sandra & Karl Elers
Four Points by Sheraton

Philanthropy

Jeffrey & Donna Goldberg
Goodwill Golf Tournament
Richard Guthrie &
Patricia Dunford
Gary Harper
Ray Haynes
Hofmann Family Foundation
Ta-Ming & Shuh-Ming Hsu
Institute of Industrial Engineers
International Foundation for
Telemetering
Robert & Gwen Jackson
Joy Mining Machinery
Cynthia & Daniel Klingberg
Peter & Patricia Likins
Marshall Foundation
S. Jack McDuff
Med Write, Inc.
William & Dianne Mensch
Mining & Metallurgical Society
Mining Foundation
of the Southwest
Raymond & Virginia Morgan
Motorola Inc. Foundation
National Coal Transportation
Gregory Nazaroff
Northrop Grumman Foundation
Edward & Patricia Nowatzki
Donna Osborn
Cassandra Owen
The Pittsburgh Foundation
Mary & William Poulton
Joan Pracy
PTV America, Inc.
James & Sharon Randolph
Dallas Reigle
Rocky Mountain Coal Mining
Institute
V. S. Rukkila
Science Applications Int'l
Shell Oil Co. Foundation
Sergey & Nataliya Shkarayev
Douglas Silver
Society of Automotive Engineers
William Stone
Structural Engineers Assoc.
Texas Instruments Inc.
William & Christine Toperzer
Tucson Raceway Park
Anatoli & Alla Tumin
David & Linda Turner
Donald Uhlmann
Eugenie Uhlmann
Juan & Maria Valdés
Vanguard Charitable Endowment
Israel Wygnanski
Xilinx, Inc.
Jessica You

\$500 TO \$999

Kevin & Cindy Abreu
Andrew Adams
Dennis & Sylvia Anders
Stephen Arndt
Breault Research Org.
Cambridge Systematics
Robert Campbell
CB Richard Ellis Inc.
ChevronTexaco

Composite Mirror Applications
Dillard Department Stores, Inc.
Dowling Associates, Inc.
Eric Dunemn
Janet Fertig
Gary & Carole Frere
Barry & Starr Ganapol
Theodore Gelber
Gem Gravure Company, Inc.
Henry & Beverly Grundstedt
Guardian Life Insurance Co.
Christopher Gypton
Wendell Harness
Michael & Amy Hillenbrand
Honeywell Hometown Solutions
Der-E Jan
Edwin Jones
Michael & Robin Kaiserman
James & Krina Komadina
Marti Marek
John & La Donna Marietti
Dennis McLaughlin
Sara Meinert
Larry Milner
Northern Trust Bank, N.A.
Raymond Oliver
Aldo Orsi
Payne Family Foundation
Phoenix Analysis & Design Tech.
Charles & Maria Preble
John & Elke Reagan
Richard & June Rhoades
Sarianne Rittenhouse
Samuel Robinson
Michael & Deborah Runde
Judy Sara
Sargent Controls & Aerospace
Gary & Claudia Scott
Kok Kwai & Avis Wong See-Too
Matthew Shelor
Steven & Mary Greer Short
Siemens ITS
S.M.E. Tucson Section
Snell & Wilmer L.L.P.
Southern Arizona Architects & Engineers
Marketing Assoc.
Southern Arizona Institute of
Transportation Engineers
William & Elizabeth Staples
Richard & Anne Steiner
Irving Studebaker
Kelton & Doris Thomson
Christopher Toal
Tucson Regional Clean Cities
Ventana Medical Systems, Inc.
The Wachovia Foundation
Shohei Yoneda

UP to \$500

Abbott Laboratories Fund
Andrea Acuna
Jack Adams
Gregory & Kathleen Adams
Manuchehr Afari
Bajarang & Sumitra Agrawal
Pawan & Nilima Agrawal
Iftekhar Ahmed
Charles & Diane Aiello
AKZO Nobel
Carol Alderman & Richard Kurtz
John Alexander
Thomas Allred
Jasim & Linda Alrijab
Randy & Barbara Alstadt
Joseph Alvarez
American Institute of Chemical Engineering
James & Kathryn Ammon
Peter & Patricia Amundsen
Carl Anderson
David & Teresa Anderson
John Anderson & Dawn Anderson Vorfeld
Susan Anderson
Darcy Anderson
Dennis Angelo
Chris Angleman
Beatrice Arch
Jimmy Archer
Arizona Carbon Foil Co.
Brian Arnold
Lawrence Aron
David Aros
John & Sherrie Ashcraft
Francis & Virginia Ashley
Ronald & Virginia Askin

AT&T Foundation
The Athens Group
ATK Foundation
Brian N. Aviles
Raymond Avina
Shayne Aytes
David Aziz
Kimberly Babers
Katherine & Paul Babonis
Kwang Baik
Daniel & Marleen Bailie
Bill & Diane Bain
Frederick Bakarich
John Baker
Jonathan & Mary Baker
Fred Bakun
Craig & Janet Baldon
James Banfield
William Banyai & Bonnie Bridges
Bruce Barbara
Forrest Barker
Brett Barnett
Edward Barrios
Dennis Bateman
Elizabeth Bauer & Peter Brown
Roger Baumann
Michael Bayley
Bruce Bayly
Kirk Beatty
Martha Beaver
Joseph & Inga Beavers
Bechtel Foundation
James Beckman
James & Trudy Bedessem
John Behrmann
Steven Bengis
Marlin & Donna Benson
Berge Ford
Andrew Berson
John Berthold
Gregory Bertram
Daniel Best
Robert Best
Rosemarie & Kenneth Betzen
Richard & Paula Beyak
Kiran Bhumana
Garrett & Mary Billman
Larry Black
James & Jeanne Blair
Douglas Blanchard
William & Elizabeth Blohm
David & Diane Bloodworth
James & Margaret Bly
Thomas Bobo & Jennifer Geoghegan
Mark Boggs
Philip & Dianne Bolger
David Bolles
Miles & Teddy Bolton
Gregory Boner
Donald Booth
Lawrence Borg
Liciniu & Gabriela Bota-Groza
Jacob Bowen
John & Sherilyn Boyer
BP Matching Fund Programs
Clayton Braddock
James Braidic
James Brantly
David Bright
Gene Broadman
Jerry & Evelyn Brooks
George & Diane Broome
Thomas Broughton
Chris & Cynthia Broughton
Marshall & Cindy Brown
Barry & Shirley Brown
Francis Brown
Brown Investigative Group, Inc.
Lawrence & Lori Bruskin
Philip Bryant
Bucyrus-Erie Foundation, Inc.
David Bujak
Harry Bunza
Pamela Burda
Martin Burgos & Karen Kohne-Burgos
Witcher & Peggy Burnett
William Burns
Richard & Karen Burrows
David Buseck
Richard Bushroe
Robert Caccavale
Walter & Marilyn Calhoun
Michael & Dorothy Callan
Keith & Maria Campbell

Richard Canfield
Theresa Carlson
Nicholas & Dorothy Carnevale
Barbara & Juan Casanova
James Cashin
Mary & William Cassabaum
Peter Castaneda
Louis & Alice Catalini
Peter Cerna
Jami Chaloupka
Cho Chan
Frederick Channon
Scott Chapman
Natasha Checkovich
Chuan Chen
Nobel Chen
Peter Chen
Mary & Robert Chesher
Lizzie Cheung
Shu-Chung Chiao
Heather Chowaniec
Po-Han & Kam Chung
Paul & Roxanne Cicchini
Zygmunt Cielak
Citigroup Foundation
William Clarke
Eric Clarkson
Mark Clements
William Clemons
Winston & Maria Clendennen
Eugene & Joan Cliff
C. Brent & Raydene Cluff
CMG Drainage Engineering Inc.
Richard Coffey & Sheryl Stogis
Jeremy Cohn
John & Virginia Colyer
Dennis Conradi
Charles Constance
Jason Contapay
Edward Conway
Lacy Cook
Norman Cook
David Cooper
Donald Cooper
Wilson & Nancy Cooper
Stuart Coppedge
Louis Coraggio
James & Robin Corbett
Patricia & William Corbin
Nicholas & Denese Cordaro
Jerry & Jacqueline Corn
Marsha Corral
Arthur Corral
Salvatore Cosenza
Barry & Gayle Cossel
Theodore Cox & Patricia Ring
Kenneth Crawford & Linda Bussey-Crawford
Rufus Crawford
Gary & Barbara Cropper
Peter & Dana Crosby
Elizabeth & David Crouthamel
R. Bruce Crow
Richard Crowell
Jeremy Crutchfield
W. R. Cumings
Earl Cumming
John & Deborah Cummings
Robert & Greta Cummings
Michelle Cunningham
Charles Cunningham
Ronald Cupples
Randolph Currin
Amanda & Paul Curto
Cycles, Skis and ATV's
Craig Daley
David Dalton
Bryan Dalton
Tony Dambrasukas
Ashok Damera
Kirk Damron
Scott Dance
Scott Danielson
Matthew Danner
Douglas & Elizabeth Darlington
Thomas & Judy Darr
Eduardo & Carolyn DaSilva
Christine Davey
Glenn Davis
Kelly Davis
Robert & Susan Dawson
Dayton Foundation
Richard Deatley
Allen Debacke
Edward DeGrood

Philanthropy

Deloitte Foundation
 Daniel & Rene Deloria
 Delphi Automotive Systems
 Johann Demmel
 Susan & Donald Dempski
 Steven Den-Baars
 Carl Denman
 Teresa Dereniak
 John & Candace Derickson
 Suzanne & Thomas Dew
 Barbara & David Dewesse
 Alfred Diehl
 Matthew Diethelm
 John Dimer
 Michael Do
 Kenneth Dobbs
 Richard Dobs
 Diana Dohmen
 Brian Dolan &
 Dorothy Chavez-Dolan
 John Dolegowski
 Priscilla Dombek
 John & Patricia Donahue
 Stephen & Peggy Doncov
 Qiping Dong
 Tanya Donohue
 Thomas Dooley
 Frederick & Monique Doten
 Barbara & Rand Drake
 Francisco Duarte
 Thomas & Linda Duffy
 Samuel & Leanne Dukes
 Fabricio Duran
 Forrest & Jo Durham
 Mark Durham
 William Dykes
 Steven Earle
 Kentworth & Meg Lombard Edel
 Mathilda Edmunds
 Peter Edsall
 William & Denise Edwards
 John Edwards
 Kevin & Vicki Ehlers
 Lynne Eigler
 Ann Eisenbraun
 James & Janet Elliott
 Timothy & Diane Ellis
 Shahin El-Sharif
 Employees Charity Org.
 Paul Englehart
 Stephen English
 Eniko Enikov
 Jesse Enlow
 Eric & Kristen Ennis
 Bryn Enright
 James Ensminger
 Prasad Erabelli
 Gregory Ericson
 James & Harriett Erwin
 Wayne Erxleben
 Marcos & Lucia Esparza
 William & Shirley Estes
 John & LaDonna Evans
 Thomas Ewing
 Catherine Eyrich
 Michael Farinech
 Kenji & Marie Farinelli
 John Farmer
 Bruce Farmer
 Charles Fellows
 Robert Feugate
 Dan Fieldman
 Thomas Filar
 Armando Fimbres
 Donald Finch
 Randall Fink
 Cecilia Flamme
 John Fleming & Deanna Fenton
 Mark & Sheila Fleming
 Paul & Sandra Flint
 Ka Fogg
 Randall & Margaret Foote
 Ford Motor Company Fund
 James Forthman
 Bryce Foster
 Lance & Kelly Fowler
 Kim & Charles Frankenberg
 James & Mary Franklin
 Joseph & Patricia Franna
 Harry & Marilyn Fraser
 Vincent Freeh
 William Freely
 Michael Freeman
 Catherine Freeman

Jesus Fregoso
 Andrew Friedl
 Fred Froehlich
 Walter & Kathie Frost
 Marino Fuentes
 Kyle Fujimoto
 William Gabler
 Art & Jean Gage
 Todd Galinski
 Gregory Gallagher
 William Ganus
 Margaret Garcia
 Paul & Wallay Gardanier
 Mary Garrity
 Gartner Group
 Paul Gaydos
 Joseph Genchi
 Michael Gerle
 Robert Giacomazza
 Bryce & Brenda Gibson
 David & Connie Gildersleeve
 Wayne Gilles
 Gerard Gillette
 Edward & Beth Gladly
 David Goldfein
 Eric & Ellen Goldin
 Myla Goldman
 Richard Gomez
 Ronn Gonzalez
 Goodrich Corporation
 Edward & Ellen Gouvier
 Anupam Goyal
 Clayton & Annette Grantham
 Grayhawk Venture Partners, LLC
 Melvyn Green
 Maribeth & Michael Greenslade
 Paul Greer
 David & Sherry Grenier
 Grenier Structural Engineering
 Pamela Griffin
 Larry & Judy Griffin
 Frank Grochocki &
 Leslie Henson-Grochocki
 John & Nancy Groh
 Martin & Jo Ann Gronberg
 Elmer & Laurel Grubbs
 David & Barbara Guarino
 Jeff Guay
 Ernesto Gutierrez
 Henri Guyader
 Patti & Ronald Guymon
 Chikonga Gwaba
 Byron & Kathy Hack
 Gary Hagedon
 Lisa Haldane
 Steven Haller
 Danielle Haller
 Cherie & Loren Hallin
 Roy Hamil
 Edward Hamilton
 Kenneth Hamm
 David & Genie Hammel
 Robert Hammerstein
 Paul & Holly Hand
 Roy & Martha Hansen
 Steve Hardash
 Judith & James Hardy
 James Harper
 Richard & Janice Harper
 Harrah's Operating Co.
 Darrel & Sandy Harriman
 Andy Harris
 Harris Foundation
 Joel Hart
 Peter & Martha Hart
 Joseph Hartley
 Margaret & Kenneth Hartwein
 David & Gwen Harvey
 Gary & Lucinda Harwin
 Ahmad & Rakhshinda Hasan
 Brian Haugh
 Michael & Carla Haws
 Lauren Hay
 John Hector
 Richard Hector
 Richard & Jane Heffelman
 George Hefner
 Jeffery Heidler
 Roland & Carola Heinrich
 Daniel & Beth Heires
 Joseph & Debrah Helak
 Paul & Elizabeth Helmer
 Gary & Linda Hemphill
 Michael Hennessy

Lorenzo Hernandez
 Mandy Herner
 Edward & Shendy Herrera
 Anthony Hess
 Colin & Elizabeth Hewett
 Walter Higgins
 Dale & Karen Higgs
 Geoffrey Hill
 Jeanine & Michael Hill
 Durrell Hillis
 John Hippensteel
 Philip & Christine Hodder
 Steven Hodges
 Dale Hodgson
 Stephen Holanov
 Brandi Holen
 Gregory Holland
 William Hollman
 Robert & Michelle Holm
 Yolanda & Donald Hom
 Bei Hong
 Tommy Hooten
 Robert Horst
 Herbert & Wanda Hotchkiss
 Erik & Cheryl Houts
 Robert Howell
 Vic & Kimberly Hsiao
 Joel Hudgins
 Robert & Patricia Hughes
 John Huleatt
 Franklin & Sandra Hungerford
 Timothy Hurtt
 Mr. & Mrs. Cory Hustad
 Adam Hutchinison
 Richard & Dolly Ickler
 Jennifer & Gordon Ingmire
 Michael P. Ingram
 INNOV8
 Investor Growth Capital, Inc.
 George Irwin
 Leslie & Janet Isaacs
 Catherine Jablonsky
 Gary & Melissa Jackson
 Eric Jackson
 Barry Jacobson
 Scott Jenkins
 William Jenkins
 William Jensen
 Brian Jepperson
 Adelard Jodoin
 Perry & Jamie John
 Ronald Johnsen
 Craig & Mary Johnson
 Chani Johnson
 Ronald & Carol Johnson
 Frederica & Brian Jones
 Anthony Jones
 Byron Jones & L. Gail Winn-Jones
 Humayun Kabir & Zeenat Mahal
 Stuart Kadas
 Laura & Jonathan Kagle
 David Kahn
 Laveen & A. Raclare Kanal
 Veikko & Elizabeth Kanto
 Donald & Naomi Karr
 Ronald & Carol Kasulaitis
 Kenneth Katsma
 Kurt Kawabata
 Steven & Mary Keane
 Ifiyenia Kececioglu
 Patrick Keefe
 John & Pamela Keffer
 Shanon Keigher & Libe Washburn
 Dennis Kekas
 Kenneth & Carol Kelley
 Dennis J. Kennelly
 Joseph & Marilyn Kent
 Katharine Kent
 Gregory Kerr
 Kerr McGee Corp.
 Ed Kerschens
 Peter Kerwin
 Sandra Ketcherside
 Kids Klub
 Michael Kies
 Robert & Carol King
 Cabrini & Thomas King
 Eric & Margaret Kinneberg
 William & Karen Klaus
 Paula & Stephen Klein
 Michael Kleinrock
 Lucien & Joyce Klejbuk
 Peter Knaggs
 Joshua Knepper

Wesley Knick
 Polly & Kenneth Kohl
 Barbara Christina Kohler
 Beryl Kohlman
 Gregory Kolb
 Steven Komerska
 Robert & Marianne Kondziolka
 Isaac Konikoff
 Vithoba Konur
 Joan Koskiniemi
 Keith & Susan Korchou
 Geraldine & Jerome Koupal
 Robert & Leslie Kowalski
 Mark & Trisha Kozik
 Zlatica Kraljevic & Werner Hahn
 Raymond & Anthonette Kramer
 Frederick & Frances Krause
 Rodney Krebs
 David Kriesand
 Kenneth & Teresa Krisa
 Raul Krivoy
 Patrick Kuhne
 Gerald Kvaall
 Brigitte & Michael Kwinn
 John La Bar
 Laurel Lacher
 Louis & Melissa Lagomarsino
 Alvaro & Christine Laguna
 Juha-Pekka Laine
 Lam Research Corp.
 Philip LaMantia
 Terry & Helene Lambright
 Kami Lammon Hilinski
 Edward & Lynda Lamson
 Wendi Lane
 Michael Lane
 Anthony Langer
 Sepp & Mary Lanz
 Maria Laporte-Ayo & Alvaro Ayo
 William & Carolyn Laray
 Paul & Kendra Larmour
 James & Geraldene Larrington
 Carl & Joan Larson
 James & Dixie Lauderdale
 Robert & Minnie Lawrence
 Miodrag Lazarevich
 Robert & Patty LeCompte
 Joannes Lee
 Yuri & Daniel Lee
 Richard & Sharyn Leeper
 David Lehrman
 Peter Leonard
 Chris & Jeannine Leverenz
 John & Cherie Lewis
 Francis Leyva
 Guangming Li
 Thomas & Palma Liebert
 Yeow & Wei Lim
 Lori & Joel Lindahl
 Earl & Kathy Lindstrom
 Ty Lindteigen
 Jane & Ian Linton
 Ying-Ming Liu
 James LoCascio
 Joseph Lockett
 Paul Loef
 Laura Lohner
 Addison & Linda Looney
 Ernest Lopez
 Melissa Lopez
 Steven & Brinda Lord
 Robert Lorentzen
 Gregory & Elizabeth Lorton
 Stephen Lott
 Yen Low
 John Lowy
 Stanley & Mildred Lowy
 Peter & Caroline Lozano
 Craig Ludtke
 Thomas & Ann Lundquist
 Jerry Lundy
 Randolph Lungren
 Robert & Sandra Lutz
 Forest Lyford
 Walter & Dorothy Lynch
 Charles Lynch
 Oscar & Patricia Lyon
 Gary & Joyce Lytle
 Dennis & Susan MacDonell
 Heath MacDowell
 Richard & Heather Mackey
 Michael & Maura Mackowski
 Emeline & Keith Maddern
 Susan Madeira

Judith & Arthur Magner
 Michael Magoon
 Hashim Mahdi
 Eric Mahr
 Joseph Major
 William Malaney
 Ignacio Maldonado
 James & Andrea Malmberg
 Diane & Keith Manslove
 William & Rita Mansfield
 Clifford & Elizabeth Mansfield
 Michael Mansour
 Matthew & Maria Marcus
 Lyle & Julie Margulies
 Alan Marshak
 Noah & Leslie Martin
 Jeffrey Martin
 George & Emily Masech
 Richard Maslow
 Bruce Mason
 Kourosh Massarat
 Michael Massaro
 Stephen Masser
 Charles Massieon
 Mark & Laurel Matais
 Susan & Stephen Matheson
 William Mathews
 Katherine & Michael Mathieu
 James Matson
 Larry Matthews
 Robert Maxwell
 William Maynard
 Mason McBride
 Eric & Doreen McBride
 Daniel McBride
 Michael & Kathryn McCabe
 Robert McCaleb
 Dennis McCarthy
 Richard & Zoe McClellan
 Katrina McClelland
 Kenneth McCleskey
 Robert McCool
 Patty McCormick
 David McDonnell
 Jack McFarland
 Brent McFarlane
 Arthur McGinnis
 Donald & Denise McGough
 James & Margaret McGuckin
 George & Anastasia McInnis
 Dennis McKeen
 Kim & James McKenzie
 Krista McKim
 Bruce McLaren
 Kevin McNeill
 William & Kimberly McTee
 Richard & Mary Mead
 Michael Mebes
 Roy & Rowene Medina
 Leslie Megaw
 Wellington Meier
 Thomas Melody
 Daryl & Julie Melvin
 Donna Mendoza
 Mentor Graphics Foundation
 Jeffrey & Ann Mervin
 Carmen & Patricia Messina
 Mr. & Mrs. R. John Meyer
 Richard Michelson
 David Milam
 William & Pamela Milam
 James Miletich
 Mr. & Mrs. Robert Miller
 William Miller
 Charles Miller
 Paul Miller
 Coleman Miller
 Deborah Miller
 Robert Mills
 John & Susan Mills
 Stuart Milton
 John & Kathy Mincer
 Bruce & Mona Mitchell
 William Mitchell
 Mel & Beverly Mitchell
 M.L. Callabresi Technical
 Consultant
 Anton & Emma Mobleby
 David Mobleby
 Carl & Yvonne Mohrbacher
 Mehran & Shahla Mokhtarian
 Patricia Molina
 Mark & K.K. Mollison
 Christopher Mone

Philanthropy

Monsanto Fund
 Jamie Monte
 David & Magdalena Mooberry
 Richard & Nancy Moore
 Mary & Bruce Moreton
 Lois Morey
 Henry & Suzanne Morgen
 Robert Morse
 Delbert & Janet Mortenson
 James Moser
 Gordon Moses
 Amir Motamedi
 Dean & Julie Moulis
 David Moutt
 Donald & Christine Mulligan
 Robert Mulvihill
 Franklin & Jane Murden
 David Murphy
 Bruce Murphy
 Sean & Ann Murphy
 David & Ellen Murphy
 John Murphy
 Bryan Murray
 Dean Mutti
 Stefan & Beth Myslicki
 Michael Nance
 Susan & Michael Nativi
 Carlos Navarrette
 Jimmy & Linda Naylor
 NCR Foundation
 Howard Nebeck
 James & Georgia Needham
 David & Katherine Nelsen
 Michael & Cynthia Nelson
 Louis & Nora Nelson
 Lance Nelson
 James Nelson
 Joann & Robert Nettles
 Thomas & Elizabeth Neubauer
 Paul & B.H. Neuenschwander
 Dennis Neumann
 David Nevins
 Gary Newson
 Parviz Nikravesh
 Mark & Marie Nilsen
 Craig Nochumson &
 Karyn Friedman-Nochumso
 William Noe
 Timothy Noon
 Nancy Norem
 Luis Noriega
 Lawrence & Elaine Norrid
 Novartis Pharmaceuticals
 Gary & Nancy Nunn
 William & Sophia Nyanue
 Mark Oakleaf
 Keith Oakley
 Mary & Richard Obee
 Paul Ocansey
 Paul Ochs
 Scott O'Connell
 James & Jean O'Grady
 William Olson
 John & Robyn O'Neal
 Irving Orrell
 Charlotte Ort
 Mark Orth
 L. Devens Osborne
 Andrew Osbrink
 Chris & Marilyn Osterman
 Martin & Carol O'Sullivan
 Gerald Owens
 Ertunga Ozelkan &
 Agnes Galambosi
 Wilson & Sharon Pace
 Joe Padias
 Mr. & Mrs. Donald B. Page
 Steven Pageau
 James Paison
 Miguel & Julie Palacios
 Sandra & Joseph Palais
 Dorothy & Mark Palmer
 Daniel Pardieck
 David Paredes
 Dave & Vivienne Parizek
 Trevor Park
 Terry & Barnes Parker
 William Parks
 Jon Parsons
 Thomas & Rosalinda Partel
 John Pass
 Ann Pastor
 Thomas Patterson

John Patterson
 David Paullin
 C. Derry & Virginia Pence
 Gary & Yodona Pennell
 Pepsico
 Juan Peredo Villarreal
 Mr. & Mrs. Henry Perkins
 Wallace K. Perkins
 Kenneth & Ellen Perkins
 Gale & Janice Perry
 David Pershing
 Christopher Peters
 R. Douglas Peters & Lai Lou
 Jill & Kenneth Petersen
 David Peterson
 L. R. Peterson
 Lance & Carol Peterson
 Thomas & Shannon Peterson
 William Petroske
 Warren Phelan
 Phelps Dodge Foundation
 Philips Electronics
 Paul & Linda Pickard
 Glenn Pierce
 Ryan Pine
 John M. Pins
 Linda Piper
 Ernest Plank
 Raymond & Donna Plock
 Matthew Ploor
 Victor & Janice Plumbo
 PNM Foundation
 John & Jan Podlesny
 Pablo Policroniades
 David & Marleen Pollard
 Thomas Pollock
 Theodore Polychronis
 Agnes Poore
 Mark Poppe
 Charles Potuzak
 PPG Industries Foundation
 Paula Prather
 Praxair Matching Grants
 Eric Preiss
 Edward & Diane Preston
 David Pribyl
 Procter & Gamble Fund
 Scott & Janine Prost-Domasky
 Walter & Theresa Pruitt
 Ruth Pullen-Soklow
 Bonnie Punske
 John & Margaret Quinn
 Christine Coffey Raasch &
 David Raasch
 Eric Raatz
 David Rabb
 Michael Radtke
 Rajo Corporation
 Susan Rakow-Anderson &
 Mark Anderson
 James Ramos
 David Randolph & Chung-Tsui Lin
 Michael Randolph
 William & Karen Rankin
 Gregory & Trudy Rasmussen
 Laurence Rasmussen
 Peter Rau
 Richard Ray
 Anne & Dan Ray
 Burt Rea
 Michelle & Derek Reaban
 Betsy & Michael Reader
 Vincent Realmuto
 Joseph & Linda Redmond
 Emmett Reed
 Sandra Reel
 Kathleen Rhoten
 Stanley Rice
 George Richard
 J. M. Richardson
 Michael Rief
 J.M. Al Rijab
 Matthew Roberts
 Phillip & Peggy Robidoux
 John Rodgers
 Jorge Rodriguez
 Raymond & Lorinda Roessel
 Randolph & Virginia Rogers
 Thomas Rohrer
 David Rosenbluth
 Stephanie Ross
 Mark Rosswurm
 Augusta Simpson Roth &

Bruce Roth
 Maurice Rouso
 Reid & Kathryn Royball
 Jerry & Marie Rozenblit
 Fred Rubi
 Scott Rudin
 Sam Rugel
 Jesse Saar
 Raymond Saccardi
 Mehdi & Lupita Sadatmousavi
 Alexander & Margaret Sadowski
 Michael & Cecelia Salcido
 Hussein Salty
 Sean & Maria Saltzman
 Gilbert Saltzman
 David Sams
 Cesar Sanchez
 Daniel Sandblom
 Emilie & Thomas Sandin
 Candace Chan Sands & Mark Sands
 Elijah Sansom
 Philip & Diane Sarikas
 Mark Sartor
 Ralph & Roberta Scaramella
 Cyril Schaller
 Judy & Richard Schell
 Larry & Patty Schick
 Penny Schindler &
 R. Wade Williams
 Theodore & Janice Schmidt
 William Schock
 Nick & Jean Schott
 Daniel & Donna Schotter
 Jeffrey & Collette Schrader
 Ronald & Amy Schreier
 Richard Schrum
 Anthony Schultz
 Jonathan Schwab
 Michael Schwager
 Elizabeth Scott
 Kevin Scott
 Laurence & Karen Scott
 Nathan Seabury
 Wayne & Janet Seames
 Brian & Sheryl Seamon
 Allen Schloff
 Andrew Sellars
 Paul & Ruth Seppala
 Charles Sersun
 Laverne Severud
 James & Linda Shackelford
 Somnath Shahapurkar
 Ali & Noel Shambayari
 Jesse Shank
 Karnum Shashidhar
 James & Ellen Sherwood
 Suzanne Shields
 Mark Shill
 George & Dixie Shirley
 David Shoemaker
 Cecil Shrader
 David & Lynne Shropshire
 Weldon Shumaker
 Siemans Energy & Automation
 Joseph Sienicki
 Julie & Stephen Silliman
 Elliot & Nancy Silverston
 Thomas & Yolanta Simacek
 Kelly Simmons-Potter
 James & Kathryn Simms
 Daniel Simon
 Robert Simpson
 Douglas Sims
 Irv Singer
 Mark & Lee Sisson
 Robert Slocum
 Mithkal Smadi
 Forrest Smith
 Charles Smith
 David Smith
 Michael & Mona Smith
 Robert Smolinsky & Janet Smith
 Kathryn Snider-McCarthy &
 James McCarthy
 Gerald Snyder
 John Solakiewicz
 Gary Sollers
 Nancy Sollinger & James Calieuri
 John Somsel
 Don & Sally Sorenson
 Peter Sorrells
 David Soukup
 Ann Soule

Southwest Gas Corp. Foundation
 Douglas Speck
 George Spindle
 James Spinhirne
 John Stacy
 John & Patricia Stanley
 Peter Staples
 Robert & Diane Steenberg
 Roberta Webb Stempfley
 Maurice Stephan
 Daniel & Deborah Stephens
 Larry & Sandra Stephens
 Carl Sterling &
 Candace Birch-Sterling
 William Stevens
 Tammi & William Stevens
 Jennifer & Bruce Stewart
 Douglas & Cathine Sticht
 Edward Stokes
 Paul Stolar
 Robert Stone
 Robert Stott
 Daniel Stout
 Mark & Debra Stratton
 David Strawn
 Student Council of Engineering
 Daniel & Kimberly Sullivan
 Mark Sullivan
 Arthur Svensson
 Sam Swan
 Noah Syroid
 Judy Tackett
 Thomas Tadano
 Albert Tarcola & Cecilia Madrid
 Victor & Teri Tavour
 Douglas Taylor
 Mark & Lori Taylor
 James & Sandra Taylor
 Thomas Teague
 Edward Teger
 John Terrell
 Texas Instruments Foundation
 Michael Thiemann
 Gene Thomas
 Justin & Pamela Gilson Thompson
 Owen & Barbara Thompson
 Ronald & Lenora Thompson
 Eric Thomson
 Edward & Susan Thurnbeck
 David & Cynthia Tipper
 Jack & Mary Tleel
 Lamar Spaulding Todd
 Scott & Cheryl Toland
 Mark Tomes
 Yi Torng
 Michael Therothrow
 Billy & Susan Towles
 Tawnya & Cody Tretschok
 Jess Trias
 John & Cynthia Tripp
 Kathy Trudeau
 Amos Tsai
 John Tsitouras
 Graham & Sarah Tubbs
 Scott Turley
 Tyco Matching Gifts Program
 Jesse & Joan Tyler
 Jerome Uchiyama
 United Space Alliance
 United Way of the Bay Area
 David Unkrich
 Andrea Ursillo
 USG Foundation, Inc.
 Sankait Vahie
 Loizos Vakanas
 Karl & Kathleen Van Horne
 Varian Medical Systems, Inc.
 Alan & Elaine Vaughn
 LeAnn & Joe Vaughn
 Anne Marie Velosa
 Anthony Verbout
 Robert Verity
 Brian Vickers
 Michele Buenafoe Vockrodt &
 Jeff Vockrodt
 Erik Vogt
 Robert & Kathleen Von Mayr
 John & Erika Wade
 David Wagner
 Tony & Dorah Walls
 Jeffrey Walsler
 Milton & Tammy Walsler
 Timothy & Lucinda Walter

Dexin Wang
 John R. Ward
 John W. Ward
 William Ward
 Karen & James Warrick
 Washington Group International
 Robert Wason
 Larry Watson
 Lee Watson
 Edward & Cynthia Watson
 Johnny Weaver
 Harry & Nancy Weaver
 Beth Weaver
 Larry & Victoria Webb
 Brian Webb
 Ralph & Pamela Wege
 Herbert Welhener
 James & Ann Werner
 Tony Werner
 Douglas Westra
 Weyerhaeuser Company Foundation
 Justin Wheeler
 Stephen & Jennifer White
 Jane White
 Kermit Whitt
 Henry Wibowo
 Jill Wicke
 Donald & Lamyai Wickham
 Robert Wickliffe
 Gary & Jane Wiese
 Walter Wilcox
 Lynn & Doreen Wilcox
 Branda Baker Wilhoite
 John Wilkie
 Joseph Willett
 John Williams
 R. Wade Williams &
 Penny Schindler
 Ronnie & Susan Williams
 Ronald & Mary Williams
 Steven Williams
 James Willingham
 Robert Wilson
 James Wilson
 Dexter Wilson
 John & Phyllis Wilson
 Edwin & Sharron Wilson
 Gary & Ann Wiltcheck
 Craig Windrem
 Barbara Winsor
 Michael Winton
 Joseph & Gayla Wise
 Stephanie & Walter Witkowski
 Sandra Witman & Guy Vanderlek
 Lester & Laurie Wolf
 Jerry Wolf
 Sarah Wolfe
 Gary Wonacott
 Dale Wong
 Ralph & Kathleen Wood
 Michael Woodard
 John & Kathleen Woodruff
 Joseph & Heather Muir Woodward
 Mr. & Mrs. Stanley Woolf
 Buel & Beverly Woolverton
 WorldReach for Hewlett-Packard
 William Worley
 W.R. Grace Foundation, Inc.
 Wenji Wu
 Thomas Wuchte
 Wyeth Pharmaceuticals Corp.
 Xerox Corporation
 Joe & Virginia Yee
 Thomas Yi
 Michael Yockey
 James & Wendi Young
 Jeffrey & Elizabeth Young
 Larry & Jean Young
 Benny & Bobbie Young
 Lane & David Yow
 Heping Yue
 Gordon Zaft
 Zavis Zavadni
 Gregory Zelneth
 Michael Zelnick
 Xu Zhong
 Weijun Zhu
 Ziehler Insurance Group LLC
 Barry & Ellen Zilin
 Eugene & Janice Zimmerman
 Jeffrey & Kathleen Zubel
 Jonas Zukas
 Helga & Keith Zwickl

Alumni Echoes

'30s

George Potter, BS MinE '35 and MS MinE '36, died in April.

He worked in many parts of the world and was with the U.S. Bureau of Mines from 1941 until he retired in 1976.

Shortly before he died, he was interviewed about his life and the Depression years at UA. The story is at <http://uanews.org/engineering>. To find the story, search for "Potter" in the "Engineering Article Finder" box.

'40s

Oscar Lyon, Jr., CE '42, received one of five Distinguished Alumni Awards as the UA Civil Engineering Department celebrated its centennial during Homecoming 2005.

Lyon had a distinguished career with the Arizona Department of Transportation and served as State Highway Engineer. He was responsible for directing and managing the design and construction of much of Arizona's interstate highway system, including the major engineering task of putting Interstate 15 through the Virgin River Gorge in northwest Arizona.

'50s

Gene R. Morris, CE '51, received one of five Distinguished



Frank Kendorski, MS GeoE '71, has received the 2006 Rock Mechanics Award from the Society for Mining, Metallurgy, and Exploration, Inc., (SME)

guished Alumni Awards as the UA Civil Engineering Department celebrated its centennial during Homecoming 2005.

He worked for the Arizona Department of Transportation for more than 20 years. During his last five years with ADOT, he served as director of the Arizona Transportation Research Center.

After retiring from ADOT, he worked as a consultant and served as principal engineer, technical director and president of different firms.

Morris pioneered the development of asphalt-rubber paving materials, presented papers on the work, and is recognized as an international expert in the field. In addition, he developed the statewide pavement management system that saved the state more than \$100 million dollars.

'60s

David Areghini, CE '65, received one of five Distinguished Alumni Awards as the UA Civil Engineering Department celebrated its centennial during Homecoming 2005.

Areghini is associate general manager of Power, Construction and Engineering Services at SRP. During the past 15 years, he has overseen numerous capital projects in response to the growing need for generated power. He has been active in the UA and UA civil engineering alumni associations and has led the Phoenix and national alumni boards. He also serves on the College of Engineering and Civil Engineering alumni councils.

George Shirley, BS CE '65 and MS CE '68, and his wife, Dixie, were part of a UA group trip to Antarctica in January. They crossed the Drake Passage to Antarctica in their expedition ship and made ten shore landings using a Zodiac boat. "We got acquainted with penguins (Gentoo, Adelle and Chin Strap), various seals, and several varieties of birds," Shir-



Kristina (Konrath) Swallow, CE '94, received the Outstanding Young Alumni Award as the UA Civil Engineering Department celebrated its centennial during Homecoming. This photo of Swallow and her husband, David Swallow, was taken during the Civil Engineering Centennial Gala in November 2005.

ley said. "Scenery was spectacular, including icebergs, glaciers, ice-covered mountains, and volcanoes. The highlight of the trip for me was the many naturalists available to help understand and appreciate the wonders of Antarctica. The UA group leader, Yar Petrozyn (assistant curator of mammals at UA), was especially informative and made our experience much more rewarding."

'70s

Edmund H. Conrow, BS NE '71, MS '74, earned a Ph.D. in 1976 from Oklahoma State University. He also received a M.Phil. in 1983 from RAND Graduate School and a Ph.D.

in 1993 from RAND.

He has recently updated the risk management chapter in Harold Kerzner's best-selling project-management book, "Project Management: A Systems Approach to Planning, Scheduling, and Controlling," Ninth Edition, Wiley, 2006.

Conrow is a management and technical consultant in Redondo Beach, Calif., and has made numerous contributions to project risk management policy and processes that are widely used by government and industry.

He is also the author of "Effective Risk Management: Some Keys to Success," Second Edition, American Institute of Aeronautics and Astronautics.

Alumni Echoes



George Potter, BS MinE '35 and MS MinE '36, died in April. This photo of Potter and Mary Poulton, department head in Mining and Geological Engineering, was taken in November at the 2005 Engineers' Breakfast.

Frank Kendorski, MS GeoE '71, has received the 2006 Rock Mechanics Award from the Society for Mining, Metallurgy, and Exploration, Inc., (SME) "for innovative work in ground-behavior characterization, in full-extraction mining, in hardrock and coal and in the application of rock mechanics to practical mining problems improving the working environment, especially in rock-reinforcement design."

He is a principal and vice-president with Agapito Assoc., Inc., in Lombard, Ill. He is a registered professional engineer in 10 states and has more than 35 years experience in mining and underground construction, mine- and tunnel-failure investigations, underground stone-mine design, and subsidence engineering.

Lawrence E. Monrad, P.E. EE '73, recently retired after a 23-year career as president of Monrad Engineering, Inc. Consulting Electrical Engineers in Tucson, Ariz.

Monrad Engineering, Inc., was the electrical engineering consultant for significant UA projects including the Student Recreation Center, the Arizona Cancer Center Expansion, Environmental and Natural

Resources Building — Phase 1, La Paz Residence Hall and Highland District Housing.

The firm has completed more than 2,400 projects in Arizona and continues its operations with an experienced staff of four professional engineers and other support personnel.

'80s

Pradeep Saxena, MS ChE '80, is linking Sun Microsystems offices worldwide with private and virtual private networks. "It's been fun to learn something totally new — networks, data center operations, global helpdesk and business applications — and to make a difference from Day One in reducing costs and increasing capacity and resilience," he says. As part of this job, he took courses in telecommunications at Stanford.

Mike Sherer, ChE '81, started Sherer Consulting Services, Inc. at the end of 2004 and has been working seven days a week, with many companies asking for his consulting and trouble-shooting support. He works with the semiconductor industry and other industries on air permitting and compli-

ance, fab exhaust management reviews and point-of-use abatement, specifying and troubleshooting air control equipment, cost reduction, and other aspects of environmental regulations compliance.

'90s

Naresh Samtani, Ph.D. CE '91, received one of five Distinguished Alumni Awards as the UA Civil Engineering Department celebrated its centennial during Homecoming 2005.

After graduating from UA, Samtani, entered private practice and eventually served as principal engineer and Arizona manager for URS, a global engineering firm. In 2003, he founded NCS Consultants in Tucson.

During his career, he has designed and overseen numerous projects in Arizona and across the United States. He has maintained a mentor and teaching role in his everyday practice by giving seminars at the UA, and working as an instructor for the Federal Highway Administration.

Geneva (Woo) Chan, ChE '93, is the polypropylene supply chain planner for North America at Dow Chemical. She

Send us e-mail!

And update your former classmates and friends about where life has taken you since graduation.

Please include the following information:

- Name
- Major
- Degree (BS, MS, Ph.D.)
- Year you graduated
- Rundown on your activities (Please limit your submission to 200 words or less.)

While you're at it, get out that digital camera or scan a print and send us a digital photo of your family, latest project at work, or that boat or hot rod you just finished building in your garage. Vacation photos are great, too.

We'll publish your comments and photos in the next *Arizona Engineer*.

Please send your e-mail to stiles@u.arizona.edu.



Chris Lewicki, BS AE '97 and MS AE '00, is the flight system engineer for NASA's Phoenix Mars Scout Mission.

and her husband celebrated the birth of their second child, Meredith Avery, on June 16, 2006.

Kristina (Konrath) Swallow, CE '94, received the Outstanding Young Alumni Award as the UA Civil Engineering Department celebrated its centennial during Homecoming.

Swallow moved to Las Vegas, Nev. after graduation and opened a private practice.

She quickly moved to management level positions in several firms and, in 2004, opened her own firm that emphasizes

Alumni Echoes

traffic impact and drainage.

In addition, she has been a leader in the southern Nevada branch and Nevada section of ASCE and has served as president of both groups. Her activities with the Junior League also exemplify her commitment to community service.

Chris Lewicki, BS AE '97 and MS AE '00, flight system engineer for NASA's Phoenix Mars Scout Mission, was on campus in May to give the keynote address at the kick-off banquet for the Arizona/NASA Space Grant Undergraduate Research Symposium. He told Space Grant students what they need to do to get their dream job at NASA or JPL.

Lewicki also was flight director for the Mars Exploration Rovers Mission.

To read more about his talk, go to <http://uanews.org/engineering> and search for "Lewicki" in the "Engineering Article Finder" box.

'00s

Jason Chang, ME '04, is working for Stryker Endoscopy in San Jose, Calif. and also is pursuing a master's degree in Systems and Industrial Engi-



George Shirley, BS CE '65 and MS CE '68, and his wife, Dixie, were part of a UA group trip to Antarctica in January. This photo was taken when they were at the LeMaire Channel.

neering at USC.

Hannah Jurado, ME '05, is a certified flight controller for the NASA Johnson Space Center, working with both the International Space Station and Space Shuttle Discovery.

"I have made a great deal of progress in following my dream of working for NASA," she

says. "I have worked toward this goal ever since I was in the second grade when I joined the Young Astronaut's Program."

Her flight controller position "offers an incredible opportunity to learn about mission processes through incorporation of a variety of mission data," Jurado says. "As flight controllers, we have to develop

keen listening skills, allowing us to be attentive to several conversations at once."

The work involves planning activities for astronauts from sleep time to space walks.

Jurado now is training for certification in Message and Timeline Support, with the ultimate goal of becoming a Flight Activities Officer.

The University of Arizona
Arizona Engineer
College of Engineering Newsletter
Tucson, AZ 85721-0072

Nonprofit org.
**U.S. Postage
Paid**
Tucson, Arizona
Permit No. 190