



Robert H. Tures, Raytheon

Team Scorpion's Urban Challenge vehicle is designed to drive itself through 60 miles of city traffic.

## Urban Challenge Team includes UA Engineering faculty

University of Arizona engineers are part of a team selected by a Department of Defense agency to build a smart vehicle that can drive itself through 60 miles of city traffic.

The team, named Team Scorpion, is led by Raytheon Co. and includes Preferred Chassis Fabrication, of Tucson; Tucson Embedded Systems; and iRobot, of Burlington, Mass. The UA engineers are being led by Professor Larry Head, of Systems and Industrial Engineering (SIE), and Professor Jerzy Rozenblit, of Electrical and Computer Engineering (ECE).

Team Scorpion is one of ten teams to have received \$1 million research grants from DARPA (Defense Advanced Research Projects Agency)

to build a vehicle for the Urban Challenge. More than 60 teams competed for the grants.

The Urban Challenge race will take place at an undisclosed location in the western United States on Nov. 3, 2007. The vehicles will be tested on simulated military supply missions of 60 miles through a mock urban area.

Raytheon will provide sensor technology and Preferred Chassis will contribute its rock-crawling Scorpion vehicle, which includes a suite of electronic and digital controls. Tucson Embedded Systems will build the computing platform, and iRobot will provide the perceptual environment to sense where the vehicle is, where obstacles are located and where the

other vehicles are.

"Our piece of the project is smaller, but very important," said Head, department head in SIE. "Researchers in our department will do the traffic behaviors, and ECE will provide the intelligent systems capability that will integrate our traffic analysis and all the sensor information to make the decisions on how the vehicle will negotiate the environment."

When the vehicle drives through a city, it will have to follow traffic laws and know how the other vehicles will behave, Head said. "So we're going to provide some mission control logic that provides the driving knowledge for controlling the vehicle as it goes

*Continued on Page 16*



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# We can all make a difference for students

*Their future depends on education and our future depends on them*

Professors in UA's College of Engineering, like professors across our campus, often live vicariously through the successes of their students.

This issue of *Arizona Engineer* features many outstanding engineering students and alumni whose accomplishments make us very proud.

We're impressed by their drive and motivation and their success after graduation. And, fortunately for us, they remain both colleagues and life-long friends.

### Outstanding alums

Alums Gary Cropper and Mary Boice Moreton were recognized at the 8th annual Technology and Management Awards Luncheon for their substantial, lifelong accomplishments (Page 10).

Students and alums from the Chemical Engineering program also feature prominently in this issue.

Alum Don Pettit, a NASA astronaut, recently returned from searching for meteorites in Antarctica (Page 20.)

Alum Wayne Seames and colleagues at the University of North Dakota are "growing" jet fuel (page 19).

And, undergraduate Devin T. Wiley (Page 8) was recently named a Laureate by the Tau Beta Pi engineering honor society.

Other UA Engineering students are pursuing a wide variety of activities, including design of ornithopters (Page 8), water-related research (Page 7) and even running rim-to-rim-to-rim through Grand Canyon (Page 15).

Friends of UA Engineering are providing generous financial support that funds invaluable programs in the college. Many students benefit from scholarships, facilities improvements, mentorship and support provided by these donors.

In the last issue, I mentioned our fund-raising campaign for a new Materials Research Building. Friends

of the College also are helping us make that building a reality. I hope every one of you will join us in helping to complete this important project.

### Our industry friends

Intel and Texas Instruments are among the many companies that are providing enhanced educational opportunities for our students.

TI recently announced its Analog Design Contest, which will award a \$2,000 prize on Engineering Design Day (Page 6), and Intel donated 25 new computers for an important lab (Page 5).

IBM, Raytheon, Honeywell and TI provide vital support to the college in many ways, and we were delighted to see alums from those companies turn out in record numbers for the 2006 Engineers' Breakfast during Homecoming (Page 4).

Nearly every research project in our college involves students. So the project funding and collaboration provided by industry not only leads to important discoveries, but also furthers our educational mission.

### Professors leave a legacy

Often, when our most successful students return to campus, they recount how certain professors profoundly influenced their lives, and contributed to their success.

We recently lost two professors emeriti, Don White and Don Dudley, who mentored a great many students during their long careers (Page 18).

White founded our Chemical Engineering Department and Dudley was an internationally respected expert in the field of electromagnetics.

While their passing saddened us all, their legacy will live on through their students and the accomplishments of those students.

Education was something that Professors White and Dudley believed in and devoted their lives to. Their work continues to be carried on by those they taught and inspired.

While not all of us can help estab-

lish a new department or become world-class researchers, we all can make a difference in the lives of UA's engineering students.

It's important work and I would encourage all our alumni to be involved in continuing the legacy left to us by these faculty members.

It's a privilege to make a real difference in the lives of students and, in turn, the future of our country.

## 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."

ARIZONA

## Engineer

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Editor/Writer: Ed Stiles

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## College and foundation celebrate Tom Brown Scholarships

Students who have received Thomas R. Brown Distinguished Scholarships met with members of the Brown Family Foundation for a luncheon at the Arizona Inn to celebrate the foundation's support of students in the College of Engineering and Eller College of Management.

In 2005, the Thomas R. Brown Family Foundation established a \$1 million endowment in Engineering and another \$1 million endowment in the Eller College to fund scholarships for National Merit Scholars in engineering and for MBA students in the Eller College.

The scholarships help both colleges attract the best and brightest students to their programs.

The Brown Scholarships were first funded in 2002 and were established in perpetuity in 2005 to support Tom Brown's vision of combining technol-



Ed Shiles

Board members of the Thomas R. Brown Family Foundation (front row) met with students (back row, with Engineering Dean Tom Peterson) at a luncheon to celebrate the foundation's support of students in the College of Engineering and the Eller College of Management.

ogy and business in higher education.

One of Tom Brown's daughters, Sarah Smallhouse, spoke for the foundation. In addition, Civil Engineering senior Kara Monson spoke for the engineering students and Patricia Ewanski spoke for the Eller students.

Tom Brown was Tucson's most successful high-tech entrepreneur. Brown and his friend, Paige Burr, founded Burr-Brown Research Corp. in 1956.

Tom Brown died in June 2002.

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More info: [Tom Brown](#)

## M.C. Gill funds scholarships

Merwyn C. Gill has established the M.C. Gill Scholarship Program to support graduate students studying in the area of composite materials.

Gill, who is 96, is the chairman of the board of M.C. Gill Corp. and the only living pioneer of the composites industry.

According to information provided with the scholarships, "Mr. Gill's commitment to the composites industry is steadfast and, with this gift to the university, he hopes to provide educational opportunities for the best and brightest yet to come."

The M.C. Gill Corp. is now the world's largest manufacturer of composite cargo liners for passenger and freight aircraft. The company also makes aircraft passenger compartment floor panels.

M.C. Gill was a student at the University of Minnesota and graduated from USC in 1937 with a bachelor's degree in chemical engineering.

Tom Peterson, dean of the UA College of Engineering, praised Gill



Ed Shiles

M.C. Gill has funded scholarships in composite materials to provide educational opportunities for the best and brightest yet to come.

and his wife, Hester, for their selfless commitment to graduate engineering education.

"M.C. has focused his entire life on activities, both inside and outside his company, that facilitate fulfillment of the American Dream," Peterson said. "He is an ardent supporter of the Boy Scouts of America; his alma mater, USC; and, now, to our great benefit, the College of Engineering at UA. It is truly an honor to know both of them and to be the recipients of their incredible generosity."

## Desai wins ASCE's Karl Terzaghi Award

Chandra S. Desai, Regent's Professor in Civil Engineering and Engineering Mechanics, has received the 2007 Karl Terzaghi Award from the American Society of Civil Engineers' Geotechnical Institute Board of Governors.



Chandra Desai

Ed Shiles

The award recognizes Desai "for his outstanding, seminal and sustained contributions in Geotechnical Engineering and Geomechanics for the development of constitutive models, testing devices and computer methods, and their use for solutions of a wide range of practical problems." The committee noted his pioneering contributions to the application of numerical methods and constitutive modeling to geomechanics.

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More info: [Desai](#)

## Nearly 700 attend 43rd annual Engineers' Breakfast

About 680 Engineering alums, faculty and graduating seniors attended the 43rd annual Engineers' Breakfast during Homecoming on Nov. 10.

Alums from the Class of 1956 held their 50th reunion and alums from other classes attended, dating back to the Class of 1943, which was represented by Civil Engineering alum Genevieve Morrill.

Raytheon, IBM, Texas Instruments and Honeywell brought more than 300 alumni as they competed for bragging rights to the Industry Award, which is given to the company that brings the most alums to the event. IBM won the competition this year with 98 in attendance.

UA President Robert Shelton was among those who welcomed alums to the event.

Leigh Clifford, chief executive officer of the Rio Tinto group gave the keynote address. Rio Tinto is a world-wide mining company that is composed of 30 businesses. Rio Tinto is now determining the feasibility of developing a large ore body 1.5 miles underground in Superior, Ariz.

**More info:** [Breakfast](#)



Ed Stiles

Civil Engineering alum Genevieve Morrill (left) represented the oldest class, 1943, at the Engineers' Breakfast. Civil Engineering Department Head Juan Valdés (right) was among those sitting with Morrill.

## Simulation gives students hands-on experience in mine rescue techniques



KGUN-9 On Your Side

The mine rescue exercise was covered by KGUN-TV. This still photo was taken from that report.

UA students, state mine inspectors and fire rescue workers staged a mine-rescue simulation in October at UA's San Xavier Underground Mining Laboratory, which is about 30 miles south of Tucson.

The exercise simulated an accident that left a miner injured in the lower levels of an underground mine. The students were from UA's Mine Health and Safety class, which is taught by the Mining and Geological Engineering Department.

Students played roles in the exercise such as the injured miner, working

partner of the miner, shift supervisor, safety director and mine manager.

The students prepared the "injured" miner for transport out of the mine and moved him to the mine entrance.

Once outside, the miner was picked up by members of the Helmet Peak Fire Rescue squad and transported to a helicopter pad, where a Lifeline helicopter landed, and the "victim" was then flown to a hospital.

After the rescue, members of the Arizona State Mine Inspectors Office conducted a simulated accident investigation.

## Smerdon wins Vector de Oro Award

Professor Emeritus Ernest T. Smerdon, former dean of UA Engineering, has been named one of three Vector De Oro (Golden Vector) award winners.

The award is presented by the Union of Pan American Engineering Societies (UPADI) and recognizes engineers



Ernest T. Smerdon

for teaching and research that leads to improvements in engineering education.

Smerdon is an internationally recognized expert on engineering education. He is past president of the American Society of Engineering Education (ASEE), served as president of the deans of engineering for ASEE, and headed the National Academy of Engineering committee on Lifelong Learning for Engineers.

**More info:** [Smerdon](#)

Courtesy of Ernest T. Smerdon



**Engineering Dean Tom Peterson** (left) and Assistant Engineering Dean for Industrial Relations **Ray Umashankar** (right) received a commemorative plaque from Intel representatives **Tom Leahy** (second from left) and **Carlos Contreras**. The plaque will hang in the UA Virtual Development Center computer lab to honor Intel's contributions to the lab.

Ed Stiles

## Students benefit from Intel support of computer lab

Representatives from Intel Corp. were on campus in December to present a plaque commemorating the company's donation of 25 Dell OptiPlex computers and a Dell Latitude laptop computer to a key college computer laboratory.

"Our Virtual Development Center computer lab is very busy," said Ray Umashankar, assistant dean for industrial relations and director of UA's Multicultural Engineering Program. "This donation by Intel is critical to providing up-to-date equipment for

our students."

The lab also is used for outreach programs, such as the Summer Engineering Academy (SEA), which brings about 150 middle school and high school students to campus each summer for an engineering camp. The SEA program also is supported by the Intel Foundation.

"We gladly support programs such as SEA that are critical in creating an engineering pipeline and have demonstrated success in attracting students to engineering," said Tom Leahy, opera-

tions manager for Intel's Assembly Test Development Factory.

The lab also will be used in summer 2007 for the Jump Start program, which provides math instruction for incoming freshman who need additional work in that area before beginning freshman calculus.

Leahy and Carlos Contreras, Intel's Arizona education manager, presented the plaque to Umashankar and Engineering Dean Tom Peterson.

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**More info: Intel**

## Tharp is Lockheed Martin Corporate Professor

Hal Tharp, assoc. department head in Electrical and Computer Engineering, has been named to the Lockheed Martin Corporate Professorship.

This professorship recognizes those who are doing outstanding work in the undergraduate program, particularly in areas important to Lockheed Martin.



**Hal Tharp**

Leo Enfield

Tharp was recognized for his contributions to the design component of the curriculum, particularly through his work with the ECE design requirements for Engineering Design Day.

The appointment is for three years, beginning with the 2006-2007 academic year. Tharp will receive \$20,000 annually for use in advancing undergraduate education.

The professorship is designed to support dedicated faculty advisors who

work closely with industry representatives to mentor undergraduates and to teach the design process.

These faculty members ensure that students are learning about grounded examples of "design in action," and that they are building a shared language for doing design.

This kind of professorship is particularly important for recruiting and retaining excellent faculty members.

Those who are named to the professorship will be selected from programs that are key recruitment areas of interest to Lockheed Martin: Optical Sciences in Engineering, Electrical Engineering, Systems Engineering, and Aerospace and Mechanical Engineering.

Possible uses of the funds include purchasing equipment or materials for student design projects, covering curriculum development expenses, and supporting teaching activities.

## Mary Poulton honored by UA BPW

Mary Poulton, department head in Mining and Geological Engineering, has received the Woman of Distinction Award from The UA Business & Professional Women.



**Mary Poulton**

Ed Stiles

The annual award is presented to those who have made outstanding contributions to their profession.

The award includes a plaque and recognition in BPW newsletters statewide.

UA BPW was formed about 40 years ago to promote an equitable work environment.

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**More info: Poulton**

## TI Design Contest

*Offers \$2,000 prize to winning senior design team*

UA engineering students have a chance to turn their senior design project ideas into cash during the new Analog Design Contest sponsored by Texas Instruments.

Just for entering, student teams get electronic parts, evaluation boards, a polo shirt, a multimeter and a chance to win \$2,000.

And their senior design project doesn't have to be sponsored by TI. All that's needed is a senior project that uses at least three different TI analog microchips. The chips can come from multiple categories, including amplifiers, clocks, timers, switches, and temperature sensors and are key components of systems that do wireless communications, data conversion, power management, and other tasks.

Even mostly digital circuits often have a link to the outside world, so it's not difficult for most teams to find some analog aspect to their project.

The winning team will be selected at the Engineering Design Day Com-



TEXAS INSTRUMENTS ANALOG DESIGN CONTEST

**\$2000**  
to the Winning Team at Your School

TURN YOUR BRIGHT IDEAS FOR YOUR SENIOR DESIGN PROJECT INTO CASH!

Texas Instruments

petition in May. The new TI award is likely to get lots of attention from students because it's twice as large as the largest single prize awarded last year, when total cash awards were \$6,500. The prize money will be split among the members of the winning team.

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More info: [Texas Instruments](#)

## Ma wins outstanding junior faculty award

Assistant Professor Dongsheng (Brian) Ma, of Electrical and Computer Engineering, has won the 2006 Outstanding Junior Faculty award from UA's Asian American Faculty, Staff, and Alumni Assoc.

The award is given for "exemplary teaching, research, scholarship, and/or meritorious contributions to the university and the community."

Ma holds the prestigious Analog Devices Corporate Professorship in ECE and is actively collaborating on research with Analog Devices, Texas Instruments, Ridgetop Group and other electronics companies.

Ma's current research involves analog and mixed-signal integrated circuit (IC) design, on-chip power management for VLSI systems, microsystem designs for biomedical applications and nano devices and hopf bifurcations and chaos circuits.

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More info: [Brian Ma](#)



Dongsheng Ma

Courtesy of Dongsheng Ma



Dan Albrecht (center) with Ernest Smerdon, professor emeritus and former dean of UA Engineering, and his wife, Joanne Smerdon, at the special showing of Inuit Art in October. All three are members of the UA College giving society, the da Vinci Circle.

Beth Weaver

## Inuit art featured at da Vinci Circle event

Members of the da Vinci Circle, the Engineering College giving society, were treated to a special showing of Inuit prints, drawings and sculpture collected by alum Daniel Albrecht (Ph.D. Met '64) and his wife, Martha.

The exhibit was presented in October at the Heard Museum in Phoenix.

The Albrechts, who co-curated the exhibit, are trustees of the museum.

The exhibit, entitled "Life in a Cold Place: Arctic Art from the Albrecht Collection," examines the ways artists portray life and survival in an Arctic environment, including themes of family, housing, traditional ways of life, land and animal life.

The event was co-sponsored by the UA College of Fine Arts giving society, the Medici Circle.

# Water Forum

## Sustainability

*UA well equipped to lead in water sustainability efforts*

Creating sustainable water supplies doesn't mean living off the grid, huddled in the cold and dark, UA President Robert N. Shelton told those attending the UA Water Forum in November.

"We can seek sustainability in ways that maintain and even enhance our own quality of life, that allow our economy to prosper and our culture to flourish," he said.

Not only is this the necessary thing to do, it's the right thing to do, Shelton said. He called it "inter-generational social justice."

"We simply have no right to squander resources in a way that impoverishes our children and grandchildren," he added.

Shelton's talk concluded the water forum, which brought together UA faculty and students to share the results of their water-related research.

UA is uniquely equipped to lead



Ed Stiles

UA President Robert N. Shelton addresses the audience at UA Water Forum 2006.

efforts toward creating sustainable water supplies, Shelton said.

"No other university in the country, perhaps the world, is as well endowed to take on this leadership role," he said.

UA has:

- 28 degree programs and concentrations in water-related fields
- 9 water-related centers and institutes

- 10 field sites, labs and other research facilities
- 300 professionals involved in water research, education, and outreach.

He noted that perhaps the most important contribution UA makes to sustainability is in educating the next generation of water professionals.

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**More info: Water Sustainability**



Ed Stiles

UA President Robert Shelton with the winners of the Water Sustainability Program Student Poster Competition. A total of 22 student posters were displayed at the water forum, which focused on "Tools for Water Sustainability" and featured presentations by faculty from several departments as well as a keynote address by UA President Robert Shelton on UA's role in creating sustainable water supplies.

## Engineering students win top three poster awards at water forum

Four Engineering College master's students won all three awards in the Water Sustainability Program Student Poster Competition at UA's Water Forum 2006.

The forum focused on "Tools and Technology for Water Sustainability." UA President Robert Shelton presented the awards to the winners.

A total for 22 student posters were displayed at the water forum.

The award winners are:

- **1st Prize — \$200**  
Jacqueline Shaw  
Sahar Fathordoobadi  
Chemical and Environmental Engineering Department
- **2nd Prize — \$100**

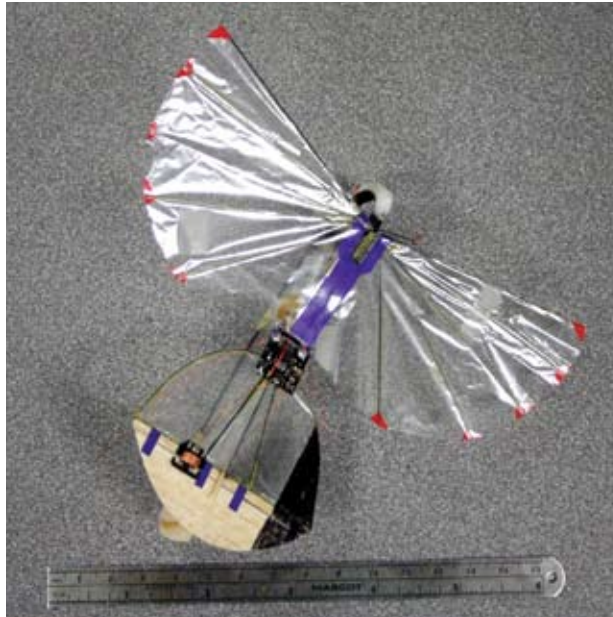
Deirdre Brosnihan  
Hydrology and Water Resources Department

- **3rd place — \$50**  
Monserrat Chairez-Llamas  
Chemical and Environmental Engineering Department.

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**More info: Water Forum**

**This radio-controlled ornithopter**, about the size of a hummingbird, can stay aloft for three minutes. It took first place at the 10th International MAV Competition in Provo, Utah.

UA's Micro Air Vehicle Team also demonstrated the world's most compact MAV during the competition. It folds down into a matchbox-sized container that is less than half an inch tall and two inches on a side.



Ed Stiles

## World's tiniest ornithopter a big winner

UA's Micro Air Vehicle (MAV) Team placed second overall in the 10th International MAV Competition in Provo, Utah. The team also took first place in the ornithopter portion of the competition for the third year in a row.

Ornithopters are mechanical birds that use flapping wings for lift and propulsion. UA's winning design, which has a wingspan of less than six inches, can stay aloft for more than

three minutes in calm weather. It is the world's smallest radio-controlled ornithopter.

The UA team also demonstrated the world's most compact MAV, which folds down into a matchbox-sized container that is less than half an inch tall and two inches on a side.

MAVs are tiny, radio-controlled airplanes that are often equipped with video cameras. They're designed for reconnaissance and can be used in

search-and-rescue, law enforcement, military surveillance, or any situation too dangerous or time consuming for a human observer.

Aerospace Engineering graduate student Bill Silin, who heads the ornithopter team, said UA students did a lot of wind tunnel testing to determine the best design parameters.

"Another thing that helped with miniaturizing is that there has been a lot of progress in microelectronics," Silin said.

The sub-six-inch ornithopter uses carbon-fiber struts and Mylar-covered wings. It has a three-channel radio system and control-surface actuators that employ tiny electromagnetic coils to move the surfaces instead of push-rods and servos.

The ornithopter is powered by a miniature pager motor that was designed to create the vibrating alert system in pagers.

"We are now working very hard toward this next competition, where we plan to demonstrate some interesting, new technology," said Aerospace and Mechanical Engineering professor Sergey Shkarayev, who directs MAV research at UA and is the MAV team's advisor.

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**More info: Ornithopter**

## Wiley named Tau Beta Pi Laureate

Chemical Engineering senior Devin T. Wiley, has been named a Laureate by the Tau Beta Pi engineering honor society.

He joins 58 other members of the honor society who have been named Laureates since 1982. Wiley was the only person selected to receive the award in 2006.

The Tau Beta Pi Laureate Program recognizes up to five Tau Beta Pi student members annually who also excel in areas outside their technical majors and comes with a \$2,500 cash award and a commemorative plaque.

In addition to his outstanding scholastic record, Wiley is being recognized



Matt Brailey

for his accomplishments as a pianist, as well as his achievements in athletics and service to the community.

He won the Tucson Symphony Young Artists Competition in 2006.

He also has organized and performed in four benefit concerts and been involved in numerous other

public service projects.

He also competes in triathlons, qualified for nationals in intercollegiate intramural table tennis and plans to earn both a Ph.D. in engineering and an M.D. degree.

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**More info: Wiley**



## Bringing High Definition Radio to the masses

Two UA researchers are working with Texas Instruments to make High Definition Radio portable and low cost.

Many AM and FM stations already are broadcasting in HD radio, which will pack 2 or 3 channels into the space now occupied by a single radio station and will bring FM quality to AM and near CD quality to FM.

Current HD radio receivers are expensive desktop models or found in high-end luxury automobiles.

The UA researchers and TI hope to bring HD signals to iPods and other portable devices at low cost and in a battery-friendly package.

HD radio will revolutionize radio broadcasting, says Assistant Professor Dongsheng (Brian) Ma, of UA's Electrical and Computer Engineering (ECE) Department. "It's not like conventional radio," he said. "It's a whole entertainment package. You'll be able to listen to the radio program, download a biography of the artist, hear an interview with them and have access to other features."

### HD Radio on a Chip

Ma and ECE Ph.D. student Inshad Chowdhury are working with TI to develop the world's first HD radio on a single microchip, one that's small enough to slip into an iPod and uses little battery power while maintaining the low-noise, high quality signals of HD radio.

The UA team is working on what's called the radio's "front end." That's everything from the antenna connection up to the digital signal processor (DSP), which is followed by an audio amplifier.

"This is very pioneering, very challenging work," Ma said. "Our design has to be low-power, low-cost, low-noise and with enhanced sound quality."



Texas Instruments illustration

This Texas Instruments microchip includes the complete circuitry needed to tune in and separate digital and analog radio signals. It is the heart of many of the current generation of high definition radio receivers.

### System Integration is the Big Challenge

"The big challenge is large-system integration because we have to address the noise problem," Chowdhury added. "By its very nature, DSP is very noisy, but analog is very sensitive to noise. So we have to combine the DSP and the analog signal processing on the same chip without the DSP noise compromising the analog performance."

Currently Ma and Chowdhury are designing a low-noise amplifier to increase the strength of radio signals received by the antenna and an automatic gain control (AGC) that prevents powerful signals from overloading the receiver front end.

The payoff could be big, both for consumers and TI. Current receivers are desk-top-size units in the \$300 to \$500 range or similarly costly automobile receivers. If the researchers and TI can produce an inexpensive receiver on a chip, it will open up a huge market for HD radio.

## Poirier Wins Bruce Chalmers Award from TMS

Materials Science and Engineering Professor David Poirier has won the 2007 Bruce Chalmers Award from the Minerals, Metals & Materials Society (TMS).

The award is presented to individuals who have made outstanding contributions to solidification science, which involves the physics and technology surrounding the transition of matter from liquid to solid. Freezing water to make ice cubes is an everyday example of solidification. Carefully controlling how this change occurs can dramatically influence the properties and, hence, performance of the solidified substance.

Poirier was honored for his contri-

butions both to the technology and fundamental science of solidification, including his scholarly writings and his seminal textbook, which has set the standard for others in the field.

Poirier has been involved in research pertaining to solidification processing of alloys for more than 30 years.

He has written more than 120 research papers and is the author of two textbooks, *Transport Phenomena in Metallurgy* (1974) and *Transport Phenomena in Materials Processing* (1994), and of a primer for casting engineers, *Fundamentals for Metal Casting* (1994).

His current research is focused on developing predictors for simulations



David Poirier

Courtesy of David Poirier

that are used by the casting industry; enhancing microstructure and fatigue properties of lightweight casting alloys; and determining the effects of thermal and convective conditions on dendritic solidification of alloys in ingots and castings.

More info: Poirier



Ed Stiles

The award winners and representatives from The University of Arizona at TMAL included (from left) **Tom Peterson**, dean of the College of Engineering; **James F. Muzzy** managing director and head of U.S. marketing for PIMCO; **Donald L. Paul** chief technology officer for Chevron Corp.; **Mary Moreton** senior vice president and corporate manager of human resources at Bechtel Corp.; UA President **Robert Shelton**; **Paul Portney**, dean of the Eller College of Management; **Gary Cropper** owner and operator of Cropper Auto Group; and **David J. Gemelli** is president and CEO of Gem Gravure

## TMAL facts

The annual Technology & Management Awards Luncheon (TMAL) honors 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 disciplines is important at both the university and corporate levels for the United States to remain competitive in today's global marketplace.

## Eighth annual TMAL celebrates engineering, business collaboration

U A's 8th annual Technology & Management Awards Luncheon (TMAL) honored five people who have made significant contributions to the economic well-being of the nation.

They received the TMAL awards and spoke to an audience of business men and women, faculty, students and administrators in October at the Arizona Biltmore Resort & Spa in Phoenix.

"We operate in an increasingly global environment today, an environment in which to compete and succeed corporations and universities simply have to work together to accelerate the rate of innovation," Paul Portney, dean of the Eller College, told the audience during his opening remarks.

"It's our responsibility to prepare our students with a broader set of skills to meet these challenges. We have to give engineers the business skills to commercialize technology and we have to give business students the analytical skills to understand and apply that technology, as well. It's in

this context that the great partnership was formed between our two colleges," Portney said.

The colleges collaborate on several programs including:

- The Center for Technology, Public Policy and Markets, which is supported by the Salt River Project.
- The McGuire Center for Entrepreneurship
- The Thomas R. Brown Distinguished Scholarships program, which supports undergraduate engineering students and Eller MBA students who show an interest in studying at the intersection of engineering and business.
- The endowment program funded by Arizona Public Service to advance collaborative educational efforts by the two colleges.

Tom Peterson, Dean of Engineering, noted that since its beginning in 1999, TMAL has honored alums and executives who have made substantial contributions to managing technology in a wide range of industries, including aerospace, automotive, micro-

electronics, engineering construction, investment banking, defense, and mining.

The 2006 award winners are:  
**• Technology Executive of the Year — Donald L. Paul**

As Chevron Corp.'s chief technology officer, Donald L. Paul is responsible for Chevron's three technology companies, Chevron Energy Technology, Chevron Information Technology and Chevron Technology Ventures.

Paul leads the company's efforts to invest R&D dollars in clean energy technologies, such as hydrogen fuel cell processing and storage, fuel cells and advanced batteries. He also is involved in Chevron's energy efficiency efforts.

**• Lifetime Achievement Award, Engineering — Gary Cropper**

Gary Cropper is the owner and operator of Cropper Auto Group, which has dealerships in Casa Grande and Nogales, Ariz. He graduated with a degree in mechanical engineering and was co-captain of the UA football team in 1960.

After Cropper graduated from UA, he worked for a number of engineering companies until 1971 when his classmate, fellow mechanical engineer and SAE fraternity brother, Craig Berge, convinced Cropper to join Berge Ford in Mesa. In 1982 he formed Cropper Automotive Group.

**• Lifetime Achievement Award, Eller College — James F. Muzzy**

James F. Muzzy is the managing director and head of U.S. marketing for PIMCO, a global bond management firm.

PIMCO has been in the forefront of its industry as a fixed-income fund and now has \$645 million under management.

**• Distinguished Service Award, Engineering — Mary Moreton**

Mary Moreton is senior vice president and corporate manager of human resources at Bechtel Corp. Moreton, a third generation Arizonan from Globe, Ariz., graduated from UA with a bachelor's degree in systems engineering in 1974. She has more than 30 years of technical and leadership experience



Part of the crowd at the 8th annual Technology & Management Awards Luncheon.

Ed Shiles

around the globe in Bechtel's engineering and construction business sectors, including nuclear and fossil power, mining, and oil and gas.

She also serves on the UA College of Engineering Industry Advisory Council.

**• Distinguished Service Award, Eller College — David J. Gemelli**

David J. Gemelli is president and CEO of Gem Gravure, a leader in the wire and cable manufacturing, processing, and fiber optics industries.

Gemelli graduated from the Eller College in 1972 with an MBA degree and worked for Polaroid Corp. He also served as a captain in the U.S. Army field artillery before joining Gem Gravure in 1976.

Gem Gravure has received numerous awards for its ink jet printing technologies and received a special award from Lucent Technologies for developing a patented water-based ink that is environmentally benign.

### TMAL Sponsors

TMAL was sponsored by Salter Labs; APS; Fluor Corp.; Gem Gravure; Mattel, Inc.; Phelps Dodge; Raytheon Co.; Rodel Foundation; and Vestar Development.

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[More info: TMAL](#)

## 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.
- 2005** — J. Steven Whisler  
CEO & chairman of Phelps Dodge Corp.

## System always finds good match for radios, antennas

Software-Defined Radio (SDR) has produced new levels of performance and flexibility in cell phones, satellite radio, and law-enforcement and military communications.

By replacing or modifying the radio's software, manufacturers can immediately take advantage of the latest technologies without retooling or replacing hardware.

This results in huge cost savings and radically shortens the time to market.

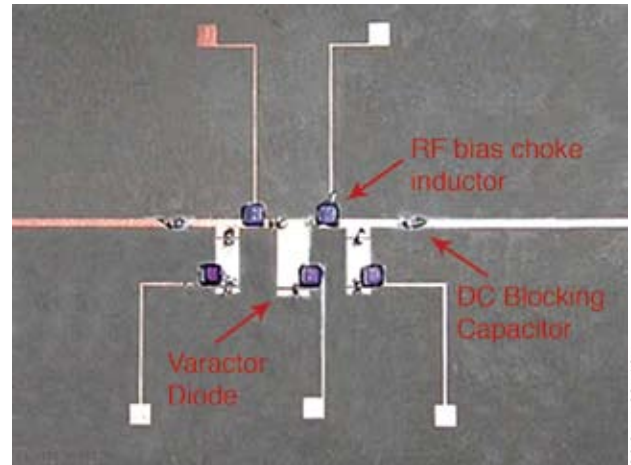
Now a University of Arizona professor and her graduate students have taken this communications revolution one step farther with a device that allows SDR rigs to efficiently cover an extremely wide range of operating frequencies.

Electrical and Computer Engineering Associate Professor Kathleen L. Melde and master's student Richard

B. Whatley (who has since graduated) have applied for a patent on an Automatic RF (radio frequency) Match Control (AMC) that makes antennas efficient over a wide range of frequencies.

In lab tests so far, a test antenna designed for 5 gigahertz and equipped with an AMC can be tuned to transmit efficiently between 1 and 10 gigahertz, with minimal loss in signal strength.

The AMC actually senses the mismatch between the radio and antenna and automatically compensates for it,



Kathleen Melde

**This Automatic RF (radio frequency) Match Control (AMC)** was used with a test antenna designed for 5 gigahertz by Associate Professor Kathleen Melde and Master's student Richard B. Whatley. The antenna, equipped with this AMC, could be tuned to transmit efficiently between 1 and 10 gigahertz, with minimal loss in signal strength.

using a system of varactor diodes and tuning stubs.

"This project could really revolutionize RF front ends in cell phones and other radios," Melde said.

•  
**More info: Antenna**

## Lab develops basic data on microchips

Kathleen Melde, an associate professor in Electrical and Computer Engineering, is characterizing the materials used for packaging electronic circuits, trying to find the most accurate values to plug into simulation software.

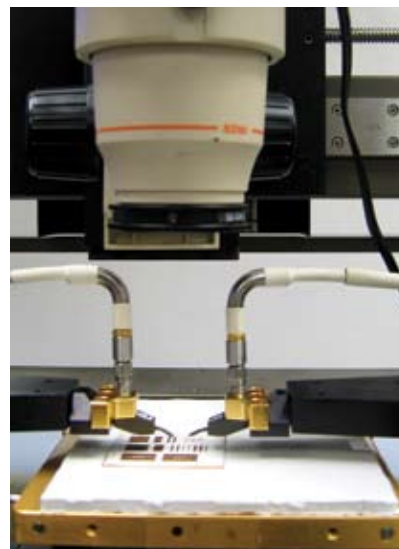
She and her students are studying state-of-the-art, microwave-grade materials in UA's Center for Electronic Packaging Research.

These new materials will run where almost no electronics has gone before — in the rarefied region where clock speeds scream above 5 gigahertz.

Engineers need to know the characteristics of these materials because electronic materials can induce harmonics due to the physical layout of the chip, which will disrupt its operation.

At these extremely high frequencies, the way samples are made and measurements are taken can influence the results.

"So we have to carefully go through the procedures to be sure we've ruled out any possible physical effects that



Kathleen Melde

**State-of-the-art microchip packaging materials** are tested on this on-wafer probe station in UA's Center for Electronic Packaging Research.

could show up in the data from a fabrication mistake or a measurement mistake," Melde said. This is further complicated because there are few other measurements for comparison. "Most of the material characterization work we are aware of stops at about 20 gigahertz," she explained.

•  
**More info: CEPR**

## SRC funds packaging lab

Microchip manufacturers have invested millions in high-performance modeling and simulation software and they need the most accurate data they can get on materials when they are designing the next generation of microchips.

This makes the work being done in UA's Center for Electronic Packaging Research vitally important to many microelectronics companies.

As a result, much of the center's work is funded by the Semiconductor Research Corp., which manages a program of university research for its member companies.

"The SRC companies want the ability to develop their own packaging materials or to work with special vendors to develop custom materials for their applications," Melde said. "The techniques we're developing to characterize these materials will help them do that."

## Combining the best of industry and academia in classroom and lab

Intelligent traffic systems are interactive. They collect real-time data on vehicle traffic flow and use that data to time signal lights to move vehicles more efficiently and safely.

Larry Head, interim department head of UA's Systems and Industrial Engineering Department, worked on traffic systems research as an SIE faculty member until he left the university in 1994 to become a partner in and Senior Vice President of R&D at Gardner Transportation Systems, which was eventually acquired by Siemens ITS of Germany.

Head spent an additional three years with Siemens ITS before returning to UA.

He's now applying much of what he learned in industry, which is significantly influencing his approach

to research and to teaching.

"I try to relay my experiences to the students with practical examples and rational foundations for why some of the ideas are so important," he said.

Head says his industry experience also helps in understanding the big difference between ideal systems designed in a university and what can be implemented on the street in terms of complexity and cost. Having worked with those limitations first-hand helps him find solutions that will implement most of the desired functions at a fraction of the cost.



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While he continues his work on traffic systems, Head also is moving into new areas that concentrate on integrating vehicles and traffic control systems.

One of these is a smart car that could drive itself through city traffic. Another, which is related, is directly integrating cars with the traffic system.

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More info: [Smart Traffic](#)

## Building confidence, changing lives

"It gives them confidence," said Prof. Supapan Seraphin, referring to the summer students who study in Thailand. "When they come back to America, they have a new perspective on their lives here."

Among other things, the students discover whether they enjoy research work. "The program is a big factor in helping them decide on the next step in their career."

Seraphin also hopes the international experience will help students balance their careers. "I hope they don't go after just the big salary, the big house, and lose all the relationships and spiritual aspects of life."

Involvement in the REU and RET programs helps Seraphin achieve that balance in her own life. Rather than confining her work to research, teaching and graduate students, Seraphin has taken on the NSF outreach work so she can share her expertise with those outside the traditional boundaries of academic research.

## Undergrads and K-12 teachers thrive on research trips to Thailand



Photo Courtesy of Supapan Seraphin

UA's REU/RET students and teachers posed for a group photo when they arrived in Thailand.

Each summer Professor Supapan Seraphin takes students and K-12 teachers to Thailand to study at King Mongkut's University of Technology.

The trips are funded by part of a \$1 million National Science Foundation REU/RET grant that Seraphin and Research Specialist Gary Chandler won five years ago. Both are from UA's Materials Science and Engineering (MSE) Department.

The NSF grant allowed them to extend the efforts they've been making

for the past 15 years to bring undergraduates and K-12 teachers into MSE's research labs.

They believe that exciting teachers about science will inform their teaching and, in turn, excite their students.

Seraphin and Chandler also have employed undergraduates in MSE labs and on research projects to encourage them to become the next generation of graduate students.

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More info: [Seraphin](#)

## Digital Cinema

### UA prof plays key role in forming Hollywood standard

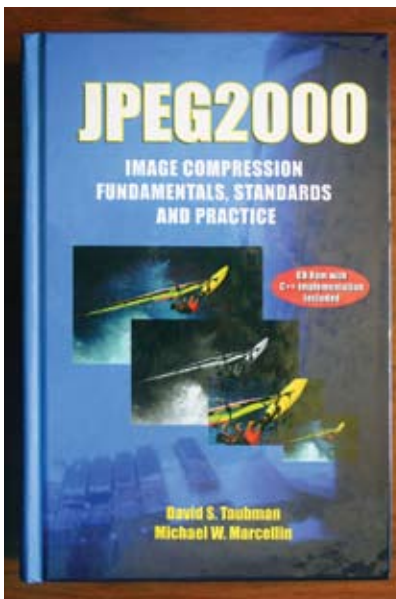
JPEG2000, a “just enough” method for compressing and displaying digital images, will revolutionize the quality and distribution of major motion pictures.

Professor Michael Marcellin and his students in UA’s Electrical and Computer Engineering (ECE) Department did a lot of the development work on JPEG2000. One of the biggest contributors was Ali Bilgin, a former grad student of Marcellin’s, who is now a research assistant professor in ECE.

They worked closely with David Taubman from the University of New South Wales, who probably is the number one contributor of ideas to what eventually became the JPEG2000 standard. Taubman and Marcellin have co-authored *JPEG2000: Image Compression Fundamentals, Standards, and Practice*, which has become the definitive reference book on the subject.

In addition, Marcellin has worked as a consultant with Digital Cinema Initiatives (DCI), a consortium of seven major motion picture studios, to develop the new standards for digital cinema.

Digital movies provide theatergoers with movies that are better than they’ve ever seen before. Digital



Ed Shiles

movies will be sharper, with greater dynamic range and more vibrant colors than those on film.

Also, “you can play back the movie 700 times and on the 700th time it will look every bit as good as the first time,” Marcellin said.

Finally, piracy will become more difficult. With reels of film, it takes a long time to make copies and distribute them. So movies typically are rolled out in phases. “With digital, the movie can be distributed everywhere at the same time,” Marcellin said. This will drastically reduce the value of low-quality pirated versions.

5,000 theaters are expected to have digital projection capability in 2008 and all the major chains will be com-

### How JPEG 2000 works

The single most important concept in JPEG 2000 is that it’s designed to give you only what you can use in the shortest possible time.

If you go to a web site, for instance, and want to look at a still photo, JPEG 2000 will find out if the image is larger than your computer screen. If it is, it won’t send you the huge file. Instead, it will send you a smaller version that just fits on your screen. This will reduce download time while maintaining the image quality that your computer is capable of displaying.

If you decide you want to zoom in on part of the image, JPEG 2000 will give you that enlarged area in sharp detail, but only that area. Again, you don’t have to download the entire image.

It works similarly with your printer, sensing whether it’s color or black-and-white and what image quality it can produce. Then it sends only the data suitable for your system.

JPEG2000 works just as well for movies.

pletely converted by 2009, Marcellin said.

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More info: [Digital Cinema](#)

## Prof. Barry Ganapol named 2006 da Vinci Fellow

Prof. Barry Ganapol, of Aerospace and Mechanical Engineering, has been named the 2006 da Vinci Fellow.

The fellowship is sponsored by the Engineering College giving society, the da Vinci Circle. Fellows are selected for their distinguished and sustained records in teaching, research and service, and special emphasis is placed on substantial and continued contributions.

A new fellow is named each year and each fellowship runs for two years. The fellows receive \$10,000 over the two-year span of their fellowship.

Ganapol has developed a mathematical theory that provides straightforward solutions in one dimension to the diffusion equation simulating neutron motion in a



Ed Shiles

heterogeneous critical nuclear reactor core. This solution can serve as the basis for solutions in multiple dimensional geometry heretofore unknown and has value as a design tool and in teaching nuclear engineering, math-

ematics and numerical simulation.

To expand his theory and present it to colleagues, Ganapol will be using some of his da Vinci Fellowship to fund travel to nuclear engineering departments and national laboratories around the world. He will be delivering lectures and short courses on this new concept to both colleagues and students.

The fellowships are only one part of the da Vinci Circle program, which benefits engineering faculty and students while engaging patrons directly in the discovery process.

## Prof's MEMS research covers big area in tiny world

Assoc. Prof. Eniko T. Enikov, of Aerospace and Mechanical Engineering, is one of the leaders in MEMS (Micro-Electro-Mechanical Systems) research at UA.

Since coming to UA in 2000, he has initiated several research efforts in MEMS and nano-devices, which are two or three magnitudes smaller than MEMS devices. MEMS devices include components that are about 10 to 20 microns in size.

MEMS research is inherently multidisciplinary and Enikov is working with researchers in many areas, such as Agricultural and Biosystems Engineering, the Department of Surgery, Civil Engineering, Materials Science and Engineering, Biochemistry, the Arizona Cancer Center, and Chemical Engineering.

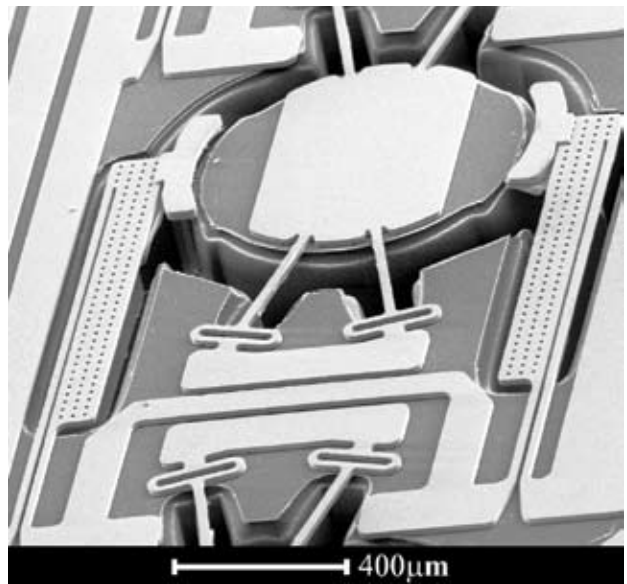
His research projects include:

- Micro-Assembly Techniques — Enikov has been working with electrostatic manipulators that depend on static electricity to hold pieces in place. Enikov also has looked at these methods for assembling molecules. The parts are moved with a guidance system based on a microscope and video camera linked to a computer.

- Low-Temperature Bonding and Metal/Organic “Nano Glues” — Once MEMS components are positioned, they need to be held in place. Enikov is exploring two methods for solidly fastening them down.

- Cell Detection — This involves growing e-coli bacteria on microchips, measuring their electrical properties and using observed changes in those properties to detect the presence of viruses.

- Thermal Micro-Actuators — This project aims to develop low-cost metal actuators on both traditional silicon substrates and non-traditional flex-PCB substrates. The actuators can be used in micro-relays, miniature medical instrumentation, and tunable impedance RF networks.



This micro-machined pixel for a tactile display was created as part of Eniko Enikov's research on virtual 3-D displays.

Photo Courtesy of Eniko T. Enikov

- Virtual 3-D Displays — This technology would allow visually impaired people to browse a web site and touch objects that don't exist in solid form. Where others can see a geometric shape or the structure of a DNA molecule on their screen, for instance, a visually impaired person could use this technology to touch the objects.

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**More info: MEMS**

## Canyon Men

*42 miles, 20K feet, 14 hours*

On October 28, two UA Engineering graduate students and a friend ran from the south rim of Grand Canyon to the north rim and then turned around and ran back to the south rim.

That's about 42 miles and 20,000 feet of elevation change. The elevation figure counts descents as well as ascents because negotiating the canyon's steep descents is taxing.

Environmental Engineering graduate students Dave Byrnes and Pete Littlehat and their friend, Ben Yates, did it in 14 hours, shaving 2 hours off their first effort on April 8, 2006.

This isn't something you decide to do on a whim. It can be dangerous for anyone who isn't superbly condi-



Courtesy of Pete Littlehat

*Pete Littlehat (middle), Dave Byrnes (right) and Ben Yates stop for a snack and a photo above Roaring Springs on their way to the North Rim of Grand Canyon. Littlehat already is planning the next rim-to-rim-to-rim run. He figures he can shave off another 2 hours and complete the distance in 12 hours next time around.*

tioned and accustomed to running long distances in extreme terrain. Even a day hike to the river and back from the south rim is beyond the ability of all but the strongest hikers.

The trio began seriously training for the run three months earlier. Littlehat devised a scientific day-by-day training schedule that is taped above his desk

in UA's Civil Engineering Building.

He said careful planning is vital to avoiding training injuries and to being prepared for running in temperatures that can vary by 50 degrees and at elevations ranging from about 3,000 to 9,000 feet.

•  
**More info: Runners**

## Wafer polishing

*Conserving resources and improving production in microchip fabs*

The demand for more capable electronic devices requires ever-smaller, more-complex microchips — also known as (ICs).

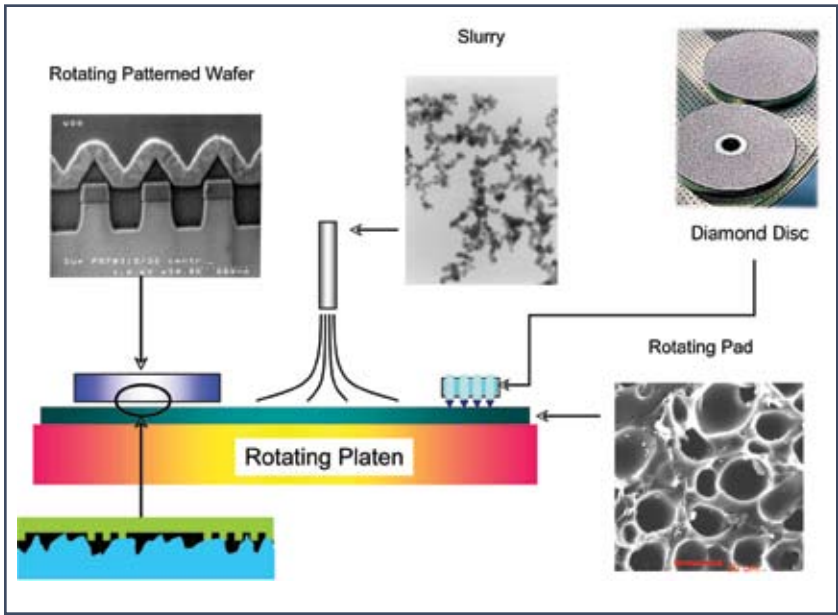
“ICs are becoming tiny skyscrapers,” explained Ara Philipossian, a professor of Chemical and Environmental Engineering who holds the Koshiyama Professorship in Planarization at UA. “As we shrink the footprint to make smaller chips, while demanding more functionality, there is only one way to go, and that’s up.”

Today’s skyscraper ICs have eight or more layers of circuitry piled on top of one another, he noted. This is expected to grow by three or more layers within the next five years.

After each layer is fabricated, its surface must be polished perfectly flat so the next layer can be built on top of it. Engineers call this “planarizing.” It makes today’s ICs possible, and it can be achieved only through Chemical Mechanical Planarization (CMP).

In CMP, a silicon wafer that contains the circuitry for hundreds of ICs is pressed against a rotating polishing pad. A slurry of abrasives and oxidizing chemicals is introduced between the pad and wafer to aid in removing material and flattening the surface.

In addition to the pad and slurry,



Courtesy of Ara Philipossian

This schematic diagram shows the basic setup for Chemical Mechanical Planarization technology.

CMP also employs a rotating diamond disc to resurface the polishing pad.

Many interdependent factors influence the planarization rate and wear on the polishing components.

Philipossian is studying the composition of the surfaces, the chemical and mechanical interactions of the surfaces and the slurry, surface temperatures and pressures, and how to combine these factors to make the process as efficient as possible. The goal is to reduce wear, machinery downtime and the use of expensive and difficult-to-produce polishing materials that are sometimes difficult to dispose of.

“To extend the life of parts and to minimize shutdowns, we’re trying to understand the factors that cause

wear,” Philipossian said. “We can then understand what materials to use and not to use, what pressures to avoid, and what sliding velocities and slurry-flow rates to promote to make sure that parts are worn at a low rate, while not compromising wafer quality.”

It’s also vital to determine the instant when the wafer surface is flat. “In most cases, over-polishing gains you nothing, but you lose a lot of consumables you could have saved,” Philipossian said. “Sometimes too much over-polishing actually is counterproductive because softer materials may be gouged out, leading to a non-planar surface.”

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More info: [CMP](#)

## Scorpion

*Continued from Page 1*

through the city.”

The challenge is to build an unmanned, robotic vehicle that can drive itself safely in an urban environment. Researchers are not allowed to send signals to the vehicle or to in any way influence its progress once it’s on the road.

The driverless vehicle will have to merge into moving traffic, navigate traffic circles, negotiate busy intersections, and avoid a variety of obstacles, including other moving vehicles in a

mock urban setting. The “city” will be designed to include the types of city streets on which military supply missions are conducted.

Just 24 hours before the Urban Challenge race, teams will receive a description of the city’s street network. Then five minutes before the race, the teams will be given a set of waypoints that the vehicle must visit. Teams will have six hours to drive 60 miles.

“They may block roads, and they’re going to have all kinds of obstacles set up,” Head noted.

The top three teams that complete the 60-mile course in less than six

hours will receive trophies. Top prize will go to the team that drives the course in the fastest time.

Congress and the Department of Defense are sponsoring the competition to stimulate research on autonomous vehicles that can be sent into situations that present a high risk to soldiers or security personnel. These vehicles could be used in military and homeland security applications, as well as in a variety of industrial and commercial environments, such as high-risk construction and demolition.

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More info: [Scorpion](#)



# Philanthropy

## ASCE scholarship

The Arizona Society of Civil Engineers (AZSCE) has established an undergraduate scholarship to commemorate the 100th anniversary of UA's Civil Engineering Department.

The scholarship will be awarded to undergraduate students in the Civil Engineering and Engineering Mechanics (CEEM) Department who are actively participating in the UA student chapter of the American Society of Civil Engineers (SCE).

The number and amount of the scholarships will vary. But the intention is to award a total of \$2,500 in scholarship support each academic year.

Recipients will be selected by AZSCE, the CEEM department head and at least one practitioner advisor to SCE.



Beth Weaver

Juan Valdés (left), department head in UA Civil Engineering and Engineering Mechanics officially accepted the Arizona Society of Civil Engineers Scholarship from AZSCE members at a scholarship luncheon. Those representing AZSCE are (from left) Richard L. Martinez, P.E., of Arcadis-US, Inc. and president of AZSCE; Daniel K. Yu, E.I.T., of RS Engineering, and secretary of AZSCE; and Sheila M. Bowen, P.E., of Castro Engineering Corp., and vice president of AZSCE.



Ed Stiles

Tom Owen (left) and Lindy Coté with Prof. Robin Stickland (right), who accepted the Lindy Scholarship for UA's Electrical and Computer Engineering Department at a luncheon to commemorate the scholarship.

## The Lindy Scholarship

UA alums Lindy Coté and Tom Owen have established the Lindy Scholarship in UA's Electrical and Computer Engineering Department.

Coté earned a bachelor's degree in EE in 2001 and Owen received a BA in economics in '74, a bachelor's in EE in '78, and an MBA in '82.

Scholarship recipients must be full-time students in their junior or senior year pursuing a degree in electrical engineering. Recipients must have and maintain a 3.0 GPA. The \$2,000 scholarship is renewable for a maximum of two years. Preference will be given to U.S. citizens and to those with financial need.

## Maricopa Alumni Breakfast

The UA Alumni Assoc., the Maricopa County Engineering Council and the College of Engineering hosted the Maricopa Annual Fall Breakfast in October at the University Club in Phoenix.

UA Athletic Director Jim Livengood was the featured speaker. Livengood became UA's 8th director of athletics in 1994.

The breakfasts are designed to keep Maricopa County alums in close contact with the college and updated on the latest activities both within engineering and at UA.

The council sponsors an endowed scholarship that goes to an outstanding engineering student each year.

The Maricopa Council hosts a breakfast for alumni twice each year, including the 22nd Annual St. Patrick's Day Breakfast, which took place on March 15 at the University Club of Phoenix.



Beth Weaver

Among those attending the Maricopa County Engineering Council breakfast were (from left) Mark Strickling, regional director of the UA Alumni Association's Phoenix office; UA Athletic Director Jim Livengood; and Joe Gervasio, CE '57, of Gervasio and Associates, Inc.

# In Memoriam



Arizona Engineer Archives

**Donald G. Dudley**, professor emeritus of Electrical and Computer Engineering (ECE), died on Jan. 2. He was 75.

Dudley earned his bachelor's degree from Virginia Polytechnic Institute and State University, and his master's and Ph.D. degrees from UCLA.

He began his research and teaching career at UA in 1968 and retired in 1994.

His research focused on the mathematical foundations of electromagnetics, integral equations and inverse theory.

After retirement, he continued to consult and conduct research in electromagnetics.

Dudley wrote more than 70 papers and 200 abstracts and wrote *Mathematical Foundations for Electromagnetic Theory*. He also was editor for the IEEE (the Institute of Electrical and Electronics Engineers) Press Series on Electromagnetic

Wave Theory, which includes 21 books.

He was a founding member of UA's applied math program and founder of ECE's Electromagnetics Laboratory, which he directed for eight years.

He was twice named the Outstanding Professor of the Year by students in the UA College of Engineering.

Dudley served as a member of the administrative committee of the IEEE Antennas and Propagation Society (APS), as an associate editor of the IEEE *Transactions on Antennas and Propagation*, and as a member of the IEEE/APS Education Committee.

In 1997, Dudley received the Schelkunoff Prize for best paper of the year in the IEEE *Transactions on Antennas and Propagation* journal.

In 2000, he received the IEEE Third Millennium Medal. The IEEE Millennium Medals recognized 3,000 business leaders and scientists whose work significantly influences the electronics industry in the new millennium.

In 2002, he received the Chen-To Tai Distinguished Educator Award. The award is given by the IEEE.

In addition to his academic work, Dudley worked as professional musician, playing keyboards in jazz bands since his days as a student at UCLA. He also was one of the founders of Tucson's Big Band Express.



Ed Stiles

**Donald H. White**, professor emeritus of Chemical and Environmental Engineering (ChEE), died Sept. 21, 2006. He was 88.

He earned his bachelor's degree from Ohio State University and his master's and Ph.D. degrees from Iowa State University, graduating with his Ph.D. in 1949.

Before that, he had worked on atomic energy related research during World War II. Following the war, he was a researcher for Phillips Petroleum.

In 1958, he came to UA, where President Harvill asked him to establish a chemical engineering department. In 1959, he was named head of that department.

He retired from UA in 1984, but continued his research activities until recently.

White was a Fellow of the

American Institute of Chemical Engineers and a Fellow of the Society of Plastics Engineers.

He conducted pioneering research on methods for creating clean liquid fuels by liquefaction of biomass wastes.

This research led to a patent for an efficient conversion technology and his company, Waste Technology Transfer, was established to commercialize the process.

White also was interested in creating polymer composites from recycled plastics.

During a memorial service for White, former ChEE department head Jost Wendt said he always marveled at how White was able to start a department from the ground up. "It was remarkable that he was able to do that," Wendt said. "Don always thought big. He never let little details like lack of money or things like that get in his way."

Wendt also noted that White never promoted himself but he always was boosting the other faculty in his department.

White's daughter, Theresa White, agreed. "My Dad lived and breathed his academics and he loved every one of his colleagues and his students," she said.

"He wanted to see everyone reach their fullest potential. Whatever he could do to help them reach that goal, he was there for them."

# Alumni Echoes

## '70s

**Rich Rovang**, MS ChE '78, recently retired after 27 years with Rockwell and Boeing.

He says the "Energy Option" he took at UA served him well during his career, which included working on a wide variety of terrestrial and space-related energy programs.

During his career he worked on the Space Nuclear Power

Program for SDI platforms, nuclear propulsion for Mars exploration, the electrical system in the International Space Station, and several other projects.

Rovang has moved from California and now lives in Aberdeen, South Dakota.

## '80s

**Gene Maslana**, ME '80, is

now with PerkinElmer Life and Analytical Sciences, which is located in Downers Grove, Ill. He is working as a senior mechanical engineer.

He works in the Liquid Handling Research and Development Group developing automated liquid handling instruments.

These instruments are used in biotech and pharmaceutical labs for such applications

as research drug compound analysis and activity screening.

## '90s

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

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

## Alum's chemical process turns soybeans into jet fuel

A UA engineering alum and a colleague at the University of North Dakota have submitted a provisional patent for a process to generate biojet fuel made from crops, such as soybeans, or from animal fats and wastes.

The process was developed by Wayne Seames (ChE '79 and Ph.D. ChE '00), and Ted Aulich, Research Manager at UND's Energy & Environmental Research Center. Seames is a UND associate professor of chemical engineering.

His research team tested several mixtures of jet and biodiesel fuels in a helicopter turbine engine.

Seames and Aulich believe they have a fuel that meets most of the FAA and military specifications for aviation turbine fuels.

"Another goal of mine was to try to generate a fuel that would not require a change to the fuel transportation and storage infrastructure — pipelines, storage tanks, distribution pumps, etc.," Seames said.



University of North Dakota

Wayne Seames (center), ChE '79 and Ph.D. '00, examines biofuel samples in a laboratory ventilation hood at the University of North Dakota, where he is an associate professor of chemical engineering. Autumn Dockter (left) and Swapnilkumar Gandhi are both working toward master's degrees in chemical engineering.

The problem now is scaling up to commercial production. "Given our current resources, we can't even make enough of it fast enough for all the turbine testing we need to perform," Seames said.

Cost is another limiting factor. The new biojet fuel

technology is competitive with current biodiesel production, but both currently are more expensive than traditional gasoline and jet fuel.

But there are ways to bring those costs down, Seames said. Current technology, for instance, is designed to pro-

duce food-grade cooking oil. Since jet fuel doesn't have to be edible, Seames said the extraction costs can be cut.

Seames and his team also are investigating chemical byproducts of their process, such as replacements for polymers, specifically acrylics.

## Ray Haynes wins AISES award

Ray Haynes, AE '67 and MBA '70, received the 2006 Professional of the Year Award from the American Indian Science and Engineering Society (AISES).

Haynes, who belongs to the Cherokee Nation, is corporate director for technical alliances in the office of the chief engineer at Northrop Grumman Space Technology.

He was born in Hemet, Calif. and grew up in Nogales, Ariz.

He also earned a Ph.D. in operations research from ASU in 1987 and then spent 17 years in academia and 25 years working in the aerospace industry.

He is a professor emeritus at California Polytechnic State

University.

Haynes is a member of the AISES Corporate Advisory Council. AISES works to substantially increase the representation of American Indian and Alaskan Natives in engineering, science and other related disciplines.

Haynes said, "I am very honored and humbled (to win this award) and hope that my story might inspire others to pursue science, technology, engineering and math (STEM) education and careers, and have an opportunity to give back."

To learn more about Haynes and the award, visit the "Winds of Change" magazine' web site at: <http://www.wocmag.org/2006/fall/feature1.html>



Courtesy of Ray Haynes

Ray Haynes received the AISES Professional of the Year Award in November at the AISES National Conference in Detroit, Mich.

## Send us e-mail!

Where has life taken you since graduation? We'd like to know and so would your former classmates.

Please send us an e-mail including the following:

- 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](mailto:stiles@u.arizona.edu).

# Alumni Echoes

## Hunting meteorites in Antarctica

“This rock looked different than just a rock, it had a special character that said it was not of Earth,” Don Pettit, Ph.D. ChE '87, wrote in one of his *Chronicles on Ice*.

“Glazed with black patina, there were crazed marks as if it had been fired in a kiln at the wrong temperature. It had an odd shape; one sculpted by a fiery entry into Earth's atmosphere and naturally shaped into something similar to what rocket engineers design for the heat shields on spacecraft.

“Yes, this bit of rock was definitely not of Earth.”

Pettit wrote his chronicles during a six-week-long trip to Antarctica in December and January, where he learned that minus 20 degrees Fahrenheit could feel warm compared to other bone-chilling times out on the ice.

Pettit was part of a team of scientists who were searching for meteorites in Antarctica.

In 2003, Pettit spent five months living in the tight confines of the International Space Station (ISS), and the trip to Antarctica was not unlike living in space.

Pettit was working in an iso-

lated and extreme environment where the meteorite hunters shared 2-person tents for several weeks during the South Polar “summer” — just the kind of place that would appeal to Pettit's sense of adventure.

### *The Token Astronaut*

“I was fortunate enough to be asked to tag along as the token astronaut,” Pettit joked in a story on a NASA web page. “Why me? It was mainly dumb luck. One of the ANSMET (Antarctic Search for Meteorites) scientists dropped out at the last minute for medical reasons. Because the principal investigator had dealt with astronauts before, he knew they would not have trouble passing the medical exam and could be called up on short notice. When my boss asked me if I wanted to go, I thought about it for perhaps a nanosecond and said, ‘Yes!’”

ANSMET, which is funded by NSF and led by principal investigators from Case Western University, has been making annual trips to Antarctica since the mid-1970s, and researchers from UA have been on several of the expeditions.



Don Pettit

*This view of meteorite hunters' camp in Antarctica shows the group's four-sided Scott tents. These tents are similar to those used on the 1910-1913 Robert Scott Expedition. You can read more about what it's like to live inside these tents in one of Don Pettit's Chronicles on Ice at [http://www.nasa.gov/astronauts/pettit\\_chron\\_14.html](http://www.nasa.gov/astronauts/pettit_chron_14.html)*

During that time, ANSMET has found more than 10,000 meteorites, including the famous Allan Hills meteorite from Mars.

### *Science Experiments*

Those who followed Pettit's ride aboard the ISS — and those who worked with him when he was a grad student at UA — know he has an insatiable curiosity and views even the most mundane activities as opportunities for scientific experiment.

He wrote a *Saturday Morning Science* column while aboard the ISS about such off-hours experiments as assembling giant blobs of

floating water that he spun, inflated with air and vibrated in microgravity ways. Physicists are still puzzling over some of his findings.

He continued the series in Antarctica by writing the *Chronicles on Ice*. (For a link to the chronicles, go to UA's Engineering news page and use the More Info keyword below.)

Although meteorites don't fall on Antarctica any more often than on other parts of the globe, it's the perfect place to look for them because rocks stand out on the vast, ice-blue landscape.

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**More info: Pettit**

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