

# arizonaengineer

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**azengineering**

## Record-Breaking Baja Racing



Courtesy of UA Baja Racing

**Team Building**—The UA Baja Racing team at the 2012 Baja SAE Collegiate Design Series in Burlington, Wis. Left to right are Sean Hays, Robbie McCarthy, Cody Wood-Hromidko, Nick Woodgate, Keegan Maddern, Will Titus, Shanna Tune and Matt Ware.

UA Baja Racing placed a record 12th in a field of 117 teams at the 2012 international collegiate off-road racing competition, only a year after the student engineering club achieved an all-time best position of 21st out of 100.

The UA Baja team raced up the rankings with a 12th-place showing in the 2012 competition.

**Ae FULL STORY** In 2011 the UA Baja team  
Number 484 achieved a personal best in  
the same competition series by placing 21st.  
UA Baja Racing's overall score this year was  
771 points out of a possible 1000, a significant  
improvement of 103 over last year's 668.

Student teams from the U.S., Argentina, Brazil, Canada, India, Mexico and Venezuela hit the dirt in June to compete in the Baja SAE Collegiate Design Series, hosted by the University of Wisconsin College of Engineering.

The event was organized by the Society of Automotive Engineers and held in Burlington, Wis., at the proving grounds of transportation engineering firm MGA.

Sean Hays, team president and civil engineering senior, was clear about how the team achieved this giant leap up the rankings. "Testing, testing, testing," he said. "We did more testing, more tuning, and more validation to see where we could take out every last gram of excess weight and squeeze every last tenth of a horsepower from the engine."

CONTINUED ON PAGE 6

# Breaking Records, Breaking Ground

By the time they are seniors, students from our biggest, brightest and most diverse freshman class will be working and learning in the recently opened Engineering Innovation Building.



Homecoming may be over, but we are still celebrating a record-breaking semester for the College of Engineering, in which we welcomed our academically strongest, most diverse, and largest

manufacturing, materials processing, biomedical systems and devices, critical minerals processing, computational modeling and simulation, and physical infrastructure. We received \$50 million in bonding authority from the University and the remainder of the expenses will be raised from donations. Our target is to break ground in

January 2014 and move in by September 2015. This is our first new building since the late 1990s, and we envision it as a critical interdisciplinary meeting point for research, technology transfer, and student design experiences.

Because we want people to know that we excel at education as well as research, we will end this stellar semester by publishing a report that highlights the importance of our teaching mission. We value our accomplished engineering educators, our strong staff members who support students, and our innovative education-related programs. We



Courtesy of SmithGroupJJR

**Coming Soon**—This artist's conception is just one possible design of many under review for the new Engineering Innovation Building.

provide an exceptional engineering education that enables students to become lifelong learners and successful professionals. As engineering education evolves, be assured that we will be in the vanguard, always looking for ways to improve the outstanding performance of our students.

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freshman class ever. We now have almost 2,500 undergraduates and 600 graduate students in the College. We also won a \$5 million Department of Energy award, under the SunShot project, to design heat-transfer materials for concentrated solar power systems. And we have received new faculty investment dollars from the University because both our research and educational programs are growing.

We have made substantial progress in programming our new Engineering Innovation Building. Faculty and students meet regularly with the architects, SmithGroupJJR and Diebold, to plan how we will make the best use of more than 65,000 net square feet of new lab, office and work space. The current design includes 11,000 square feet for a student innovation center to house our student clubs and senior design teams, and we are planning lab areas for advanced

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Many stories in this print edition have been edited for length, and it is not feasible to include related multimedia material such as video and audio files, and hyperlinks to related websites.


 To get the full story, look for the story number by the **Ae** icon embedded in the article, then go to the online edition and enter the story number in the search box.



Photo courtesy of Crew 117

**The Life Astronaut, Part 1**—Sam Martin, a UA senior majoring in optical sciences and engineering, surveys the red planetary landscape surrounding the Mars Desert Research Station in Utah.

## Seniors Test Design for NASA Camera on Mock Mission to Mars

A team of UA Engineering seniors went on a two-week simulated mission to Mars to test a camera they are designing for NASA. The students' senior project, part of the UA College of Engineering senior capstone program, is to develop the NASA-sponsored remote imaging system acquisition, or RISA.

The student team, aka Crew 117, holed up in the Mars Desert Research Station, a simulated Mars habitat managed by the Mars Society near Hanksville, Utah.

During the mission, Crew 117 simulated living on Mars, including treating the outside environment as the space environment and using simulated space suits, known as "sim suits," for all extravehicular activities, or EVAs.

The crew lived in a two-story habitat, known as the "hab," from where they had access to a greenhouse, a telescope and observatory, and all-terrain vehicles for EVAs. "The surrounding area is very remote, so the complete isolation aids in creating the simulated environment," said Kyle Stephens, crew commander and optical engineering senior.

New NASA mission requirements mean that future space vehicles will have less room, which is why the agency specified that RISA should incorporate the abilities of multiple existing cameras into a single system.

This means that RISA will do double duty as a camera for rover-based planetary surface exploration, and for onboard use in NASA space vehicles. The project is sponsored by NASA's Johnson Space Center and is currently in its sixth year of development.



College of Engineering/Pete Brown

**The Life Astronaut, Part 2**—Casey Mackin, left, an electrical and computer engineering honors student, with Ed Gibson, Skylab astronaut and U.S. Astronaut Hall of Fame member.

## UA Engineering Student Receives National Astronaut Scholarship

Former Skylab astronaut and U.S. Astronaut Hall of Fame member Ed Gibson was on campus Sept. 12 to present UA College of Engineering senior Casey Mackin with a \$10,000 scholarship.

"I am sure our nation couldn't be in better hands," said Gibson, describing Mackin and 25 other 2012 Astronaut

Scholarship recipients nationwide. The Astronaut Scholarship Foundation is a national nonprofit organization that promotes the retention of college students in the science and technology fields.

Mackin went to high school in Sierra Vista, Ariz., and intends to pursue a doctorate after graduating from the UA. He credits his professors, especially Roman Lysecky and Jonathan Sprinkle, as well as his early involvement in research, with motivating him to remain in academia.

"I plan to continue doing research during and after graduate school. I would like to remain in academia and hope to become a professor," said Mackin. "I like the idea of building things and being able to create my own ideas and see whether they work."

Gibson and his fellow Skylab astronauts circled the globe 1,214 times, traveled 34.5 million miles and brought back 1,718 pounds of film, data and biomedical specimens for scientific study.

"We will never stop exploring," Gibson told attendees of the scholarship presentation, held at the UA Aerospace and Mechanical Engineering building. "It is hardwired into our psyche."



## Chemical Engineering Sophomore Awarded Goldwater Scholarship

Jennifer Ramin, a student in the UA chemical and environmental engineering department, was awarded a \$15,000 Goldwater Scholarship in March 2012.



**Jennifer Ramin**

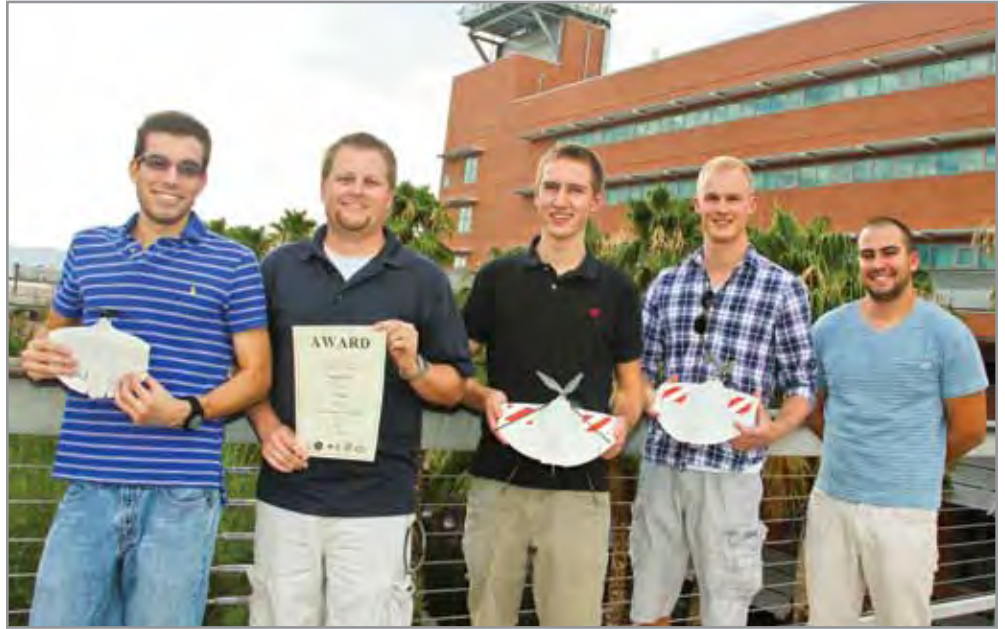
Ramin is a returning student who left a successful 15-year career as a nurse to take up engineering. "I am thrilled to

have been chosen for the Goldwater Scholar program," Ramin said. "It makes me feel like I have chosen the right path to pursue chemical and environmental engineering. I left a career as a nurse practitioner to follow my heart."

Ramin wants to complete a PhD in chemical engineering, focusing on sustainable energy, particularly on alternatives to fossil fuels. "I would love to work in a research lab like the National Renewable Energy Lab in Colorado," she said.

Ramin got her bachelor's degree in mathematics at the University of Texas at Austin in 1988, and in 1995 earned her master's in nursing at Boston's Massachusetts General Hospital Institute of Health Professions. She is a member of the UA student chapters of Engineers Without Borders and the Society of Women Engineers.

The Goldwater Foundation has awarded more than 6,600 scholarships worth about \$50 million.



College of Engineering/Pete Brown

**Micro Managers**—MAV team members who won first place in the IMAV 2012 indoor autonomous flight competition are, from left, Brandon Pitts, Jeff Olmstead, Jordan Odle, Aaron Petras, and Sean Katsarelis. Not pictured is AME graduate Daigaro Cota.

## International Win for UA Micro Air Vehicle Team

A micro air vehicle flown by the team from the UA won first place in an indoor flight competition during a major international MAV conference.

The UA Micro Air Vehicle club's micro aircraft, which specialized in autonomous vertical takeoffs and horizontal flight, received the first place award during the International Micro Air Vehicle Conference and Flight Competition, or IMAV 2012, in the category of "Indoor Autonomy - Fixed Wing." The IMAV 2012 competition was in Braunschweig, Germany, in July 2012.

The flying competition was part of the conference that included 150 participants representing 15 countries. Attendees from all over the world shared ideas for improving MAV flight, a unique situation for the students to participate in, said Sergey Shkarayev, UA aerospace and mechanical engineering professor and team advisor.

Shkarayev said that this year's UA MAV group had advisors from other

engineering departments, such as UA electrical and computer engineering assistant professor Jonathan Sprinkle, who gave students direction in the autonomous flying area of micro air vehicle design. "This was a deliberate effort to help the club do its best at the competition," Shkarayev said.

Jordan Odle, UA aerospace engineering senior, credits the depth of the UA research in the MAV field as a significant factor in the group's success.

"This year the team was able to leverage this research background and incorporate those lessons learned into the current micro air vehicle, while still looking forward and integrating some of the most technologically advanced production methods available," Odle said. "The result was a reliable airframe, with excellent flying characteristics for a vehicle with its diverse flight profile. This is something few university level teams can achieve, and gave us a clear advantage at the IMAV 2012 competition," he said.

## UA Team Awarded \$3.6M to Design Metaphorical Cybersecurity Map

University of Arizona engineering and computer science researchers have won a \$3.6 million cybersecurity research contract from the Office of Naval Research to develop dynamic maps that visualize suspicious activity on computer networks.

The project is rooted in the fact that monitoring a network for suspicious activity is a daunting task: the amount of data that has to be monitored is enormous, and it is a cacophony of malicious and normal traffic originating from disparate sources.

The research team consists of associate professors Christian Collberg and Stephen Kobourov from the computer science department, and assistant professor Loukas Lazos

and associate professor Srinivasan Ramasubramanian from the electrical and computer engineering department.

The visualization techniques developed for this project are based on converting large-scale relational data into what looks like a geographic map, but is in fact a metaphorical map. "As



people are familiar with the concept of geographical maps in day-to-day life, it is easier to use maps as a means to convey complex data in a meaningful form," Kobourov said.

The UA's contribution to the project will be research and development of a natural, easy to learn, comprehensive, and real-time visualization system. The system will employ a familiar

metaphor – the geographic map – to visualize network activity that could indicate security threats.

For instance, such a map could represent the global Internet topology, organized at different levels of granularity. The Internet is made up of approximately 35,000 autonomous systems, connected to and passing traffic between one another based on contractual agreements.

"Visualizing this complex system requires the development of efficient data gathering, filtering, storing, updating and eventually displaying mechanisms that would suppress normal network activities while highlighting suspicious traffic in real time," Ramasubramanian said.

## UA Engineering Leads \$5.5M Project to Create Low-Cost Solar Energy

The University of Arizona College of Engineering will lead a \$5.5 million, 5-year research project, funded by the U.S. Department of Energy, to develop more affordable and efficient concentrated solar power systems.

Concentrated solar power, or CSP, is generated by mirrors that focus sunlight on a receiver containing a heat transfer fluid that absorbs the energy, which is then used to produce steam to spin electric turbines.

About 80 percent of the funding will go to the multidisciplinary UA Engineering research team, which will conduct the research in partnership with Arizona State University Poly and Georgia Tech.



The research team will be led by energy expert Peiwen "Perry" Li, an associate professor in the UA department of aerospace and mechanical engineering.

The project will also involve several researchers from various engineering disciplines within the UA College of Engineering's School of Sustainable Engineered Systems, which is directed by professor Pierre Deymier.

The research program will investigate the composition, properties and costs of new molten-salt-based CSP heat transfer fluids, which must absorb, transport and store solar energy, and generate electrical power efficiently and cost-effectively.

The salts used in current CSP plants are nitrates, which can operate at a maximum of about 1,000 degrees Fahrenheit before they become unstable, Li said. "This is not efficient enough,



Peiwen "Perry" Li

and this research has a requirement to find a salt that reaches about 1,500 degrees," he said. "But if we can stretch to 2,400 degrees, that will be super."

Li said the team will look at existing salts with very high boiling points. "Then we take this basic candidate and see if we can fine-tune its properties by changing the composition or adding other compounds to push the boiling point higher."

The project is cost-driven, Deymier said. "The current objective for this project is a molten salt that costs less than a dollar per kilo," he said. "When you think about the thousands of tons to be used, we're talking about millions of dollars just for loading power plants."

# Bomb-Eating Bugs

Researchers are studying bacterial eating habits as part of a \$1 million study to determine the environmental fate of newly developed munitions.

UA researchers are studying the environmental effects of insensitive munitions compounds, or IMCs, which are new, more stable explosives that won't detonate in response to heat or shock.

Not much is known about the environmental impact of IMCs, which the Department of Defense hopes will reduce injuries and fatalities among troops who handle explosives.

"The idea is that if you're driving in a caravan and get hit, the munitions in your truck won't detonate," said James A. Field, head of the UA College of

Engineering's department of chemical and environmental engineering. IMCs are mixed with conventional explosives to make them more stable.

Field and three other UA researchers are studying the interaction of these nitrate mixtures with the environment under a 3-year, \$1.04 million grant from the Strategic Environmental Research and Development Program, a Department of Defense partnership with the Environmental Protection Agency and the Department of Energy.

"The Army is taking a very proactive role here," Field said. "They're trying to discover the environmental consequences before deploying these new compounds. No one really knows what their effect will be on the environment. So we're looking at their fate and toxicity, how they interact



**Jim Field**

with the soil, their degradation pathways, and whether they may pose a threat to surface water or groundwater."

The intermediate compounds

formed when IMCs degrade may be toxic or nontoxic, Field added. They might be cytotoxic, meaning they have an immediate, but reversible, effect on cells. Or they may be mutagenic – cancer causing.

"One thing for sure is that a lot of these compounds get reduced to aromatic amines, making them very reactive," he said. The carcinogenic compounds that form on barbecued meat are examples of aromatic amines.

# Record-Breaking Baja Racing

CONTINUED FROM PAGE 1

The result is all the more impressive given the setbacks experienced by the team since last year's personal best performance. "We had a rough year," Hays said. "Two months ago we didn't even know if we would make it to the competition. We lost so many experienced team members after graduation, and had to fight through the growing pains all over again."

But this year's rookie team members were equal to the challenge. "The whole team put in countless hours to get up to speed," Hays said. "We all spent a lot of time in the shop and lots of time behind the wheel improving our driving skills, looking for ways to shave competition times by half a second here or there."

After graduation in May, team members virtually lived in the shop in the Aerospace and Mechanical Engineering building. Most team members had jobs



or internships, but worked tirelessly until the time came to put the race car on the trailer ready for the trip to Wisconsin.

"Between final exams and race day, we were in the shop every day, often till 2 a.m.," Hays said. "There were quite a few sleepless nights."

Former Baja club president Josh Spivey graduated in mechanical engineering in May 2011, when he handed over club presidential reins to Hays. Since then he's been advising and supporting the rookie team any way he can.

"The team lost seven highly experienced seniors who graduated last year," Spivey said. "They had to make up for the loss of knowledge and experience this year while still taking steps forward and not backwards like a lot of teams do in this situation."

The fact that a relatively inexperienced team still placed 12th at a major international competition means that Spivey, and indeed the entire Baja team, have high hopes that 2013 will be the year the UA team really makes its mark in the world of collegiate Baja racing.

"I'm really looking forward to next year," Spivey said. "I know that placing 12th has given the team the confidence to work really hard next year and hopefully place in the top 10."

Hays concurs: "We are right on the threshold of becoming one of the elite legacy teams. We know it and our competitors know it," he said. "We have built a history of moving up and next year we'll be in the top 10."



College of Engineering/Pete Brown

**Pipe Dream**—Mo Ehsani, QuakeWrap president and professor emeritus of civil engineering, demonstrates carbon laminate honeycomb pipe sections built at his facility in Tucson, Ariz.

## QuakeWrap Founder Invents Infinite Pipe

Mo Ehsani, Professor Emeritus of Civil Engineering at the University of Arizona, has designed a new, lightweight underground pipe he says could transform the pipeline construction industry.

Instead of conventional concrete or steel, Ehsani's new pipe consists of a central layer of lightweight plastic honeycomb, similar to that used in the aerospace industry, sandwiched between layers of resin-saturated carbon fiber fabric.

In combination, these materials are as strong, or stronger, than conventional steel and concrete pipes, which are time-consuming and expensive to manufacture and transport.

"There are really two aspects to this invention," Ehsani said. "One is this new type of lightweight honeycomb pipe. Second is our ability to give clients an endless or infinite pipe, without a joint. That is a big, big breakthrough in the pipeline industry that has implications for natural gas, oil, water, and sewer pipes."

The secret of producing virtually endless pipe sections lies in the manufacturing methodology. Ehsani wraps the various layers of carbon fabric and honeycomb around a mandrel that matches the pipe's internal cross-section.

After testing this manufacturing method, Ehsani had a "eureka" moment when he realized that the finished pipe could be partially slid off the mandrel, and more pipe could be added to the section of pipe remaining on the mandrel. "I thought, why don't we just slip this off of the mandrel and continue making this pipe?" Ehsani said. "Never stop."



## Engineering Grad Promotes Life-Saving Copper Alloys

When Adam Estelle graduated from the University of Arizona's materials science and engineering program in 2008, he had no idea he would be working with technology that has the potential to save thousands of lives.

The technology is based on copper alloys that kill bacteria, fungi and viruses. The metals can be fashioned into everything from IV poles to sinks to bed rails – just about anything that is frequently touched in hospitals.

While disease-causing organisms can lurk on stainless steel surfaces for two weeks, according to a recent UA research study, 99.9 percent die within two hours on surfaces that contain at least 60 percent copper.

Estelle has been working at the Copper Development Association, a not-for-profit trade group, to develop a market for copper alloys in the health care industry. He and his team have also been helping manufacturers gear up for producing copper products.



Adam Estelle

Estelle's major focus for the past two years, however, has been to retrofit the Ronald McDonald House in Charleston, S.C., with copper alloy stair railings, door hardware, sinks, faucets, counter tops, and other surfaces.

This has been a win-win for everyone, Estelle explained, creating a safer environment for families and children, while at the same time helping the first wave of manufacturers tool up and commercialize lines of copper products that can now be marketed to hospitals.

Working for a small company that is on the leading edge of developing a new market has been rewarding and challenging, Estelle said. "I get involved in everything from supply chain development and marketing to clinical trials, regulatory approvals, congressional advocacy, and more," Estelle said. "This is really a multidisciplinary job, and a lot of it is business-oriented. There's a lot of on-the-job networking, and interfacing with different professionals."

"But the most rewarding thing for me is the ability to work on a project that centers on technology that will save lives," he said. "I'm a pretty lucky guy."



# Engineers Breakfast

More than 500 alumni, faculty, students and friends of the College of Engineering packed into the student union ballroom Nov. 9 for the 49th annual Engineers Breakfast.

Engineering Student Council President Elizabeth Forhan opened the proceedings and introduced keynote speaker Rick Norling, retired president and CEO of Premier and a senior fellow at the Institute for Healthcare Improvement. Norling's talk focused on the woeful state of the U.S. healthcare system, or lack of system, which he said was encapsulated in a quote by "Missouri philosopher" Yogi Berra: "If you don't know where you're going, you're likely to get there." Engineers, Norling said, have crucial roles to play in healthcare, in areas such as informatics, process improvement, automation, and translational research.



University of Arizona President Ann Weaver Hart introduced the UA Engineering alumni being honored this Homecoming. "We recognize the tremendous legacy that our alumni pass on to us," she said, acknowledging that the faculty, staff and students of the College "understand what it means to preserve and advance that legacy."

## Hard Labor

The 2012 Alumnus of the Year award went to Dave Crawford. Before he earned his bachelor's degree in civil engineering from the UA in 1972, Crawford worked as a concrete laborer with The Sundt Companies Inc., headquartered in Tucson, Ariz. Since



College of Engineering/Pete Brown

**Breakfast of Champions**—From left: Engineering Dean Jeff Goldberg, UA President Ann Weaver Hart, and Alumnus of the Year Dave Crawford.

then, his degree and professional talents have launched a stellar career. Today, he is president and CEO of Sundt Construction Inc., one of the largest and most respected general contractors in the nation.

Throughout his career, Crawford has represented his Wildcat roots well. He is a registered professional civil engineer in three states – Arizona, Colorado and Texas – and is considered one of the nation's leading experts on alternative project delivery methods in construction. He is actively involved in

# Thank You!

This section lists the companies, organizations and individuals who have contributed to the College of Engineering between July 1, 2011 to June 30, 2012.

Their support is vital in providing scholarships, funding programs and supporting research. Without this help, some students would not be able to complete their education.

Many other students would not have access to resources that give UA Engineering a margin of excellence for educating tomorrow's engineering leaders.

We want to take this opportunity to say "thank you" from the students and faculty who have benefited so much from this generous support.

We have made every effort to list all those who contributed to the college and sincerely apologize if we have missed anyone. If you donated to UA Engineering during 2011–2012 and are not on this list, please let us know, and we will list your name in the next issue of *Arizona Engineer*.

# 2011–2012 Donor Honor Roll

*Maiden names are in parentheses.*

<b>\$100,000 and above</b>	Estate of Donald Ross Davis	Rosemont Copper
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this effort in several states and on the federal level.

Crawford has advocated for and supported his alma mater by hiring fellow Wildcats, and by playing a key role in Sundt's philanthropic investments in the UA, including support for the colleges of Engineering, Architecture and Landscape Architecture, Fine Arts, Medicine, and Science, and for Arizona Athletics.

Crawford's passion for his field is evident, because he also gives of his time to a number of professional organizations and boards. He is a member of the Arizona Builders' Alliance, the American Concrete Institute, and the Alliance for Construction Excellence, and is on the board of directors for the Design Build Institute of America. He finds time to sit on the boards of several community organizations, including the Crisis Nursery and the YMCA of Phoenix.

## Dynamic Duo

Bear Down Award winners Cindy and Dan Klingberg are known for their tireless support of the UA's College of Engineering and are model alumni. Not only have they achieved success in their own careers, but they also find ways to connect with the University that gave them the foundation for that success by giving back through their time, talents, and treasure.

Jeff Goldberg, dean of the College of Engineering, said the couple shows their support in numerous ways, including "by establishing an endowment in the College, organizing their colleagues from Raytheon to attend various College events, and devoting time to serve on alumni boards."

Cindy is particularly active in Raytheon's campus recruitment efforts, and serves as a judge at Engineering Design Day. Both are active with the da Vinci Circle, the annual giving society of



College of Engineering/Pete Brown

**What System?**—Engineers Breakfast keynote speaker Rick Norling stressed the role of engineers in fixing health care.

the College of Engineering whose funds support faculty and students.

Michael Arnold, chair of the da Vinci Circle board, has called the Klingbergs' support "unwavering," adding they not only contribute financially, but also by serving as board members and on the selection committee for da Vinci Scholars. Dan even took the extra time to develop a quantitative scoring system for the committee to remain entirely objective during the selection process.

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## Cindy and Dan Klingberg

*This year's Bear Down Award winners are Raytheon employees Cindy and Dan Klingberg. Cindy graduated in 1988 with a BS in industrial engineering; Dan in 1993 with a BS in electrical engineering. She's a Javelin program manager and he's a senior supply chain manager. We asked them about their days at UA Engineering.*

### How has your UA education benefited you?

**CINDY:** My UA education enabled me to secure a great starting job with Rockwell International, eventually leading me to work for a reputable major defense company. The engineering degree from UA has allowed me to not only satisfy the required curriculum, but prepared me by working in multidisciplinary teams through senior projects and

internships.

**DAN:** My education has benefited me by providing an excellent foundation to build my career upon. More than an education, the UA provided me with the competency to apply my problem-solving skills across many disciplines and technologies.

### What are your favorite memories from your time at UA?

**CINDY:** My continued friendship with former classmates and roommates, UA "mall studies," competing in intramural sports (volleyball and tennis), spending a lot of time at the Science Library, and breakfast at Louie's Lower Level in the Student Union. It was also when I first met my husband.

**DAN:** My favorite memories are of my professors and their passion to help



College of Engineering/Pete Brown

**Dynamic Duo**—Cindy and Dan Klingberg at the 2012 Engineers Breakfast.

students learn. I distinctly remember the time that Dr. Marcellin sparked the realization that I could adapt concepts learned in other classes to the problem at hand. That instant fundamentally changed my thinking process.

## 2011–2012 Alumni Donors by Class

*Maiden names are in parentheses.*

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## What are your reasons for supporting UA financially?

**CINDY:** The primary reason that I support the UA is to give back to the institution that provided me a quality education. My husband and I provide for student scholarships to make a difference in a student's life by opening up opportunities to experience college in different ways: for example, joining clubs such as Engineers Without Borders.

**DAN:** I am so grateful for what the UA has enabled in my life. It provided me the foundation to succeed in my career and the engineering family-like culture brought me and my future wife together, which in turn brought us two wonderful children. I want to enable others to have the same opportunity to succeed that I had.

## What are your hopes for the future of UA?

**CINDY:** One hope is to make it possible for any student desiring an advanced education to go to the UA through scholarships and endowments. Another hope and expectation is that the UA continues to support high student retention and graduation rates and help students become gainfully employed.

**DAN:** I hope that the UA continues on its growth path and becomes a top 10 public institution and a leader in innovation (and that we become regulars at the Rose Bowl, Final Four, and College World Series).

## What else would you like our readers to know?

**CINDY:** I gain more from my involvement with the UA than I give. I enjoy talking to students and sharing my experiences

with them – both negative and positive – and how they have changed me as person. It has been a rewarding experience and I believe that this has led me to prepare my own children for college and beyond. I hope your readers take the time to mentor students at any grade level to keep them interested in higher education.

**DAN:** As we grow older I believe that we have an obligation to help future generations to succeed. By investing in their future, even if it's just donating time, we can ensure the success of our future.

*The Bear Down Award, which was established in 1986, is given to those who have performed noteworthy or meritorious service on behalf of the University of Arizona.*

Ziaullah Yazdani  
Benny Young

### 1975

David Acklam  
Chappy Brown  
James Carlson  
George Coppus  
Charles Cunningham  
Kenneth Dobbs  
Jerome Glass  
Katherine Liesmaki  
Theodore Moulin  
Richard Stevens

### 1976

James Angel  
Fritz Brinck  
Nicolas Cocavessis  
Robert Cummings  
Steven Davis  
David Gossett  
Nicholas Mak  
Edwin Morcomb  
David Murphy  
Robert Nabors  
James Nelson  
David Soukup  
Robin West  
Stephen Williams  
Sherman Wu

### 1977

Lloyd Benes  
Fred DePorter  
Jorge Gamboa-Ortuno  
Jeffrey Glover  
Carole Harbour  
Paul Hom  
Michael Mackowski  
Maura Mackowski (Phillips)  
Sam Matthews  
Daniel McBride  
Mark Mollison  
John Moore  
William Moya Espinal

Jeffrey Park  
George Schuler  
Laurence Scott  
Gregg St. Clair  
Jon Thomas  
Tom Zigterman

### 1978

Mark Baker  
Jon Borhauer  
Michael Bunch  
John Dangremond  
James Ditsworth  
Donald Ditter  
William Dixon  
John Geyer  
Tom Hacker  
Robert Hammerstein  
Carol Hartz (Peevy)  
Brian Hastings  
William Hirt  
James Komadina  
Donald Liu  
Connie Miller (Taylor)  
James Mullins  
Dennis Neumann  
Richard Newell  
Mary Obee (Nugent)  
Thomas Owen  
Robert Parker  
Rudolph Radau  
Robert Roscoe  
Robert Rutherford  
Mahmoud Salehi  
Anthony Verbout  
Emmett Yee

### 1979

John Bechman  
Sergio Cabrera  
Leonel Campoy  
Gloria Castelluzzo  
(Coppa)  
ChenHuei Chiang  
David Clapp  
Robert Davis  
William Downey

Christian Ellefson  
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Monica Pastor (Kilcullen)  
Henry Rosoff  
Wayne Seames  
Tina Sisley  
William Staples  
William Taft  
John Wade  
Mark Woodson

### 1980

Tracy Barclay (Lancaster)  
David Burgess  
Michael Cease  
Liangruey Chang  
Kathleen Chavez  
James Collins  
Thomas Corbett  
Debra Corbett (Garland)  
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Willis Sawyer

Katherine Sementilli (Hine)  
Shane Shovestull  
Edward Warkomski  
Peter Wheel

### 1981

Karl Allmendinger  
Earl Cumming  
Joseph DiMatteo  
James Hansen  
Julia Henricks (Scovel)  
Clare Johnson  
Mohamad Kavosi  
Lori Lindahl (Barron)  
Gonzalo Romero  
Stephen Sargent  
Andrew Schaffer  
Victor Silecky  
Donald Watson  
Sarah Wolfe

### 1982

Marybeth Andree (Manchenton)  
Abdullah Arik  
Jeffrey Betsill  
Howard Beyer  
William Branch  
Scott Bulau  
Diana Bustamante  
Seth Chalmers  
Steven Chung  
John Coe  
Gregory Cord  
James Davis  
Denise Doctor  
Donald Finkle  
Theodore Gelber  
Christopher Johnson  
Lucien Klejbuk  
Fania Lee  
Richard Lesnewski  
Chris Leverenz  
Martha Marek (Daughterly)  
Marcus Partlow

Steven Ritter  
Charles Smith  
James Staehle  
Mary Thomas (Gerhardt)  
Alan Tinseth  
Nicholas Webb

### 1983

Dorothy Chavez-Dolan  
Grant Cummings  
James Davidson  
John Davis  
Allen Derman  
Mark Fleming  
Shawn Furgason  
Alan Gilchrist  
Martin Gronberg  
Jo Ann Gronberg (Murashige)  
Robert Hoover  
Laura Jacobsen  
Robert Jensen  
Eric Kalivoda  
Jeannine Leverenz (Critchley)  
John Linert  
David Martinez  
Stephen Masser  
Carolyn McClure (Sutter)  
Kevin McNeill  
Mark Moeller  
Lynette Moughton (KenKnight)  
Howard Nebeck  
Charlotte Ort (Gunrud)  
Steven Pageau  
Dorothy Palmer (Timian)  
Harry Patton  
Marla Peterson  
Steven Rothstein  
Steven Short  
Jenny Thompson (Birtch)

### 1984

Stephen Arndt  
Anne Bingham (Moses)

Joseph Cannavino  
Mark Casolara  
Steven Den-Baars  
Dwayne Elliott  
Charles Fellows  
Richard Fillman  
Christopher Gypton  
Catherine Jablonsky  
David Jacques  
John LaBorde  
Pamela Lemme  
Paula MacKenzie (Siegel)  
Wellington Meier  
John Pins  
Russell Pittman  
Scott Rudin  
Michael Runde  
Gerald Scully  
Stanley Stachowiak  
Donald Tharp  
Hieu Truong  
Amos Tsai  
Steven Warren  
Ann Wilkey  
Walter Witkowski  
Stephanie Witkowski (Sierka)  
David Zaleski

### 1985

David Arbo  
Andre Ares  
Brian Aviles  
Laura Bennett (Fulton)  
David Blackburn  
James Borgens  
Frank Burstrom  
James Davey  
Richard Dobs  
Jeffrey Douglass  
Alan Forrest  
William Geary  
Beth Gottschall  
Thomas Hayes  
Sheila Kirton  
Mark Koenig

Bruce Langone  
Paul Lomayesva  
Emily Maseeh (Pope)  
James McArthur  
H. Erik McNair  
John Michaud  
Robert Prescott  
Christine Raasch (Coffer)  
Richard Ramsey  
Betsy Reader (Guinn)  
David Rhoades  
Allen Sehoff  
John Sternitzke  
William Stevens  
Kristofer Tvedt  
Barbara Wasson  
Robert White  
Jeffrey Williamson  
Steve Wong  
Gordon Zaft  
Gregory Zeihen

### 1986

Jonathan Baker  
Brian Beddo  
Stephen Boerigter  
William Grizzell  
Robert Haines  
Ann Moynihan (Conway)  
Marc Orman  
James Paison  
Lindsey Philpott  
Mark Rhyner  
David Robinson  
Rene Rodriguez  
Frank Stuffer  
Jeffery Wallace  
James Williams  
Wayne Wisdom  
Patsy Zwick (Hooper)

### 1987

Joseph Alfieri Garcia  
Douglas Blanchard  
James Cannon

Jaime Carbajal  
John Corey  
Marc De Pauli  
Tanya Donohue  
Stephanie Gilles (Carrell)  
Andrew Harris  
William Hazlehurst  
Charles Johnson  
John Kemmer  
Leonard Le Clair  
Emeline Maddern (Germain)  
Diane Manlove (Frazier)  
Susan Meusel-Sharp  
Stefan Myslicki  
Ali Oksasoglu  
Donald Penners  
Ruth Pullen-Soklow  
Hugh Sardoff  
Analydia Shooks (Cordova)  
Eric Stout  
Antoinette Theriault-Faucette  
Shohei Yoneda

### 1988

Mark Angier  
Ricardo Benitez Auza  
Kevin Campbell  
Chitong Chuang  
Thomas Cole  
Andrew Cole  
David Cooper  
Brian Goble  
John Goedert  
Marie Hackbarth (Hecht)  
Ryan Hall  
Randall Harris  
Craig Henden  
Susan Hessler  
Cynthia Klingberg (Tang)

*continued on page 14*



**Ice Break**—Gary and Mary Beth Hagedon in front of the Mendenhall Glacier near Juneau, Alaska, during a 2006 cruise.

**Gary Hagedon**  
BS/EE 1972, MS/EE 1975

Gary Hagedon retired this year from Raytheon Missile Systems after a 37-year career that began after graduating from the University of Arizona in 1975, and spanned General Dynamics, Hughes and

Raytheon. Key positions held include chief engineer then program director on the Rolling Airframe Missile, and director of the Evolved Sea Sparrow Missile, Extended Range Guided Munition, Tomahawk, and Standard Missile-3 programs. He was nominated General Dynamics engineer of the year in 1979,

received Raytheon program leadership awards in 2005 and 2010, and in 2011 was the recipient of the Raytheon CEO Award. “I feel blessed to have worked with some of this country’s and our allies’ best and brightest in developing, producing, deploying and supporting weapon systems that contribute to our national defense,” Hagedon said. He said his retirement plans include he and his wife of 37 years, Mary Beth, doing some globetrotting from their base in Tucson, Ariz. “Our three children have all graduated from college and are employed around the U.S.,” Hagedon said. “Mary Beth and I plan to remain in Tucson, travel around the

United States and world and visit our children.”

**Edward Lee Murray**  
BS/SE 1977

Lee Murray joined the U.S. Army Corps of Engineers, Seattle District, as a database administrator in 2011. His previous employers include Avue Technologies, Weyerhaeuser, and Boeing. “As a member of an enterprise virtual team, my fellow database administrators are located across the country in 10 states,” Murray said. “But we can and do work on systems that can be located anywhere the Corps has a presence.” His virtual team supports Oracle, SQL and MySQL databases on servers located

**2011–2012 Alumni Donors by Class**  
*continued from page 13*

- |                          |                          |
|--------------------------|--------------------------|
| Peter Lawson             | David Blake              |
| Ying-Ming Liu            | Brent Blevins            |
| Keith Manlove            | George Hefner            |
| Thomas Messenger         | Eric Jackson             |
| David Paredes            | Paul John                |
| Charles Parkes           | Elizabeth Kostiuik       |
| Wayne Pollard            | Sheri Lee                |
| Derek Reaban             | Michael Mansour          |
| Michael Sandford         | Terry Meier              |
| Mark Sargent             | Charles Norman           |
| Kevin Sullivan           | Jill Petersen (Lekawa)   |
| <b>1989</b>              | <b>1991</b>              |
| Ted Buell                | Kenton Aikens            |
| Michael Campillo         | Qiping Dong              |
| David Crouthamel         | Michael Graham           |
| Sandra Currier (Houston) | David Jenkins            |
| Christopher Evans        | Ching-Shan Jung          |
| Pamela Griffin (Defrey)  | Tae Jin Kim              |
| Michael Hill             | Prabhudev Konana         |
| Michael Jenkins          | David Kriesand           |
| Larry Milner             | Abhijit Kudrimoti        |
| Dominique Mitchell       | Timothy Lane             |
| Gregory Noble            | L. Beth Lowery (Leopold) |
| Edward Olsen             | Paul Mureiko             |
| Kenneth Pili             | Susan Nativi (Couillard) |
| George Richard           | David Paullin            |
| Thomas Rohrer            | Sandra Reid              |
| Anthony Schaeffer        | Mitchell Smith           |
| Ronald Semel             | <b>1992</b>              |
| Van Tran                 | John Applegate           |
| Paul Woolard             | Eileen Ashworth          |
| <b>1990</b>              | Stephen Betzhold         |
| Bridget Barr (Dudek)     |                          |

- |                      |                             |
|----------------------|-----------------------------|
| Gregory Boner        | <b>1994</b>                 |
| John Buck            | Jeffrey Berg                |
| Winston Clendennen   | Brad Colson                 |
| David Cooley         | Craig Dunning               |
| George Grift         | Lee Farris                  |
| Wai Jan              | Stefan Gogosha              |
| Alicia Kohner        | Emily Kubovchik (Dearhamer) |
| Mark Levine          | Robin Levitt (Spector)      |
| Douglas Merrill      | Charles Micka               |
| Carla Ruhl (Breuker) | Andrew Paulo                |
| Gregory Strimbu      | Sofia Petropoulos           |
| James Tofel          | Matthew Ploor               |
| Yan Wang             | Joseph Potter               |
| Samuel Wang          | William Rasmussen           |
| <b>1993</b>          | Susan Schima                |
| Jose Arce            | Lisa Severnak (Tank)        |
| Edward Bukoski       | Mark Smiley                 |
| Duncan Clendenin     | Khaled Taiba                |
| Ryan Fisher          | Bryan Thoreson              |
| Joe Fulton           | Joseph Trinh                |
| William Harman       | William Wilkening           |
| Daryl Hild           | Xingqiang Wu                |
| Earl Hokens          | <b>1995</b>                 |
| Adam Hutchinson      | Iftekhar Ahmed              |
| Henry Knoepfle       | Walter Boughan              |
| Carl Larson          | Robert Cesena               |
| Dhananjay Mahajan    | Robert Daniels              |
| Michael Patterson    | Tara Fifer (Williams)       |
| Jeffrey Pavlik       | David Grattan               |
| Edward Pohl          | Oscar Jaime                 |
| Lloyd Pollard        | William Johnson             |
| Leonard Schultz      | John Lewis                  |
| Jim Su               | Chad McRae                  |
| Mark Sullivan        | Christopher Mone            |
| Brian Tuohy          | Colleen Moreno              |
| Timothy Zamora       | (Byrnes)                    |

- |                         |                                 |
|-------------------------|---------------------------------|
| Guy Potucek             | James Porter                    |
| Jayesh Ramsinghani      | Themis Tokkaris                 |
| Juan Salcedo            | <b>1998</b>                     |
| Teng-I Wang             | Keith Ballou                    |
| Dong Wang               | Janet Brelin-Fornari            |
| Igor Wojewoda           | Michelle Cunningham (Langmaid)  |
| Zhaoewen Yang           | Todd Ellermann                  |
| <b>1996</b>             | Stacy Gottesman                 |
| Guangshun Chen          | Travis McCarthy                 |
| Andrew Paul             | Michael Moats                   |
| Erika Hanson            | Dennis Mooney                   |
| Keith Lierman           | Josh Nies                       |
| Ingrid McNeil (Nelson)  | Carter Romero                   |
| Paul Philippou          | Daniel Sandblom                 |
| Pravin Rangachari       | Grant Schmieder                 |
| Toni Rogero (Johnson)   | Patricia Tellez                 |
| Fermin Samorano         | Jacob Zwick                     |
| Joseph Woodward         | <b>1999</b>                     |
| Heather Woodward (Muir) | Kelly Bunker                    |
| Michael Yockey          | Cesar Cheng-Guajardo            |
| Gong-san Yu             | Tasmin Eusuff                   |
| Tom Zhong               | Charles Gajda                   |
| <b>1997</b>             | Marco Gardner                   |
| Jinhan Choi             | Marc Greenberg                  |
| Dov Citron              | Yarisa Jaroch (Jaroch-Gonzalez) |
| Marianne Fernandez      | Zhijie Liu                      |
| Mary Garrity            | Patrick Marcus                  |
| Rene Gonzales           | Elizabeth Scott (Kinkadee)      |
| Frank Grochocki         | Arthur Slatin                   |
| Kevin Harris            | Manuel Teran                    |
| Gyver Huang             | Hans Huth                       |
| Hans Huth               | Eric Weston                     |
| Eric Mahr               | Tao Wu                          |
| Joshua Orosco           | Jeffrey Zubel                   |
| Esteban Ortiz           |                                 |

- |                                  |                        |
|----------------------------------|------------------------|
| <b>2000</b>                      | <b>2003</b>            |
| Jason Contapay                   | Sarvesh Bhardwaj       |
| Janova Lerdal (Petersen)         | Bipin Giri             |
| Laura Lohner                     | Kyle Goss              |
| Zhiming Lu                       | Amy Goyer (Boomer)     |
| Gustavo Maldonado                | Sandra Kukurba (Bueno) |
| Saul Mora                        | Jing Luo               |
| Lance Nelson                     | Heath MacDowell        |
| Scott Sayles                     | William Miller         |
| Michael Schwager                 | Nathan Palmer          |
| Leah Stanley                     | Anh Quach              |
| Michael Wong                     | Cesar Ramirez          |
| <b>2001</b>                      | Douglas Westra         |
| Matthew Angiulo                  | Justin Wheeler         |
| Kiran Bhumana                    | John Woodson           |
| Lindy Cote                       | <b>2004</b>            |
| Wendi Lane (Fusler)              | Allison Basche         |
| Rachel Paul                      | Lauretia Baum (Begay)  |
| Sara Seuberling                  | Omar Cachola           |
| John Stockero                    | Iraill Cortinas Lopez  |
| Daniel Williams                  | Paul Gaydos            |
| <b>2002</b>                      | Kirk Gossage           |
| Anton Anderson                   | Michael Kiefer         |
| David Bujak                      | Travis Lindberg        |
| Thomas Christian                 | Wei Luo                |
| Mark Hutzler                     | Brian McMorrow         |
| Xuejun Li                        | Federico Pennacchini   |
| Dhananjay Mishra                 | Joseph Torrano         |
| Tyler Newberg                    | <b>2005</b>            |
| Stephanie Ogle (Carroll)         | Brian Alden            |
| Natasha Schnaitmann (Checkovich) | Joseph Augustine       |
| Daniel Wilson                    | Paul Case              |
|                                  | John Condon            |
|                                  | Hector Coronado        |
|                                  | Anthony Delorenzo      |



**Highland Heritage**—Lee Murray celebrating Burns Night.

in all 55 of the districts comprising the Corps of Engineers. “My main nonwork activity is bowling in a sanctioned league on Sunday nights,” Murray said. He spends a lot of time supporting his 24-year-old youngest daughter, who is a special Olympian. “My other two kids are a son who is 27

and another daughter who is 31, and the mother of my two grandkids, a girl age one and a boy age three,” he said.

**Amy (Hurt) Rivers**  
**BS/IE 1992**

Amy Rivers started out working in Tucson, Ariz., for Quadna, which designs fluid handling systems for industries such as mining and oil and gas. In 1997 she went to work for Quadna supplier Flowserve, which moved her to Virginia Beach, Va., in 1999, where she has been ever since. Rivers is currently distribution director, responsible for distributors in Canada, U.S. and the Caribbean, for the Flow Solutions Group of Flowserve Corporation, which makes

precision-engineered pumps, valves and seals, mainly for the oil and gas and chemical industries. She was initially surprised to learn that “sales engineer” was actually a real job title. “I ended up on the sales side, but couldn’t have done it without an engineering degree,” Rivers said. “I had no idea that was an avenue for an engineer, and was thrilled to find it.” She admits she doesn’t remember all her professors from 20 years ago, but has fond memories of Jeff Goldberg, Larry Head and Terry Bahill. Of her two children, Rivers said 7-year-old Jake is “an engineer through and through.” He attends a gifted elementary school in Virginia Beach,



**Rivers of S.C.**—Amy Rivers with children Isabella and Jake.

but Rivers said he will only commit to being a “scientist” at this point. Daughter Isabella is 4 and, Rivers suspects, the smartest in the family. “She uses her brains for getting out of things we’ve asked her to do by finding loopholes,” Rivers said. “Right now she would like to be a circus vet.”

Gregory Dion  
Nicholas Hansen  
Kevin Opalka  
Kristy Pearson  
Todd Roman  
Erik Rupp  
Kimberly Saeger  
(Casetta)  
Peter Zinsli

Dennis Roberts  
Kerry Ruiz-Magariel  
Melissa Thumberg  
Jun Yan

**2007**  
Hussam Batshon  
Jeffrey Beran  
Cody Bliss  
Shannon Green  
(Hoblitzell)

Akshay Gupte  
Ryan Kanto  
David Kraemer  
Dominic Leone  
Sarah Mckenney

Alexis Milliken  
Garrett Mitchell  
Thomas Murphy  
Scott Nielsen  
Angela Noon  
Tyler Pearce  
Charles Reid  
William Salus  
Nicholas Yamashita  
Matthew Zerull

**2008**  
Avinash  
Ayyalashomayajula  
William Baker  
Gregory Barry

Donald Bruyere  
Austin Folley  
Jacob Gulotta  
Edwin Gutierrez Palma  
Jeffrey Hunt  
Jaime Kafader  
Armando Membriola  
Andrew Olson  
Tremaine Powell  
Biswas Rijal  
Geoffrey Steward  
Christopher Swanson  
Sean Tunell  
Narendhran  
Vijayakumar  
Corey Wisdom

**2009**  
David Addai-Gyansa  
Jonathan Alexander  
Anthony Alfonso  
Ifeyinwa Amene  
David Burbank  
Robert Case  
Anvesh Cherukupally  
Jeremy Coleman  
Gerardo Cornejo  
Nathan Decker  
Edward DeHoog  
Jeffrey Egan  
Andrew Friedman  
Jesus Garcia

David Hohman  
Ryan Patton  
Regina Reed  
Oscar Silva  
Kevin Spencer  
Oliver Stickroth  
Casey Tambe-ebot  
Kyle Van Renterghem  
Ian Wallace  
James Williams  
Phillip Zinsli

**2010**  
Miguel Gaytan  
Anthony Heim

Oscar Pulgarin  
Ruben Romero

**2011**  
Ryan Badilla  
Danielle Craig  
Diego Gil-azamar  
Jeffrey Lownsbury  
Kevin Lundstrom  
Harrison Roberts

**2012**  
Amy Douglas  
Christopher  
Grusenmeyer

Daniel Hand  
Damen Haughey  
Colton Iske  
Nikolas Kaplan  
Joseph Levy  
Alex Mattioli  
Adam Mullenbach  
Joseph Ott  
Aaron Petras  
Kevin Schwab  
Collin Smith  
Nathan Thorne  
Christopher Wellons  
Lee Wilson

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