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ABOUT THE COVER
This issue’s cover features Zahara, a member of a women’s argan cooperative in Tiout, Morocco. For a number of years, students in Richard Schuhmann’s engineering leadership classes have been working to make these women’s lives better by designing and building devices to make their work day easier.

This issue highlights just a few of the projects and efforts Penn State engineering students and faculty have undertaken to improve the lives of people all over the globe.
Heinemann named head of agricultural and biological engineering

Paul Heinemann, professor of agricultural and biological engineering, was named head of the department on July 1. He succeeds Roy Young, who retired after 12 years as department head.

Heinemann has been a member of the Penn State faculty since 1988. His research focuses on food-production mechanization, produce characterization, food processing, and odors from mushroom substrate and other food products and byproducts.

Heinemann has served as coordinator of the biological engineering program since 2001 and the agricultural systems management program since 2006. He holds a bachelor’s degree in meteorology and a master’s degree in agricultural engineering from Penn State. He earned his doctorate in agricultural meteorology, with a focus in agricultural engineering, from the University of Florida.

Engineering ranked 23rd in 2011 U.S. News graduate survey

The Penn State College of Engineering was ranked 23rd overall in the 2011 edition of U.S. News & World Report’s America’s Best Graduate Schools. The overall ranking ties Penn State with the University of Pennsylvania.

The Harold and Inge Marcus Department of Industrial and Manufacturing Engineering graduate program tied with Northwestern and Stanford Universities for fourth.

Nuclear engineering tied with the University of California, Berkeley, for fifth.

Agricultural and biological engineering tied for ninth with North Carolina State University and the University of Nebraska.

Computer science tied for 28th with Rutgers University.
Penn State receives $5 million for smart-grid workforce development

The University received a $5 million grant from the U.S. Department of Energy for workforce tracking and development in smart electrical grids. The government program is designed to modernize the nation’s electrical grid and implement smart-grid technologies in communities across the country.

The grant will fund the proposal “Workforce Training for the Electric Power Sector” and create the Smart-Grid Training and Application Resource Center. The project’s principal investigator is David Riley, professor of architectural engineering and director of the Center for Sustainability.
Clearview featured in national design exhibition

A typeface designed by a team including Martin Pietrucha, professor of civil engineering and director of the Thomas D. Larson Pennsylvania Transportation Institute, is part of the National Design Triennial in New York City.

The event explores designers’ efforts in addressing human and environmental problems across many disciplines, including architecture, products, new media, fashion, graphics, and landscapes.

The Clearview typeface was developed to replace the Federal Highway Administration’s older road signs and designed for clearer legibility at night and at greater distances. A sign using Clearview greets visitors to the exhibit.


AH-64 attack helicopter

Students got a rare, hands-on view of an AH-64 Apache attack helicopter near Medlar Field on campus in April. The gunship is part of the Pennsylvania National Guards’ 1st Battalion, 104th Aviation, headquartered in Johnstown.
ASME team finishes third at Rube Goldberg nationals

The student chapter of the American Society of Mechanical Engineers (ASME) walked away with clean hands and a third-place trophy, thanks to two flawless runs of the ‘Indiana Jones’-themed hand sanitizing machine at the 23rd annual Rube Goldberg Machine Contest at Purdue University in March.

The 2010 competition challenged students nationwide to design and build a machine that dispensed an appropriate amount of hand sanitizer into a hand. The machine had to complete the task with a minimum of 20 steps—the wackier the better—in two minutes or less.

ASME’s machine, titled “Indiana Jones and the Temple of Dirty Hanz,” spoofed various aspects of the movies and took spectators along on a 52-step quest for “The Golden Idol of Cleansing.” About halfway through its run, the 310-pound machine rotated 180 degrees, a move that both surprised and delighted the audience. More information, including video footage, is available online at www.engr.psu.edu/RubeGoldberg/ASME/2010.

IE alum pledges $10 million for research

A new endowment established by Harold and Inge Marcus of Olympia, WA, will support interdisciplinary research by engineering faculty and students.

Valued at $10 million, the Marcus Family Endowment for Engineering Research is intended to foster work spanning engineering, science, and medicine.

Harold “Hal” Marcus is a 1949 industrial engineering graduate. He and his wife are among Penn State’s most generous donors. The University named the couple its 2003 Philanthropists of the Year, and the College’s industrial engineering department bears their names.

EE lab dedicated in student’s memory

The Department of Electrical Engineering dedicated the Christopher Raspanti Memorial Digital Signal Processing/Digital Music Laboratory in May.

The lab, located in 204 Electrical Engineering West Building, honors Christopher Raspanti, a Penn State electrical engineering student from 2002 to 2005. He died in a 2005 fire in his State College apartment. After his death, the Raspanti family established a memorial fund to purchase equipment for the lab in his memory.

The lab is used in conjunction with EE 453 Fundamentals of Digital Signal Processing and EE 008S Introduction to Digital Music.
College mourns passing of bioengineering’s Smith

Nadine Barrie Smith, associate professor of bioengineering, passed away suddenly on April 2. Smith, 48, joined the College in 1999. Her research focused on therapeutic applications of ultrasound and its combination with diagnostic magnetic resonance imaging.

Smith worked on a team that developed a prototype for an ultrasound insulin delivery system that can be worn as a patch on the body and is a less painful and invasive alternative for insulin administration. She also worked on a team to develop a potential cure for melanoma that is a safer and more effective way of targeting cancer-causing genes in cancer cells without harming normal tissue. Smith developed numerous undergraduate and graduate courses and was an active participant in the Women in Engineering Program.

Smith received her Ph.D. in electrical engineering and biophysics from the University of Illinois at Champaign-Urbana in 1996 and was a Radiology Fellow at Harvard Medical School.

She is survived by her husband, Andrew Webb, professor of bioengineering. He has established the Nadine Barrie Smith Mentor Award for female engineering students. Donations can be made online at https://secure.ddar.psu.edu/GiveTo/ (online gifts should be directed to the Nadine Barrie Smith Mentor Award (SCDSZ) in the College of Engineering) or by contacting John Dietz, director of development, at jld5@psu.edu.

In the name of science

Last May, engineers at the Thomas D. Larson Pennsylvania Transportation Institute launched a car off a ramp to test calculations by students involving speed, angle, and distance.
■ EcoCAR finishes third in year two of contest

Penn State’s entry placed third overall in the national EcoCAR: The NeXt Challenge’s Year Two Finals, held May 17–27 at General Motors’ (GM) Desert Proving Grounds in Yuma, AZ, and San Diego, CA.

The three-year competition, sponsored by the U.S. Department of Energy and GM, challenges engineering students from across North America to re-engineer a GM-donated car to minimize the vehicle’s fuel consumption and emissions while maintaining its utility, safety, and performance.

The Penn State team won best social media program, best AVL drive quality, and best technical report. It also placed second in A123 battery design and third in outreach and was the runner up in the wheel-to-wheel greenhouse gas emissions, best tailpipe emissions, and best fuel consumption categories.

■ Students place second at Shell Eco-marathon

Penn State’s hydrogen prototype vehicle placed second at the Shell Eco-marathon’s fuel cell power category in March in Houston, TX.

The vehicle’s best run achieved a 1,806 mpg gasoline equivalent.

The team’s diesel urban concept vehicle came in third place for the combustion category with a best run of 153 mpg.

The students took home a total of $3,000 in prize money, which will help support future trips to Eco-marathon.

The Shell Eco-marathon began in 1939, and this year’s competition featured more than 40 teams from high schools and colleges throughout North and South America.

■ College ranks high in National Research Council Survey

A number of engineering programs were recognized in a recent report by the National Research Council (NRC) on the quality of U.S. research doctoral programs.

Programs including computer science and engineering, electrical engineering, environmental engineering, industrial engineering, and mechanical engineering were highly ranked.

A full list of Penn State’s top-ranked programs can be found online at http://live.psu.edu/fullimg/userpics/10047/NRC_rankings.pdf. The full NRC report, including the methodology, can be found at www.nap.edu/rdp/.
Water quality research was a major part of the Penn State engineering team’s work this past July in Tiout, Morocco.
It’s an hour ride to Tiout, a tiny Moroccan village east of the coastal city of Agadir. The cool Atlantic breezes that buffet Agadir quickly give way to a parched landscape dotted with the gnarled timbers of argan trees as Richard Schuhmann and student Lydia Karlheim make their way through the desert.

For Schuhmann, this July trip is simply another one of his bi-annual treks to North Africa.

This time around, Schuhmann has three major projects drawing him back to Morocco: delivery of 20 prototype chairs constructed by his engineering leadership students for a women’s cooperative; a water assessment as part of an Environmental Protection Agency (EPA) grant; and Karlheim’s own water purification project.

Schuhmann says he fell in love with the country after a trip he took three decades ago. In his mid-20s, the engineer ventured back to start a small business importing Moroccan leather goods to the United States.

The business flourished, and Schuhmann eventually sold the enterprise for a tidy profit. He continued returning to Morocco.
Morocco, indulging his passion for fossils by excavating his way through the country's ancient Atlas Mountains and adjacent Sahara Desert.

But it wasn’t until January 2006 that Schuhmann was introduced to Tiout.

“I was invited here by Prof. Zoubida Charrouf. She’s a chemistry professor at the University of Mohammed V in Rabat,” the Walter L. Robb Director of Engineering Leadership Development explains. “Prof. Charrouf wanted me to come here and meet the women of the argan cooperative to see if there was some way we can partner with these women. These are strong women, very confident.”

He continues, “We identified some needs that are non-life-threatening. They’re not horrific social needs, but they’re ways in which our students at University Park over the last four years have been making these women’s lives easier and in turn learning about appropriate engineering design and another culture.”

Tough nuts to crack
The argan tree isn’t pretty by most standards. It’s short and stout with a trunk that’s wrinkled like a prune. But what it lacks in beauty, the argan makes up for with a very valuable fruit.

“The raw nut meat is made into a green oil. This is used as a dermal regenerative in cosmetics,” Schuhmann states. “If the nut’s meat is roasted and then pressed, you get this remarkable culinary-grade oil, one of the most expensive in the world.”

And Morocco has a de facto monopoly on argan.

“The argan trees don’t grow prolifically anywhere else in the world except for Morocco. And they don’t grow anywhere else in Morocco except for here,” he says.

The hard part is getting to the meat.

The nut is essentially the fruit’s core, not unlike a peach’s pit. Once the argan is dried and the outer fruit is removed, the real labor begins with forcing open the nut to get at the meat.

The nut-cracking method has remained unchanged for generations. Using two stones, a large anvil stone and a small striker stone, the women smack the outer shell to reveal the almond slice-like meat from the nut.

The work requires a high degree of skill, or at least some experience in the art of nut cracking. Too much force will not only crack the nut, but obliterate its fragile and valuable contents. Too little force will leave the nut unscathed.

So each day, about 50 women make their way to the cooperative, sit on the floor with an anvil stone between their legs and striker stone in hand, and begin cracking.

Over the past few years, Schuhmann’s students have learned about this community and engineered ways to make the women’s lives better. The design-and-build work has been integrated across the curriculum, from the introductory ENGR 493 Leadership Experience course to a more advanced
virtual teaming class where Schuhmann’s students collaborate with Hungarian business students from Corvinus University in Budapest.

One year, the engineers designed finger protectors for the women, who had been complaining about the injuries they suffered while cracking nuts. Schuhmann says the protectors were such a hit that many of the women began fashioning their own based on the original Penn State designs.

Students have also learned valuable lessons along the way. Replacement anvils and strikers designed by the undergraduates met with a cool reception, as was a chair and table prototype meant to alleviate the lower-back strain the women were experiencing.

This time, however, Schuhmann hopes the chairs contained in the three large, brightly colored duffel bags hogging the back of his rented SUV will hit the mark.

**Water work**

A day after arriving in Tiout, Schuhmann and Karlheim are joined by Darrell Velegol, professor of chemical engineering; Stephanie Velegol, an instructor in environmental engineering; and the couple’s two young daughters. The three faculty are involved in an EPA P3 grant and using the village as an assessment site.

“The P3 program of the EPA is people, planet, and prosperity,” Darrell Velegol explains. “We’re trying to find sustainable techniques that can be helpful to the planet. At the same time, we’re trying to build prosperity in locations where people really haven’t had much prosperity. If you can find agricultural products that can accomplish all three of them, that is exactly what the P3 grant is about.”

The focus of the trio’s P3 grant is the moringa tree, a plant native to India.

“The pods of the tree contain seeds that purify water, and the leaves are highly nutritious and contain a large number of vitamins, minerals, and even proteins,” Stephanie Velegol says. The problem is the moringa seed’s water-purifying properties are only temporary.

She continues, “Not only does [the seed] coagulate particles, reduce turbidity, and kill microorganisms, it leaves behind biological oxygen demand or food that bacteria can use to regrow. Any water that’s created or purified with moringa cannot be stored for very long.”

For the developing world, access to clean water remains a monumental challenge.

“If they have water, often times it’s surface water, meaning you have shallow pools of water that are contaminated with various pathogens that the local people use as is,” Darrell Velegol states. “They can’t see the pathogens in the water, so they use it thinking it’s fine, but then they get sick. It’s often times not deadly, but debilitating in many ways.”
Christina Clementi, a 25-year-old Peace Corps volunteer who’s lived in the village for the past two months, reports that the water has made her and others sick.

“Every week, they’ll dump a big thing of chlorine into the water supply, and you’ll get some foaming in the water,” the New Jersey native says. “But beyond that, there’s nothing. I’ve been sick five times with ten-day stretches of diarrhea.”

Karlheim might have an answer to the village’s chlorine issue. “The solution we’re looking at is a flow-dependent device, which consists of a PVC pipe and an orifice plate in the middle of one of the pipes, which basically restricts flow in a certain spot. By restricting the flow, the velocity of the water increases. And this increase in velocity results a powerful suction. So if you tap the line right after the flow restrictor, you can suck chlorine up into it.”

The civil engineering senior continues, “This means that if there’s no water flowing through the orifice, then there’s no chlorine being dosed into the water. But if there is flow, then the chlorine is being dosed proportionally. So it ends up being flow-dependent, and you’re only dosing chlorine when it’s needed and to the exact amount that it’s needed. The orifice only costs pennies, so this device has real potential for the developing world.”

But before the P3’s moringa seeds or Karlheim’s chlorinator project can move forward, the engineers must examine the village’s water supply, including tracing it back to the source.

As the group ventures deeper into the countryside, the engineers encounter a small aqueduct gurgling with cool—and what appears to be—clean water.

Fear of microorganisms prevents anyone from drinking, but it doesn’t stop the Penn Staters from at least dunking their arms in for a bit of relief from the desert heat.

Further upstream, a child plays in the same channel. The algae that’s grown along the aqueduct’s bottom makes for a natural Slip ‘n Slide. Not far from the boy, a herd of goats drinks from the aqueduct.

“That’s the water coming out of the well and going into the village,” Darrell Velegol says as he looks at the drinking goats.

The team eventually finds the source and examines the water.

“We did four tests,” says Stephanie Velegol. “We did hardness, which measures calcium and magnesium. We found that it’s not very hard water. We did iron. We found no iron in the water. We measured for pH. We found the water is slightly basic, about 7.7. And we also measured for total chlorine and free chlorine down in the village, and we found essentially zero or less than .1 milligram per liter of chlorine in the water.”

The water supply data will be analyzed by the engineers upon return to the United States, and work will continue on the P3 grant and Karlheim’s chlorinator.
Second time a charm

In the meantime, Schuhmann, Darrell Velegol, and Karlheim assemble the co-op’s new chairs.

The students purposely designed the chairs without metal nails, screws, or hinges. Constructed with straight wood pieces, dowels, and denim for the seat, the hope is the villagers will decide to replicate and perhaps improve on the students’ design.

The new chairs also take into account some of the previous version’s failures. The last prototype, as Schuhmann describes it, included a chair that was too reclined and a table that did poorly as an anvil substitute. This time, the students created a low, beach-style chair that includes three angles for reclining.

When Schuhmann makes his return to the women’s cooperative, he’s greeted warmly. It’s difficult to tell that it’s been months since his previous visit.

The reception for the chairs is as equally warm, as the women eagerly ditch their old back pillows to make way for the new furniture.

One woman offers Schuhmann a suggestion—adding storage behind the chair for personal items. Another shoves her old back pillow behind her new chair to provide even greater lower-back support.

And with that, the women return to work, cracking their argan nuts, the sound like a thousand constantly bouncing ping pong balls.

“My outlook on what we do here in Tiout is that first and foremost we forge a relationship with the community,” Schuhmann says. “These women are delighted to no end that there are young people in a place called America that think about them and send them these innovations every year.”

Richard Schuhmann can be reached at rxs34@psu.edu or at 814-863-9074. Darrell Velegol can be reached at dxv9@psu.edu or at 814-865-8739. Stephanie Velegol can be reached at sbv1@psu.edu or at 814-863-3088.
Pediatric neurosurgeon **Steven Schiff**, the Brush Chair Professor of Engineering and director of the Penn State Center for Neural Engineering, has long focused his research on finding better ways to treat epilepsy, Parkinson’s disease, and other nervous system disorders. But a conversation with a fellow neurosurgeon several years ago inspired him to widen his area of interest.

“A dear colleague of mine, Dr. Ben Warf, had decided to live and work in East Africa for six years,” Schiff explains. “After about five years, I saw him at a surgical meeting, and over dinner, I listened absolutely entranced as he described what he was doing. As he laid out the problems that he was facing in that highly resource-constrained environment, I thought, ‘We can certainly address some of those at Penn State.’ Shortly after, I made my first visit to the hospital he helped build and direct in Uganda.”

One problem in particular attracted Schiff’s attention—the high incidence of post-infectious hydrocephalus among infants in the developing world.

From 1990 to 1998, Schiff was a practicing pediatric neurosurgeon at Children’s National Medical Center in Washington, DC. About half the cases he treated there involved hydrocephalus—an abnormal accumulation of fluid in the brain that can cause rapid enlargement of the head in babies and potentially lead to brain damage.

“In the United States and other industrialized countries, hydrocephalus occurs in about one out of every 2,000 live births,” he states. Most of these cases, he says, can be attributed to one of two things. Sometimes a baby is born with a congenital anomaly that slows the exit of fluid from the brain. Other cases involve premature infants who develop brain hemorrhages due to immature blood vessels.

Post-infectious hydrocephalus, however, is not widely seen among newborns in the United States and Europe.

“We’ve always had a bit of trouble—everyone does—with babies that get infections shortly after birth,” Schiff notes. “These infections can also lead to hydrocephalus, but we’ve reduced them significantly with advanced medical systems—mostly by screening mothers for dangerous bacteria that we know have a predilection for getting into babies in the first week of life.”

In the developing world, it’s very different.

Schiff explains, “It appears that the majority of the hydrocephalus cases in developing countries are the result of infection. This means that a large number of infants around the world have a preventable type of hydrocephalus, but we don’t know the agents. We don’t know if it’s bacterial, viral, or if parasites have a role. We don’t know if it changes by geographic region or weather, which means that we don’t know how to treat whatever ‘it’ is to reduce or prevent these infections.”

Schiff and his colleagues are hoping to solve this mystery through their work in East Africa. At the CURE Children’s Hospital of Uganda in Mbale, they’ve...
Answers

AN ENGINEERING FACULTY MEMBER HOPES TO SOLVE A MEDICAL MYSTERY IN THE DEVELOPING WORLD
collected more than 1,000 well-documented cases of post-infectious hydrocephalus. “We’ve extrapolated to try to get a sense of how many cases of hydrocephalus there might be in Sub-Saharan Africa, and with crude estimates, there are probably anywhere from 30,000 to 60,000 cases per year,” says Schiff.

In the majority of these cases, the infants had a serious febrile illness in the first month of life, often with epileptic seizures and convulsions. A few weeks later, they were brought to the hospital for treatment with their heads expanding quickly.

Schiff states, “We treat many of these children with surgery, but if what we’re doing is saving them for a future which is characterized by often-significant mental retardation, symptoms of cerebral palsy, and probably a substantially shortened life span, then we really need to look for the cause.”

The first thing Schiff and his colleagues did was to try to culture the infectious agent from samples of spinal fluid taken from babies at the time of surgery. Could they grow the organisms in the lab? The answer was “no.”

Schiff lists possible reasons for this. In some cases, the infection could have run its course before the child was brought in for treatment, or it could have been caused by a virus rather than a bacterium. Additionally, many of the children have been treated with antibiotics before they come for surgical care. “Or it could just be the basic, unpleasant fact that we don’t know how to grow most of the bacteria on the planet in the lab,” he says.

Next, Schiff’s team turned to DNA sequencing. With approval from the ethics review boards in Uganda and at Penn State, they undertook a cross-continent clinical study. At two different times of the year, samples of the brains of hydrocephalic children were taken and tested for a gene that is found only in bacteria. Even though the infections had long since burned out, if they had been caused by bacteria, bacterial fragments would likely be present in the infants’ brains.

The team found bacterial fragments in almost every baby’s brain. Overwhelmingly, the bacteria they found were coliform—a class of organisms that tend to live in the colons of warm-blooded animals. The bacteria were very dissimilar to the kinds of organisms found in babies in the United States who are infected in the first month of life—but not unlike the types of infections seen in wounded soldiers in military conflicts in places such as Iraq or Vietnam.
Schiff and his colleagues then conducted environmental sampling in the villages where many of the babies lived. “We found some very close genetic matches to certain fragments we had identified,” he says. “We also found that at different times of the year, the spectrum of bacteria seems to change, which seems to point to the environment.”

There are still a number of unanswered questions, however. “We don’t know if the bacterial fragments were causative of the condition,” Schiff states. They also don’t know if the AIDS epidemic, now increasing again in Uganda, has anything to do with it or if the introduction of new farm animals in this part of the world is changing the microbial flora that is then transmitted to humans. Also unknown is what piece, if any, is coming from the mother.

For Schiff and his colleagues, the search continues. Currently, they’re collaborating with physicians at a large regional hospital affiliated with the Mbarara University of Science and Technology in Mbarara, Uganda. “They see one case of neonatal sepsis or apparent neonatal sepsis every couple of days,” Schiff says. “We’ve begun a clinical trial there to sample the blood and spinal fluid from those babies. They have very good microbiologists that we’ve supplied with extra equipment to help culture organisms.”

In addition, they’re bringing DNA and RNA samples back to Penn State for both bacterial and viral sequencing, and with permission, they’re testing the mothers for HIV and taking specimens from their birth canals. “We’re in the process of collecting a cohort of about 75 newborn babies,” Schiff says. “If we can grow that to several hundred, we’re going to see which fraction of these babies go on to get hydrocephalus. That’s the key. And that will tell us if it’s just the manifestation of run-of-the-mill bacterial infections in these babies or a special subset of bacteria or viruses that we need to treat differently when we pick it up.”

Dr. Schiff’s work in East Africa is presently funded by a grant from the Penn State Clinical Translational Sciences Institute and the generous endowment of Harvey F. Brush. He can be reached at 814-863-4210 or sschiff@psu.edu.
“There is no way to prepare for the culture shock,” says Michael Cymerman, a member of Engineers Without Borders (EWB) Penn State, upon returning from the group’s trip to Baoma, Sierra Leone, in July.

Located on the western coast of Africa, Sierra Leone is ranked by the United Nations as one of the least developed countries in the world. Baoma is a remote village about ten miles from the coastal city of Freetown, the country’s capital.

“We expected Baoma to be in poverty,” says Meghan Fisher, EWB-Penn State's incoming president, “but we did not expect the entire country to look as run-down as it did. There is not a single commercialized structure in the entire country.”

Sandy Risha, a recent Penn State mechanical engineering graduate and the group’s former president, adds, “They had very few materials there—no running water, no paved roadways, and virtually no safe health facilities.”

EWB, a national organization with more than 250 chapters, uses engineering to help people all over the world who have limited or no access to basic needs such as clean water, power, sanitation, and education.

Baoma’s application to the EWB program indicated a need for a proper restroom facility in their Covenant Preparatory School.

“Currently, the kids do their business in the bushes,” says John Lamancusa, professor of mechanical engineering and EWB-Penn State’s faculty adviser.
But before building anything, EWB-Penn State members had to visit Baoma themselves to assess the community’s needs and priorities and to collect important data, including physical measurements, soil and water samples, and samples of local building materials.

Richard Kercher, an engineering consultant at Gannett Fleming, Inc., and EWB-Penn State’s professional mentor, went along on the trip to advise on the data collection.

“We captured water quality data to investigate the feasibility of a drinking water project in the future,” says Kercher, a former Peace Corps member.

“Matt [O’Boyle] and Chris [Michalak] were relentless in their survey and sampling of the water sources,” he continues. “They were drenched after they crawled through the jungle to sample the furthest water source.”

Samples of sand, concrete, rebar, and stone came back with the group as well. “The projects we do must use local building materials to be sustainable, so these samples will give us a good idea of what we will be working with and allow us to plan our designs accordingly,” Cymerman says.

In addition to measurements and sampling, the group performed health assessments to better understand the conditions in which the residents of Baoma live.

“Each family honestly answered questions about where they go to the bathroom, how often their kids get sick, what, if any, treatment is available, and how often children pass away from disease,” says Cymerman.

The health data indicate that contaminated water and poor hygiene are likely the causes of much of the illness in Baoma residents, especially children.

“The community needs a clean water system, a medical center, and a school,” says Fisher. “It is clear to us that a toilet is not their most critical need, but it is very important that we do a smaller project first.”

Over the next year, EWB-Penn State members will plan their return trip and seek out more ways to help the community of Baoma.

“Matt O’Boyle, our project coordinator for the upcoming school year, will be in charge of getting a team together to design the latrine facility itself,” Fisher says.

“We also have lots of other ideas to give them immediate aid—simple things such as raising money for tarps and collecting used shoes could go a long way.”

Lamancusa adds, “Things that are thrown out or considered waste here have tremendous value there.”

He called his experience in Baoma “life-changing.”

“How can we ever communicate this to people who didn’t see it?” he asks. “I’m still trying to process it all.”

More on EWB’s trip can be found online at http://ewb-psu.blogspot.com
looking for the **TOP LION**

BY CURTIS CHAN
people from Notre Dame, Brigham Young University, Ohio State, Hungary, and Mexico.

“The teams are balanced across experience so that there are opportunities for mentoring. Everybody is at an equal disadvantage: nobody is working on a project that is related to their research,” Parkinson explains.

After a day-long orientation, the teams are assigned a workspace and a budget as well as a refrigerator stocked with snacks and drinks. They then have four days to devise and build their solutions.

The point, Parkinson said, is to get students into a mode of “active learning.” He states, “The goal really is to provide opportunities for students to focus on an objective for a sustained period of time, to get to know each other, to add breadth to the skills in their toolbox, to develop confidence in their abilities, and to have fun. The students involved have no obligations during the week. The faculty advisers still pay them, but they are not conducting research in the traditional sense.”

The award for best project this year went to the team that designed the powered walker, though all teams received a soccer jersey with the 2010 Iron Lions logo on it.

“I think doing activities like this helps you be a better designer. It’s like a thought process gets ‘exercised’ from this sort of activity,” observes Shannon Zirbel, a mechanical engineering master’s student from Brigham Young University. “Also, I really felt like I wasn’t competing for some great prize. We were there for the whole experience.”

Support for the program came from the Department of Mechanical Engineering; the School of Engineering Design, Technology, and Professional Programs; the Center for Research in Design and Innovation; the National Science Foundation; and Ned Brokloff, a 1982 engineering science alumnus.
AN ALL-AMERICAN ENGINEER

BY MALLORY JAROSKI

Students
For **Noam Shaham**, a senior in engineering science, becoming an All-American in gymnastics has been 20 years in the making.

Shaham, a native of Israel, began his Penn State career in 2007 as an international student and a member of the Penn State gymnastics team.

The team competed at the NCAA Gymnastics Finals April 15–17 at the Christl Arena on the host campus of the U.S. Military Academy in West Point, NY. The qualifier round was held on April 15, and the advancing teams went on to compete in the final rounds throughout the remainder of the weekend. The competition consisted of six events: floor, pommel horse, rings, vault, parallel bars, and high bar.

Even though the entire team did not advance to the finals, Shaham went on to compete in five second-round events and the rings and high bar finals competitions. He placed sixth in the high bar event, which earned him his first All-American honor. In order to receive this honor, a competitor must place in the top eight of a specific event. He also placed ninth in the rings competition.

Shaham dedicates a majority of his time at Penn State to his gymnastics career. The team spends approximately 20 hours per week training, which can be quite a challenge to balance with the workload of an engineering student.

He explained that he often spends late nights completing his classwork, but has found ways to improve his time management skills.

Since he is no longer eligible to compete on the Penn State team, Shaham returned to Israel this fall to train with the Israeli national gymnastics team and competed at the 2010 Artistic Gymnastics World Championships in Rotterdam, the Netherlands, in October.

Shaham will return to the University in spring 2011 to complete his degree.

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**Engineering science's Pheil named rugby All-American**

**Christiane Pheil**, an undergraduate student in engineering science, was among six Penn State students to be named to USA Rugby's 2010 Women's Collegiate All-American Teams. This honor is bestowed upon the best women collegiate rugby players in the country and recognizes a high standard of performance throughout the year. Pheil was named to the second team of All-Americans and received a certificate commemorating the honor.

**Photo courtesy of Penn State Athletics**
THE OLDEST CONTINUOUSLY ACCREDITED architectural engineering program in the country marks its 100th anniversary in 2010 and spent the year with numerous events to commemorate the milestone.

The year-long centennial celebration began with an architectural engineering pizza social for faculty and students on Jan. 13, giving attendees an opportunity to reflect on the department’s heritage and preview some of the planned centennial events.

The official centennial celebration kicked off on April 29, coinciding with the annual senior thesis presentations and the Marvin J. Kudroff Memorial Lecture.

As part of the centennial, the department hosted the 6th International Conference on Innovation in Architecture, Engineering, and Construction June 9 to 11.

An All-Year Alumni Reunion Weekend was held July 2 to 4 on campus with more than 200 architectural engineering faculty, staff, students, alumni, and family members attending.

Originally established by the Board of Trustees in 1910, the Department of Architectural Engineering began with an inaugural class of five students. The students graduated in 1914 under the guidance of Roy Webber, the department’s first head.

As the department enters its second century, Chimay Anumba, the department’s current head, envisions architectural engineering leading the development of high-performance green buildings.

“The AE department at Penn State has arguably had more influence on building design and construction over the last 100 years than any other academic department. We are well positioned to lead the development of the next generation of intelligent, sustainable, and high-performance buildings,” he says.

On the academic side, the department has embarked upon an ambitious program of curriculum changes designed to promote a systems approach to the design and construction of buildings.

For example, Anumba says an integrated building information modeling (BIM) studio has recently been established to facilitate collaborative working within teams that include a student from each of the four architectural engineering options (construction, lighting/electrical, mechanical, and structural) and from the Departments of Architecture and Landscape Architecture. The senior thesis also has a BIM/integrated project delivery section, which requires teamwork similar to that which exists in industry.

Both of these initiatives have resulted in the American Institute of Architect’s highest award, Anumba states.

Louis Geschwindner, professor emeritus of architectural engineering, says, “The success of the department can really be attributed to the relationship that Penn State has with the profession and also the strong relationships between the students and professors.”
FOR THOSE STUDENTS WHO HAVE THE
bittersweet feeling of graduating and moving on from their
lives at Penn State, don’t be too upset—you could be reunited
with your former professor in 51 years.

That’s exactly what happened to one engineering alumnus
last spring semester.

George “Herm” Tselepis, who received his B.S. in civil
engineering in 1959, was reunited with Harry West, professor
emeritus in civil engineering, after enrolling in another one of
West’s courses 51 years later.

The two first met when Tselepis enrolled in West’s CE 280
Structural Analysis course in the spring of 1958, which was
West’s first semester teaching while he was pursuing a master’s
degree at the University.

“In those days it wasn’t uncommon to have a full-time
instructor pursuing a master’s degree,” explains West.

After graduation, Tselepis began a career with the U.S.
Navy. He worked as a hydrographic surveyor in the Gulf of
Siam, Guatemala, and Ecuador and also as a civilian employee
for the Department of Defense.

Meanwhile, West continued to teach courses at Penn State
in structural analysis and design and conduct research on
bridges and high-rise buildings. He received his Ph.D. from the
University of Illinois in 1967. He retired from Penn State in
1997 but continues to teach one course each spring semester.

After Tselepis retired from the Department of Defense,
he and his wife wanted to leave the congested suburbs
of Washington, DC, and decided to relocate to the State
College area. He began attending lectures at the University
and also enrolled in the Go-60 program, which offers
unique educational opportunities to people who are at least
60 years old.

“I love being back at Penn State,” explains Tselepis.
“I take courses at a leisurely pace, and I enjoy taking classes
with the younger generation.”

He says that not much has changed at Penn
State besides the obvious growth in campus size and
student population.

While at a civil engineering 50th class reunion, Tselepis
ran into West, and they spoke about West’s
spring STS 297A Structures and Society course.

Tselepis decided to enroll in West’s course, which
marked their reunion as student and professor. West
enjoys having Tselepis in class again and says that he is
fully engaged with the material and participates often.

“When you become a senior citizen it’s important to not
let your mind rust and to keep doing things,” says Tselepis.

West and Tselepis agree that being involved with the
University keeps them active. Tselepis also took a course in
oil painting and English literature in the fall 2009.
Know anyone?

The Penn State Engineering Alumni Society
Building an active, engaged community of engineering alumni since 1959

The alumni society provides:
- Membership in a worldwide network of more than 80,000 engineering alumni.
- Fellowship among engineering alumni, faculty, staff, and students.
- Volunteer and service opportunities on campus and in your own community.

We want to hear from you! Visit PSEAS on the Web to submit your latest news and to learn more about becoming a member: www.engr.psu.edu/AlumniFriends/

For more information, contact:
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FROM YOUR PRESIDENT

AS I BEGIN my tenure as president of the Penn State Engineering Alumni Society (PSEAS), I feel it is important to emphasize our vision that has been guiding us for the last three years. It states: “to actively involve all Penn State Engineering alumni … in the support and accomplishment of the goals and objectives of the College of Engineering.” While this appears to be very ambitious, reaching out to more than 80,000 engineering alums is possible, and we are better positioned than ever to drive toward that goal.

In our mission statement we have three focus areas: the Alumni Society, College, and Interaction. The intent is to foster and promote the involvement mentioned above. Our strategic action plans have driven us to the success we have had to date. We have taken advantage of marketing and communications to improve and update our use of today’s technology (creating a website, including a presence on Facebook and establishing Twitter accounts). We have improved some of our existing programs such as alumni mentoring, the Rube Goldberg Machine Contest, and Resumania.

Our greatest potential is in the departmental Affiliate Program Groups, which give you a chance to reconnect with your specific department and fellow alums. We are also actively developing and launching new alumni interaction events to further promote alumni involvement.

Now it is up to you to get involved in any of these areas in whichever way you choose. We are after the active involvement of 80,000 engineering alumni. Join us!

John Mikita ('67 IE)
As interest in engineering has grown over the past few years, the College of Engineering admitted its largest freshman class in recent history this fall. Engineering students continue to have the highest average SATs of any students entering Penn State, and a significant number of them are Schreyer Honors College students—a testament to the ever-increasing quality of our students. This fall’s entering class also boasts the highest percentage of women—20 percent—in the past five years.

The College continues to develop its undergraduate curriculum in the vision of the “World-Class Engineer.” A significant element of the world-class engineer is directed to making our students aware of global issues. In this magazine, a number of activities led by our faculty and students to serve developing countries has been chronicled, including work in Morocco, East Africa, and Sierra Leone. Additional efforts complementing those described include developing joint design project experiences with students in China, France, Korea, and other countries. The span of our global activities is illustrated in the figure below. It is abundantly clear that the practice of engineering is increasingly global and the ability of our students to work in a global environment will be of increasing importance to their success in the future. The initiatives discussed in the magazine begin to provide a sense of what students learn from these types of experiences and how it can affect their lifelong attitudes and career goals.

A number of rankings of colleges and universities have been published recently. The Wall Street Journal issued a ranking based upon corporate recruiters’ evaluation of U.S. universities. In these rankings, Penn State overall was ranked number one and the College of Engineering was ranked ninth in the country, contributing significantly to the University’s number one overall ranking. In addition, recent U.S. News & World Report rankings have indicated that our undergraduate and graduate engineering programs are ranked 17th and 23rd, respectively, while additional rankings include the recent National Research Council survey of graduate doctoral programs, a complex ranking system, but in which our Ph.D. programs have fared very well. In addition, the Academic Ranking of World Universities in engineering/technology and computer sciences ranking, which depends heavily upon graduate research and publications, has ranked Penn State Engineering ninth among world universities in its 2010 ranking. Thus, the College continues to be favorably viewed from both a U.S. and a global perspective, reflecting our graduates’ significant impact upon the profession and society.

David Wormley
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