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The International Issue

Wisconsin Engineer

APRIL 2012

VOLUME 116, NUMBER 3



5th Annual Photo Contest

Featured on p. 12

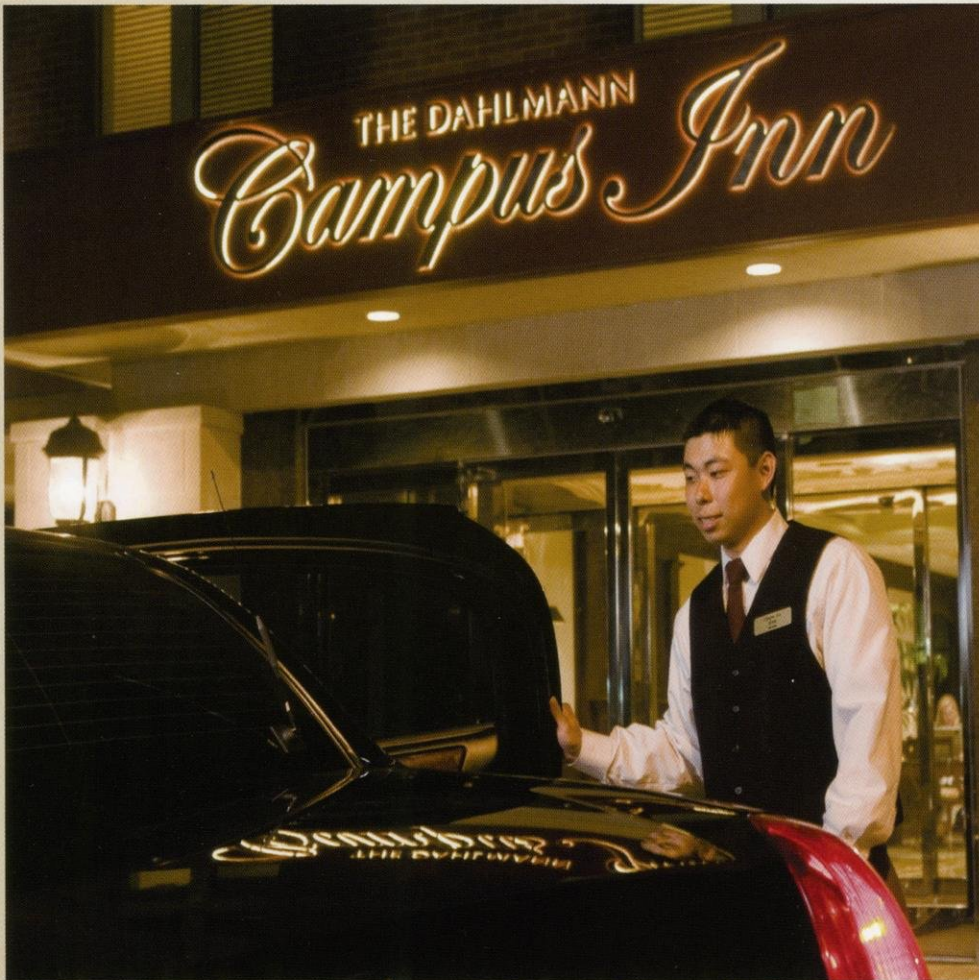
The New York Times, Chicago Tribune and Michael Sievers agree...

"The Dahlmann Campus Inn offers a touch of boutique refinement in the heart of the campus, with rich wood furniture and floral tapestries."

—The New York Times, July 5, 2009

"A quiet respite from a busy college town...The elegant touches begin in the lobby, with marble, mahogany and original artwork..."

—Chicago Tribune, October 25, 2009



I stayed at another downtown hotel for years, then I started staying here. The Campus Inn is the best of all worlds... luxurious, convenient, really friendly, and the service is always great."

Michael Sievers
Senior Project Manager,
URS Corporation
UW-Madison Graduate



THE DAHLMANN
Campus Inn
A Modern Day Classic

Wisconsin engineer

Published by the students of the University of Wisconsin-Madison

VOLUME 116, NUMBER 3

APRIL 2012

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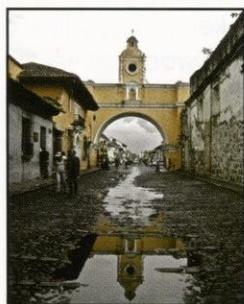
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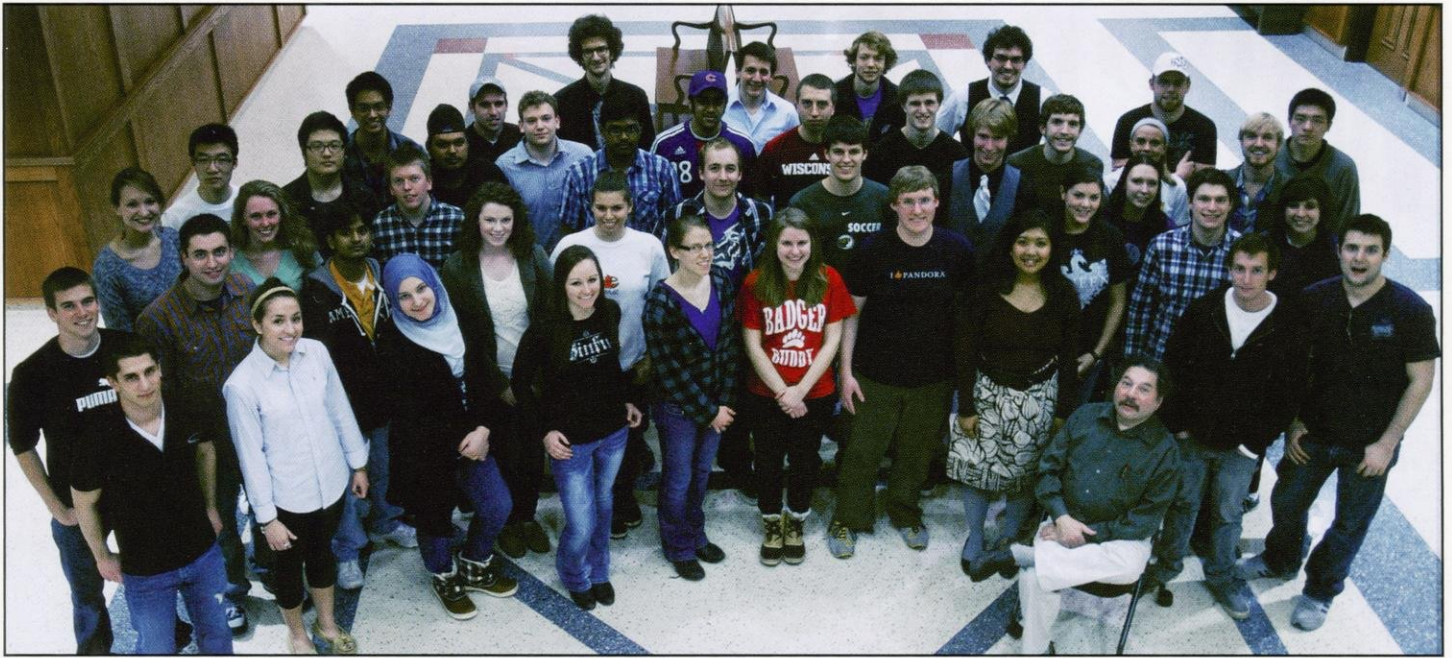
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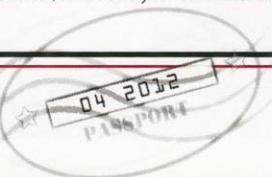
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The International Issue: by Melody Pierson - Editor In Chief



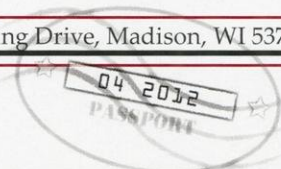
When I was getting ready to begin my first semester at UW-Madison four and a half years ago, meeting students and faculty from all over the world and enriching my exposure to a diverse array of cultures was not an experience I was anticipating. But during my first couple of years on campus when I went back to my suburban Milwaukee hometown, I started to realize that these international interactions I was having at Madison were experiences that my friends at other UW state schools were not getting as much exposure to. I learned that having the opportunity to build relationships with peers and faculty from different countries was an incredibly valuable learning experience and I started to really appreciate the thick accents of my math professors and TAs that I had previously somewhat resented as a barrier to understanding the material in class.

Learning a foreign language (see page 24) or even listening to the way a non-native English speaker composes his/her sentences is a great insight into that person's cultural upbringing. I find it fascinating that the fundamental framework of a language, the order that a speaker puts adjectives, verbs, and nouns together, really influences the way a person's brain formulates ideas. Learning from peers and faculty from different cultures in a truly international community like UW-Madison, enhances its students' abilities to view issues from multiple perspectives at once and offer more thoughtful solutions to problems. I am really excited that for this issue, the magazine staff, especially our officer team, mobilized and reached out to the many different corners of campus to put together this issue with an international theme that illuminates the influence that our campus community's diversity has on our success as an institution as well as the impact our work here has on the rest of the world.

The passport icons on the bottom of each page of this issue will take you on a trip through UW-Madison based research, philanthropy, and art that have a global resonance reaching as far as Antarctica (see page 16). Our feature this issue is our 5th annual photo contest; the success of which, I would like to thank all of our readers for. As it did in 2011, the number

of submissions this year doubled from the previous year, making the growth of the event exponential! The process was extremely competitive and I could not be happier with the quality of the results. The decision to spend the extra money to print this issue in full color was a no-brainer. The WEM officer staff wanted to be able to display all the hard work that our staff and photo contest participants dedicated, in all the wavelengths of its excellence.

I could not be more proud that this is the last issue of the magazine that I will have seen from its beginning to final stages of production. After eight semesters, I truly feel lucky to have been a part of such a unique organization that has given me both a creative outlet and a nurturing space to grow professionally. Thank you again for your continued readership and for building a scientific community that is so enjoyable to write about! As I leave Madison and head into the corporate world after graduation, I plan to keep the Wisconsin Engineer Magazine in my heart (and my mailbox) forever. **WE**



From Remnants to Reason: What Powers the Galaxy?

The dark region of the night sky which occupies space between the stars is not a perfect vacuum; but rather, it is filled with a dilute mixture of neutral and ionized gasses, dust particles, and cosmic rays that comprise the interstellar medium (ISM). The majority of these particles are the remnants of star deaths including supernovae—the massive explosions that mark the death of large stars which eject energy and matter into space. By studying the ISM in the Milky Way, scientists hope to be able to answer important questions about the history of our galaxy and the nature of the mechanisms that govern its motion.

The most abundant element is hydrogen which comprises nearly three quarters of the entire universe's elemental mass. By the 1970s-80s, radio astronomers had provided a fairly conclusive map of all of the neutral hydrogen within the Milky Way. However, it wasn't until the advent of modern charge-coupled devices in the 1990s that high-resolution imaging of ionized gas was possible. One component of the ISM which has since gained interest is the thick layer of gas containing a high fraction of ionized hydrogen (HII) known as the warm ionized medium (WIM).

In order for hydrogen to become ionized, it needs to absorb a sufficient amount of energy. Most stars in our galaxy are capable of heating gas to high temperatures, but only the hottest, most massive stars are able to ionize the gas. This would suggest that ionized hydrogen would only be found in high concentration surrounding massive stars in what are known as classical HII regions, or nebulae. In the early 1990s, however, a group at UW-Madison sought out to determine the exact makeup of ionized hydrogen in the Milky Way, and their results were surprising.

The Wisconsin H α Mapper (WHAM) is a custom-built observatory that was dedicated to the first kinematic survey of the diffuse ionized gas in our galaxy by observing ionized hydrogen's unique H α emission. The instrument, which excels in observations of faint, diffuse optical emission, consists of a siderostat with a 60 centimeter primary lens coupled with a 15 centimeter spectrometer that were designed and built in collaboration with the UW-Madison Physical Sciences Laboratory and the UW-Madison Space Astronomy Laboratory.

The project was commissioned at the Pine Bluff Observatory in Wisconsin in 1996. In November of that year, the

**"WHAM produced
the first full northern sky map of
H α emission before the end of
the millennium. "**

instrument was installed at Kitt Peak National Observatory near Tucson, Arizona where it joined one of the most diverse groups of astronomical instruments in the world. Although it was located over 1700 miles away, nearly all of the research was conducted remotely from Madison. According to Matt Haffner, now the lead principle investigator of the WHAM project, "The guy who started this was Ron Reynolds. He is an emeritus professor now. I think it was more in the back of his mind that [remote handling] would be a nice way to run this. However, he actually had in the budget that a grad student would go down to Arizona for two weeks every month and perform the actual observations."

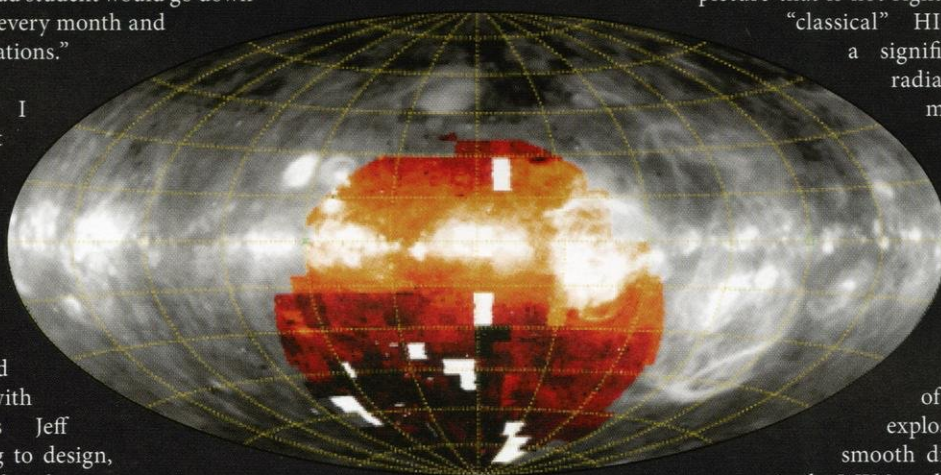
Haffner says, "Well, I happened to be that graduate student. I like taking trips, and I'd taken plenty to get [WHAM] going, but I was more interested in trying to get the remote stuff working." In response, Reynolds and Haffner worked closely with UW-Madison engineers Jeff Percival and Kurt Jaehnig to design, fabricate, and build novel, robust systems that would be remotely accessible. As a result, WHAM is a largely custom instrument with very few off-the-shelf parts. WHAM produced the first full northern sky map of H α emission before the end of the millennium.

For a gas to be ionized, it needs to be constantly energized. From a first order description—where hydrogen is smoothly distributed around a star—one would expect to find a bubble of HII around the star known as a Strömgren sphere. However,

WHAM's northern sky survey showed the distribution of ionized gas in the Milky Way to be detectable in nearly every direction and characterized by rich filament structures.

The WIM is not regularly distributed. Haffner says, "When we [go] out and look with sensitive telescopes, we're finding ionized gas everywhere. It's not even in little balls or clumps. We see H α emission in every part of the sky, so that tells us something about our initial picture that is not right." Although the denser "classical" HII regions contribute a significant portion of H α radiation, the WIM contains most of the ionized gas in the Milky Way.

In order to create this turbulent picture, explosions like supernovae likely play an important role in the Galactic makeup of ionized gas. The explosions cause gaps in the smooth distribution of hydrogen in the WIM, and this allows high-energy photons from hot, young stars to travel far from their source and ionize gas a great distance away.



H[alpha] emission spectrum of the Milky Way

Working with powerful computer programs, scientists are now able to simulate environments on scales similar to that which WHAM can see. Haffner says, "We have models on the theory side of taking the gas and trying to create structures that are more realistic from using supernovae mixing things up and putting them into hydrodynamic simulations to see what the resulting gas structure is. Then you put the stars in, turn them on, and ask the question of how far ionization is possible now that the medium is no longer smooth." In this manner astronomers are able to shed new light on what is powering our galaxy.

In 2009, WHAM was shipped to Chile and installed at the Cerro Tololo International American Observatory where it would obtain H α data for the portion of the sky not visible from the northern hemisphere. Data collection was finished by 2011, and by February 2012, over 90 percent of the data had been reduced.

From its location in Chile, WHAM is now able to collect data from the Large and Small Magellanic Clouds—irregular dwarf galaxies which orbit the Milky Way and are not visible from the northern hemisphere. Upon completion of the full sky survey, WHAM will turn its sights on the Magellanic Clouds to explore the complex, extended gas systems with which they are associated.

WHAM is an ambitious program which is helping to paint a more accurate picture of the universe. It has been funded in large part by the National Science Foundation, and it continues to produce new information and uncover secrets about the mercurial galaxy that we inhabit. **We**

Article by: Matt Treske

Design by: Ryan Krull

Photography by: Tyler Van Fossen

badgers go global

number of alumni volunteering in the peace corps soars



Ohrid, Macedonia

The Peace Corps recently announced that the UW-Madison ranked third in the amount of alumni volunteers serving in 2012. This year, there are 107 Badgers volunteering around the world, adding to the more than 3,000 UW alumni who have served in the agency since its conception in 1961.

UW-Madison has had high-ranking numbers of volunteers for twelve consecutive years and an increase of sixteen volunteers from just last year alone, according to a recent article in The Badger Herald. Currently working in over 75 different countries, the Peace Corps was founded with three missions: to provide volunteer work, to learn about and to promote an understanding of the culture of the communities served and to educate communities in the United States and worldwide about American stewardship. Volunteers spend 27 months serving in another country, beginning with three months of language and technical training.

Once a community asks the agency to assist with a specific project or goal, the Peace Corps matches up the projects with volunteers, based on individuals' skill sets

and the requirements of the project. On a general level, there are seven program sectors to which volunteers can apply to work: Education, Health and HIV/AIDS, Business and Communication Technology, Environment, Youth Development, and Agriculture. So, how are engineering students getting involved with the mission? Kim Johnson is the Peace Corps campus representative in the Division of International Studies for UW-Madison. She was a volunteer for the Peace Corps in Papua

New Guinea teaching science and math. She works to encourage, enable and assist those considering applying, as well as to provide information to all those who are simply curious about the Peace Corps' mission.

According to Johnson, there are a number of current and graduated engineering students volunteering, "more than [I] thought, actually." Johnson was "amazed" at how many students approached her at the recent Career Fair in the Engineering Centers Building.

As students with an engineering background, there are a wide variety of opportunities available for work with the Peace Corps. Because of the rigorous course load associated with engineering majors, volunteers

with this background tend to be highly qualified for teaching subjects such as secondary-level math and science. Additionally, there is the possibility to work on specific engineering projects, in accordance with the engineer's individual field of study. For example, projects dealing with water and sanitation might require and specify the help from an environmental or chemical engineer. However,

Kim states that these jobs typically only occupy "20-25 hours a week." Volunteers also have the opportunity to work on their own project, something about which they are particularly passionate.

During Johnson's trip to Papua New Guinea, she was fortunate to work on several side-projects. "I taught, yes, but I also rehabilitated a library, started a mentoring program for high school and grade

"I taught, yes, but I also rehabilitated a library, started a mentoring program for high school and grade school kids, and started a running club ... so for engineers, there's these jobs [...] plus your own projects."

-Kim Johnson

school kids, and started a running club ... so for engineers, there's these jobs—teaching, and then some of the environment, resource-management, or water and sanitization engineering—plus your own projects,” Johnson says. She notes that there is “a lot of creativity” in working on individual projects and that “people really rise to the challenge, and then they come back with these amazing stories about what they did with a string, a piece of gum and a can, for example.”

While the excitement in the opportunities offered through Peace Corps attract many volunteers to serve, Johnson believes that it is the current and past students, along with UW-Madison's core beliefs, foster the environment that cause so many to volunteer. Noting that UW-Madison is such a renowned and highly acknowledged university “well known for its service, not just its academics,” she states, “I think that people that come here are quite inclined to volunteer ... and that's one of the reasons they wanted to come to UW-Madison. They have an interest in going abroad, as well as an interest in serving the community.”

Clearly, UW-Madison appears to be, to some degree, a catalyst to the large numbers of volunteer alumni. Johnson adds that the campus focuses on “getting outside its borders,” a principle she believes to have been fostered in the “Wisconsin idea,” which has “gone from the University to the state, and now it seems like it's getting bigger,” Johnson says. She notes the presence of plaques along Bascom Hill that discuss how the UW-Madison strives to work outside its borders, to make the university “a resource, rather than something incased.” Whatever their reason, whatever their cause, these Badger volunteers have demonstrated their willingness to leave the comforts of the city of Madison, and in doing so, they have inspired not only everyone associated with UW-Madison, but also many around the world. This passion for service is something of which all Badgers can be proud. On Wisconsin! **we**

Written by: Nora Dahlgren

Photography acquired by: Nikala Wickstrom

Design by: James DeBano



Vevechani, Macedonia

More Information

An additional way graduate engineering students could get involved with the Peace Corps is through Masters International programs, offered by some universities around the United States. This program allows the student to begin graduate school first, and to apply one's studies with international Peace Corps Volunteer fieldwork. For additional information, log on to: www.peacecorps.gov/gradschool.



Buzalkova, Macedonia

A detailed look into diversity within the
UW-Madison College of Engineering

Diversity within Engineering

The question of diversity does not have a one-fold answer; many perspectives can be taken on the issue. Different ideas of ethnicity, religious backgrounds, social class, and education can all be contributing factors. As students of an American university, the specifics of global diversity can become quite cloudy. If the population of the earth was represented as a village of one hundred people, with all existing human rations remaining the same, there would be fifty seven Asians, twenty one Europeans, fourteen from the Western Hemisphere, and eight Africans. Seventy would be non-white, thirty white. Another independent group of seventy would be non-Christian, thirty Christian. Fifty percent of the entire world's wealth would be in the hands of six people, and all six would be citizens of the United States. Seventy would be illiterate, fifty would suffer from malnutrition, and eighty would live in substandard housing. Finally, only one member of the village would have a college education.

The 21st century global community faces significant challenges to meet the needs of the human race. The one percent of the population with a college education will need to work on gathering sources of clean water, food, and energy, developing medicines and improving health care, countering vicious natural disasters and restoring aging urban infrastructure. Research shows that diverse groups are more productive, creative, and innovative than homogenous groups. On the UW campus, Polygon, the engineering student council, has its own department dedicated to working with faculty, staff and other students to improve diversity within engineering.

In April of 2011, Polygon, hosted a FUSE (Forming an Understanding of Situations in Engineering) Diversity Dinner. The keynote address, given by Professor Susan Hagness, Department of Electrical and Computer Engineering, was about increasing diversity in the next generation of engineers. Professor Hagness addressed the Madison Initiative for Undergraduates (MIU), a campus wide engagement of undergraduates

in society's engineering grand challenges. The initiative introduces two synergistic undergraduate programs to better prepare students to help solve these grand challenges. The first interdisciplinary course builds on the preliminary success of InterEgr 102, a first-year engineering course to highlight opportunities to positively shape the world's future. The capacity was doubled to three hundred students per year to allow wider campus participation. The second allows undergraduate research opportunities tied to engineering grand challenges, offered through the Undergraduate Research Scholars program, increasing the number of program projects more than five-fold. However, as Professor Hagness highlighted, diversity is a means, not an end. Merely adding diverse students does not create a more supportive and intellectually stimulating environment within the college of engineering.

"We're a well respected institution, and students want to come here from many different countries, so that really adds to the diversity"

-John Archambault

A welcoming climate reinforces the collective efforts of expanding programming. Fellow FUSE Diversity Dinner attendee Dean John Archambault, a member of a Climate Committee for the college of engineering, looks at the social environment of the college for students, faculty and staff, and tries to find ways to improve the student experience. Ninety five percent of all engineering students will go through his Engineer Career Services office at some point during their time at the university. Sixteen percent of students in the engineering undergraduate

Last fall, the committee had a poster campaign for diversity and inclusion, positioning posters all about the campus. Incoming freshmen received a card about diversity on campus that delved into the university expectation guidelines regarding respect for individuals. “We’re always starting over with every freshman class that comes in, and we need to keep things going in there and keep that message strong. People who are champions of the idea keep the idea moving long. It’s especially tough with undergraduates, as they’re not here for a long time, and there are a lot of things clamoring for their attention, certainly coursework is first and foremost in the area of responsibility,” Archambault says. “I think most students on a superficial level get it, the need for diversity, but what we want to look at is at a deeper

I attended the FUSE dinner last spring without knowing exactly what to expect. As a second year undergraduate student, my encounters with conversation about diversity within engineering had been limited. After sitting down for dinner and discussion with two deans, two members from industry and three undergraduates, the experience opened my eyes to better understand situations in engineering. Fellow attendee Michael Luc, an undergraduate in Chemical Engineering, echoed my own sentiment. "It was interesting to see engineering degrees broke down with regards to ethnicity, and how constant it has remained," Luc says. "I took InterEgr 102 to first explore the grand challenges within engineering, but now they make even more sense within the context of the global community and diversity within the engineering student body, and eventually, work place." Attaining harmony with diversity within a large student body is a difficult task, but with a combined effort from the student body and faculty, the desired goal is within reach. With knowledge and a mindset gained on campus, graduates will be even more beneficial to the global community of engineers. **WE**

Design by: Marita Thou



wisconsin engineer



EWB emphasizes the value of collaboration; members of EWB-UW, the West Bend Rotary Club, and the local government work together to bring change to the community.



ENGINEERS WITHOUT BORDERS-USA UNIVERSITY OF WISCOSIN-MADISON STUDENT CHAPTER

Building Bridges and Bridging Cultures

What do the communities of La Granja, El Salvador; Muramba, Rwanda; Bayonnais, Haiti; Orongo, Kenya; and Madison, Wisconsin have in common? Hint: It's not the weather... All of these communities have benefited from the work of Engineers Without Borders (EWB), a student organization with a unique purpose. The group harnesses the skills and innovation of its members and partners with communities in developing nations to find sustainable solutions to local problems. A national organization, EWB began in 2002 and has expanded to 250 chapters nationwide. EWB-UW is the largest chapter, with over 80 members and five projects in progress, four of which are international.

The UW-Madison chapter was founded in 2004 by the late civil and environmental engineering Professor Peter Bosscher and is now led by student co-presidents Missy Setz and Eric Tervo, who are assisted by faculty advisors Norm Doll and Giri Venkataramanan. With over 80 active members and 4 international projects, the UW-Madison chapter is the largest in the US. Its members are primarily engineers

but include majors across the spectrum, from engineering to education to microbiology to neuroscience. Financial support comes from club-run fundraisers, Morgridge and Baldwin grants, partnerships with organizations such as the West Bend Rotary Club and private donations.

One of EWB's biggest accomplishments was their construction of a bridge in El Salvador. This bridge spans a deep ravine between the communities of La Granja and Nuevo Ferrocarril. It holds a pipeline that is designed to transport wastewater. Before EWB, these communities lacked any kind of wastewater infrastructure. The water for cooking, bathing and household use was deposited in stagnant pools or flowed into a nearby stream. Implementation of the pipeline in La Granja and a small section of Nuevo Ferrocarril began in January 2008 with concurrent microbial studies to quantify the improvement in water quality. Back on campus this semester, members are working on the designs for the final piece of the pipeline serving Nuevo Ferrocarril. The microbial studies and community education about water management and sanitation will continue after the construction of the pipeline is complete.

EWB doesn't just build bridges; with every project the organization makes a minimum five-year commitment to the community. The goal is not just to build the project and leave, but rather to establish a sense of community ownership of the project and educate the public about its use and maintenance so that the project is sustainable. According to Setz, "It has to come from a community initiative to understand that there is an issue, that they need this project to increase quality of life." Sustainability is the key to their work and, therefore, many projects take years to complete. "Maybe in ten years when I get an update from the El Salvador project and they have completely finished their work in that community and everything is going well, then I'll be able to stand back and say work is done," Tervo says about progress in El Salvador.

Building the bridge is not EWB's only objective as their work also bridges cultures and connects people around the world, taking the Wisconsin Idea around the globe. The work is highly beneficial for the students as well. A trip over summer or winter break is often more feasible for an engineer who may not have the opportunity to study abroad, and it can provide a meaningful and concrete experience.

Research assistant Chris Bareither received his PhD in geological engineering from UW-Madison in 2010 and has been involved in EWB since he came to Madison. When asked what he would do with the resources currently available to the organization, he says, "The best thing I would want to do is just get more people involved. Just be able to take more students and give more students that experience. It makes such a

unique impression on their life and their vision for what engineering can do for the future that I think being able to spread that vision to more students would be ideal." **WE**

Written by: Lori Bierman

Photos provided by: EWB-UW

Design by: Songkhun Nillasithanukroh

Donations can be made at:

<http://www.ewbuw.org/node/7>



EWB and community members work side-by-side to build a waste water system connecting La Granja and Nuevo Ferrocarril, El Salvador.

Category Winner

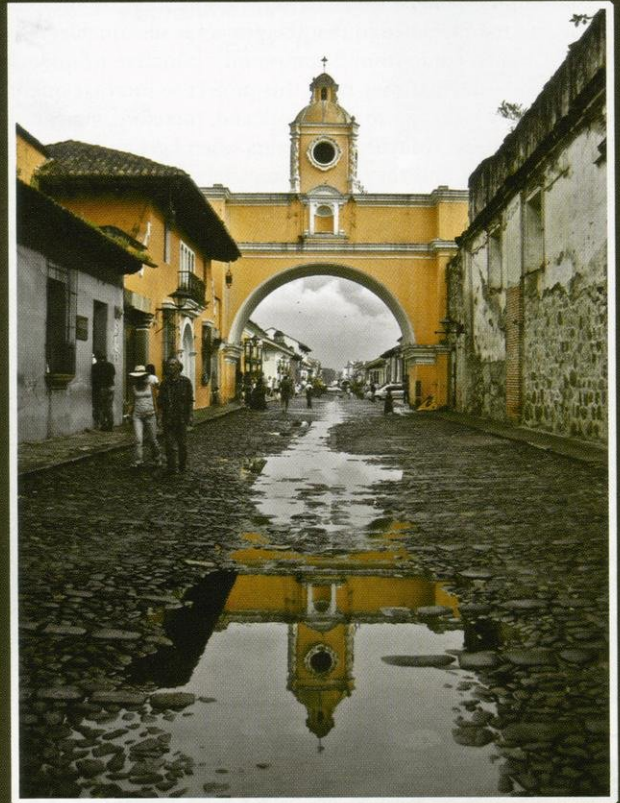
Miscellaneous

Grand Prize
Winner!

Antigua

Erin Donovan

The famous arch in Antigua, Guatemala mirrored in the puddle from a recent rain on the cobblestone streets, surrounded by the hustle and bustle of the antique city.



Runner Up

Miscellaneous

Birds & Harbour Bridge

Wan Mei

This is my first time visiting Sydney and this gorgeous city gave me a long-lasting impression. I strolled around the city and was captivated by the Harbour Bridge, Sydney Opera House and the awesome view of the sea surrounding the city. There are many birds flying around and I thought it was a great opportunity to take photos with one of my favorite views as the background.



Category Winner

Landscape

Endurance

Laura Hartmann



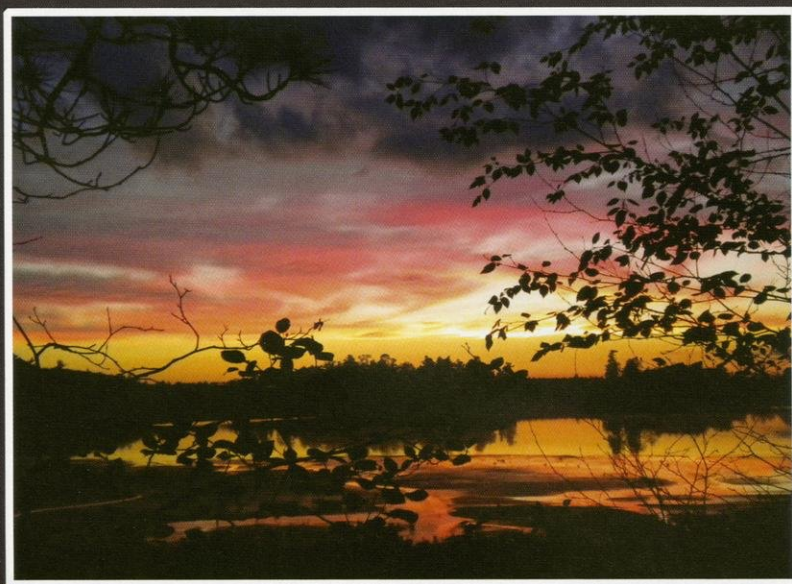
This is a small part of La Alhambra, an extensive fortress that was built over hundreds of years by the Moors in Granada, Spain, the last city occupied by the Moorish people until they were forced to surrender to the Christians in 1492.

Runner Up

Landscape

Taste the Rainbow

Ellen Zimmer



This photo was taken at a Muskellunge Lake campsite right before nightfall creating a sky full of beautifully bright colors.

The Wisconsin
Engineer's 5th Annual Photo Contest

The Wisconsin Engineer's 5th Annual Photo Contest

Category Winner

Still Life

Full Bloom

Christian Fabian

Madison in full bloom. These magnolia flowers were captured on the first rainy day in March when they are known to flaunt their most beautiful, vibrant colors.



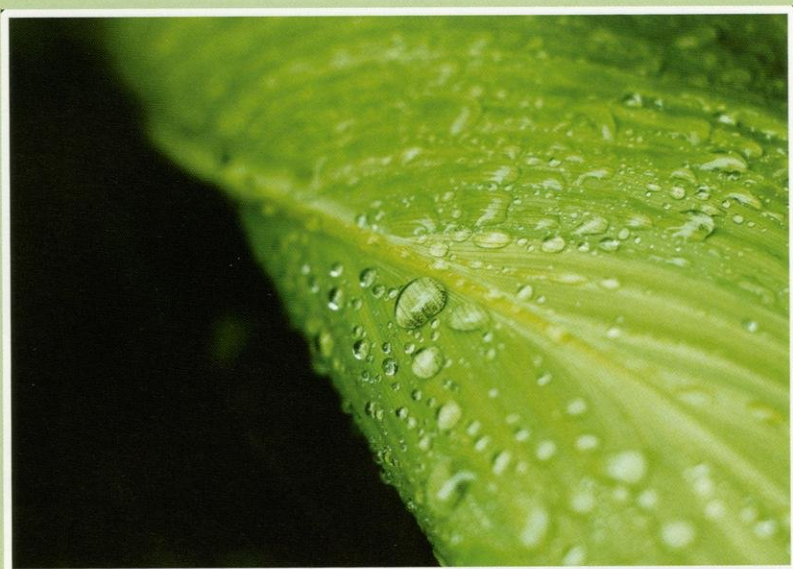
Runner Up

Still Life

Nature

Amanda Bechtel

A leaf holds rain drops from an early morning rain shower in New York.



Category Winner

Portrait

Sitting by Mendota

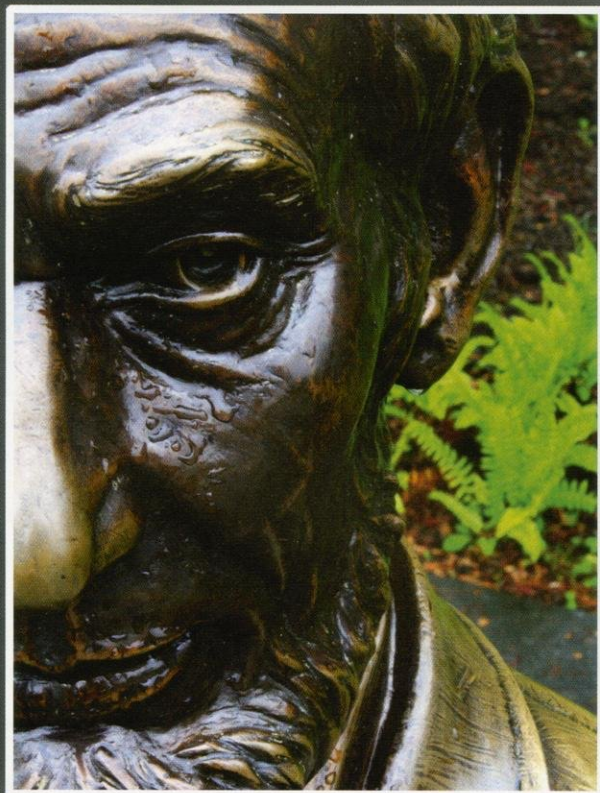
Borui Wang



This is a snapshot of a couple sitting together on the Memorial Union Terrace. While sitting on the same colored chair, they look in different directions.

Runner Up

Portrait



Abe

Mark Ericson

This picture was taken this past summer on a trip to Gettysburg National Military Park. It had just finished raining as I was passing this statue of Abraham Lincoln and the rain on his face looked like tears. It seemed fitting for the location of the statue.

The Wisconsin
Engineer's 5th Annual Photo Contest

COLD, HARD PHYSICS

The University of Wisconsin has been extensively involved in major research at the South Pole that aims to identify point sources of subatomic particles called neutrinos.

If you didn't already think that UW was involved in cool research, think again. The IceCube project is a neutrino observatory located at the South Pole in Antarctica; you sure can't get much colder than that.

The project is the brainchild of Francis Halzen, professor of physics here at the University of Wisconsin – Madison. The primary aim of this project is to find extragalactic point sources of high energy particles known as neutrinos. These particles have so much energy that they can't even be controlled by galactic magnetic fields. Despite having all this energy, neutrinos are almost undetectable. So even if you did run into one you would never know it. Actually the only place on Earth where you might run into one would be inside a nuclear reactor.

For those of you who aren't particle physicists, a neutrino is an electrically neutral subatomic particle. Since they have no charge, and are tiny even by subatomic standards, they are only affected by the weak nuclear force that causes the repulsion of opposite charges. This means they can travel over immense distances and through matter without interacting. These particles can possess energy levels so high that a cataclysmic event greater than the collision of stars would be required to produce them. In the rare chance that a neutrino does interact with, say a water molecule, a charged particle is created. If the neutrino had enough energy prior to this interaction, then the newly created particle will emit Cherenkov radiation. This radiation is similar to the shockwave produced when a jet travels faster than sound. In this case, the particle travels faster than the speed of light and a cone of photons is left in its wake.

The IceCube observatory uses an array of thousands of Digital Optical Modules (DOMs) that are equipped with photomultiplier tubes (PMTs). According to Adam Wright, a researcher working on the IceCube project here, these PMTs can be thought of as "reverse light bulbs." Instead of producing light from electricity, they detect light and produce an electric current." These DOMs are deployed deep in the Antarctic ice on strings of around 60 modules. If a neutrino traveling through the ice does interact with any matter near the detector array, the DOMs pick up the resulting Cherenkov radiation. Through use of complex algorithms, the trajectory of the neutrino can be determined and traced back to its source. From here optical telescopes can be directed to this location in the cosmos in an effort to determine what exactly this source was.

Construction of IceCube has been ongoing since 2005, with installation of the final string taking place in December 2010. With this in place, the detector takes up a cubic kilometer making it the largest neutrino telescope in the world. This was no small feat, and UW-Madison had to call in some help to cover the \$271 million price tag. In total IceCube involves over 40 international organizations, encompassing 11 countries. Despite their geographical and cultural differences, these organizations manage to work together seamlessly to reach their unified goal. Twice a year, conferences are held in which participants meet to discuss findings and propose further research. These meetings take place all over the world; Madison was host to last spring's conference.



Adam Wright (Researcher for Icecube project) holding the DOM.

While the principle goal of the IceCube observatory is to detect point sources of high energy neutrinos, there's no reason it can't be used for other ends. As Wright says, "IceCube is a collaboration of many nations that can detect many particles... We're just a bunch of nerds searching for WIMPs." He's not referring to stringy little kids who get picked on by bullies. WIMP stands for Weakly Interacting Massive Particle. These are hypothetical particles that possess many qualities similar to neutrinos, with the exception that they are massive (as far as subatomic particles are concerned). Many physicists think that these WIMPs may be a form of dark matter, which is believed to make up of 80% of the universe. One of many secondary uses for IceCube has been the indirect detection of this dark matter.

different approach by utilizing neutrino interactions. Things like dark matter, which are undetectable through use of photon interactions, may finally start to reveal their secrets thanks to this new way of seeing the universe. All the way at the bottom of the Earth, UW-Madison and other researchers from around the globe are working on research that is not only out of this world, but downright cool. **WE**

Written by: Nathan Rogers

Photography by: Tirupan Mandal

Design by: Joe Powell

"IceCube is a collaboration of many nations that can detect many particles... We're just a bunch of nerds searching for WIMPs."

- Adam Wright

Essentially it comes down to this: For centuries astronomers have been viewing the universe through optical telescopes and only saw the visible spectrum. What this means is that they are only seeing the result of particles known as photons interacting with matter. Recently they have started using other methods to view the cosmos, such as infrared or x-rays. This is fundamentally the same principle however; these are just photons with different wavelengths. IceCube offers an entirely

Nations Involved:

USA
Germany
Belgium
Sweden
Switzerland
United Kingdom
Japan
Australia
Canada
New Zealand
Barbados



A Digital Optical Module (DOM). ready to be put into the ice.

Engineering Escapades

“Engineering students describe their experiences while studying in Europe.”



‘Fuerza es igual a masa multiplicada por la aceleración.’ That is the Spanish translation of ‘Force equals mass multiplied by acceleration.’ Can you imagine learning all of your classes for an entire semester in a foreign language? If math and science weren’t foreign enough for some, many engineering students choose to do this when they leave to study abroad. Although not all universities abroad teach in a foreign language, simply experiencing the cultural differences and living in an unfamiliar place far, far from “Sconnie Nation” can be a challenging task; however, the experiences and irreplaceable knowledge that are gained is undeniably worth it.

Engineering students at UW-Madison can choose from fifty different study abroad programs to participate in. Although all of the students that I spoke with had very different experiences in the variety of places that they traveled, everyone described it as a life-changing event. Michael Szewczyk, a fifth year senior in mechanical engineering went to Valencia, Spain for a semester; he says, “It’s kind of scary to think about who I would be today if I had not studied abroad. The whole experience made me more outgoing and I wouldn’t have made decisions like accepting an internship in Brazil had I not gone to Spain for a semester.” Other engineering students from UW-Madison interviewed had been to places such as France, Germany, Ireland and Spain, and after hearing about their study abroad experiences, I really wish I would have chosen to go abroad as well. I have taken a few Spanish classes and although I have gained valuable knowledge in my engineering classes, studying abroad can teach you much more than how to apply Newton’s laws of motion.

Many people study abroad during their sophomore or junior year, but even if you are a senior, it’s not too late! Nathan Wong graduated with a bachelor’s in engineering mechanics and astronautics (EMA) from UW-

Madison and although he didn’t do a study abroad program during his undergrad, he is currently working on a master’s in space management at the International Space University (ISU) in Strasbourg, France. His program consists of 41 students representing 26 countries and is taught entirely in English. Nathan took some French in high school, but after going five years without maintaining his knowledge, his skills were essentially rendered useless. Wong says, “When I go out, I go with my friends from school so we are always speaking English. The only time I wish I knew more French is when talking to the beautiful French women.” The master’s program at ISU is crammed into a single year,

and on top of going to class and doing homework, Nathan is working on a number of projects including an inflatable habitat (similar to the X-hab project done at Madison), a Quadcopter in Zero-G and a project on Geo-engineering. Nathan explains how he manages his time even with all of that work; he says, “Madison taught me well the lessons of ‘Work Hard, Play Hard.’ Any EMA can tell you that we learn in senior design how to manage time with multiple projects, classes and a social life.”

If you are considering studying abroad, but are worried about the expenses, credits transferring or living in a foreign place - don’t be! All of the students I spoke with

assured me that although planning your trip involves some extra work, the experience is simply unbelievable. Andrew Bray, a senior in industrial engineering who studied in Madrid, Spain, describes his experience finding an apartment; he says, “I stayed in a hostel the first few days and then I tried to find a place in what they call Residencias. It was hard because my Spanish was really bad at the time and I was just showing up at doors trying to work something out. There was another American studying abroad who kind of found me as a stray dog and helped to translate for me and I eventually found a place.” Other universities in Europe may help you find a place or even set you up in an international



Paul Pezzi stands in front of the historic Altare della Patria in Rome, Italy.

dorm on campus. There are many resources at UW-Madison that will aide you in the planning process as well.

Most of the students with whom I spoke described the way in which classes were taught in Europe as more relaxed than at UW-Madison. There is generally much less homework (if any at all!) and class time, and your grade depends solely on a final and possibly one mid-term. Paul Pezzi graduated with a bachelor's degree in engineering mechanics and astronautics and he studied abroad in Toulouse, France. He says, "The style of teaching was different, but numbers are numbers in the end." Many people opt to fulfill their breadth requirements abroad because it is a challenge taking a full semester of engineering courses in a foreign language. I asked Paul whether or not he would recommend studying abroad; he says, "I definitely recommend going abroad whether you're engineering or not. I don't think enough engineers study abroad."

Although you may learn generally the same information from the classes abroad that you would at Madison, you gain much more knowledge about other cultures, different types of people, and the experiences of living in a new place. If you are a little on the shy side, a study abroad program may be the perfect situation to break you out of your shell. Charles Donaldson, a senior in biomedical engineering, went to Galway, Ireland for a semester; he describes what a rewarding learning experience it was. "Before I left for Ireland, I mainly stayed within myself, thinking my own thoughts, talking only when needed. I had no idea how to hold a conversation with someone. But, the longer I spent in Ireland, the more I was forced to talk to people; I had to learn ice breakers, find common ground with strangers, and in the end, it was the best thing that ever happened to me," he says.

Many engineers who study abroad either get a certificate in international engineering, a certificate in European studies or even another bachelor's in their specific foreign language! Most of the students that I interviewed thought that regardless of whether or not their study abroad experience has directly helped them obtain an internship or a career, their communication skills have grown and they have become more globally aware of how other people live in different parts of the world. These traits have helped some of them

exude confidence and understanding either on the job or simply in answering questions in an interview.

Eric Wedul studied abroad in Stuttgart, Germany for a year and also graduated with a bachelor's degree in engineering mechanics and astronautics, as well as a bachelor's in German, a certificate in international engineering and a certificate in European studies. He says, "I think more businesses are looking for globally rounded people because so many companies deal with people from all over the world. Dealing with cultural differences applies to any major really, not just engineering." Everyone that I spoke with about studying abroad had different ways of explaining their trips; Eric was the only one I spoke with that studied for an entire year and although some of the other students thought a year would be too long, Eric says, "I recommend the full year. My German wouldn't be what it is still today if I hadn't been there for a full year. It's important to immerse yourself in the culture of where you're at. It's good to get to know the locals and the people that are studying there. People put more effort into building relationships when they know you're not just there for four months."

Although you might miss out on Halloween festivities or the Mifflin Street Block Party, studying abroad can give you the tools to grow as a person and experience life in a way that cannot be taught in Wisconsin. Charles Donaldson summarizes his experience, case-in-point; "Before I went to Ireland, I was perfectly fine with staying in one place, keeping my same daily routine and hanging out with my same friends. But now that I have seen how big the world is, how much there is to see and that the world is bigger, a lot bigger than Wisconsin, I feel the urge to travel more and to meet new people and hear their stories. I now have more confidence in talking to strangers, acting on my own, traveling, and working with people in general. Life is an adventure, and I don't let stress bother me as much as I did before. I grew in academics, but my common sense grew ten-fold and I will always be grateful for that." **WE**

Written by: Austin Kaiser

Photos provided by: Paul Pezzi and Eric Wedul

Design by: Jessica Zeman



Eric Wedul poses on the balcony of the Heidelberg Castle in Heidelberg, Germany

Additional information about studying abroad can be found on the International Engineering Studies & Programs website at <http://international.engr.wisc.edu/> or you can stop by the study abroad office in M1002 ECB.

study

When asked why he chose to study abroad, Sam Hocevar states, "If the foundation of engineering is problem solving and critical thinking, you are holding yourself back if you don't go out and see how other people are solving problems." Hocevar is a UW-Madison civil engineering student studying abroad in Chile. Even though many express these feelings about studying abroad, so few do go abroad. Those that do, however, have an advantage: they have an expanded and worldly approach to problem solving ability. They have experienced engineering in a different "world." Students who go abroad learn from professors who live in a different environment and operate in different styles, it is an experience that can never be truly replicated. Later in the engineers' career, they may become inspired to take what they've learned and change it into something that fits needs back home.

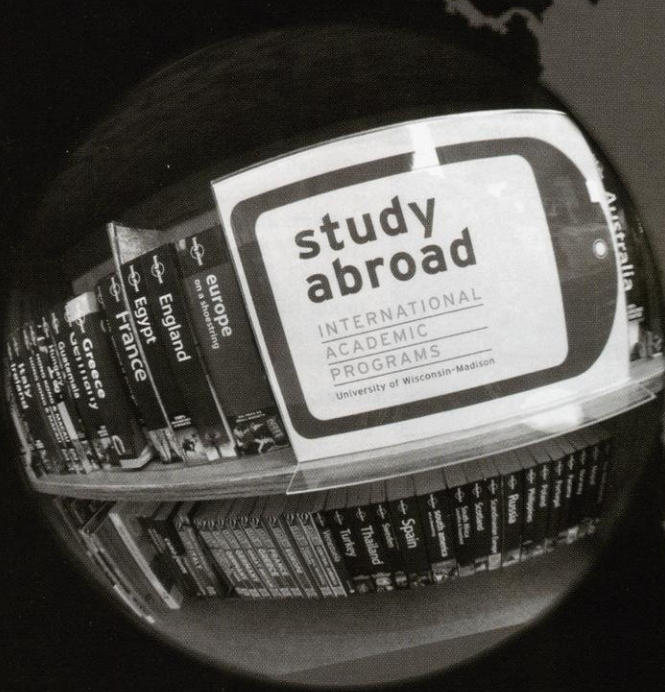
UW-Madison has set up numerous exchange programs with universities around the world to give engineers many opportunities to study abroad. Luckily for engineers, according to the office of International Engineering Studies & Programs, there are over 50 programs provided including summer, one semester and full academic calendar programs, available both in English and foreign languages. These programs are designed to fit into the already tight academic schedules of engineering here at UW-Madison.

For those nervous about learning from other professors, you can study abroad with certified UW-Madison professors and just enjoy the foreign land and culture. Amanda Hammat, director of the study abroad programs for International Engineering Studies and Programs says that the summer programs are always popular; UW-Madison professors are teaching UW-Madison students. So with more than enough reasons to go, and even more places to go, the only thing left to discuss is how to go abroad. A student must file for a visa in the country they are expected to attend. The host university and UW-Madison both help obtain health records and tests. Furthermore the office of International Engineering Studies and

**"The summer programs are always popular;
UW professors are teaching UW students."**

-Amanda Hammat

Through the various travel books provided by the IAP office, engineers can find information about potential studying abroad countries.



abroad

Programs has set up many scholarships that are available for studying abroad. From various interviews, housing seemed to be the biggest challenge. Many students, such as Sam Hocevar, choose to stay in a hostel until they find something permanent. Sam is currently staying in a hostel but says the experience is enjoyable. Instead of rushing to find a dorm, Sam preferred to wait until he found a good apartment. He disclosed that since he is having such a great time at the hostel, he is in no rush to move out. According to Sam, the hostel gives him a unique experience with locals and local events, furthermore he gets the opportunity to hang out with people just traveling through. Through all of these activities he continues his studies and projects.

Studying abroad is an essential experience, and tool, for engineers. From the ability to expand problem solving abilities, being able to learn from the great minds of international universities, to being able to gain the crucial international experience, studying abroad is a tool that cannot be ignored. With UW-Madison providing many options and resources to go aboard, the fact that studying abroad isn't a requirement is hard to believe! 

Written by: Mitul Patel
Photography by: Chen Liu
Design by: Akhilesh Dakinedi



Represent the studying abroad country!



Logo of International Academic Programs (IAP) office, in the Red Gym, together with flags of destinations of international study abroad programs.

Building With Bubbles

Have you ever wondered how structures which support thousands of pounds of weight are built? One year ago, a conducive system called BubbleDeck® made its debut at UW-Madison. This new technology for structural support is a result of international cooperation and ideas. BubbleDeck® eliminates up to 35 percent of concrete used in structural projects, basically getting rid of dead weight from the center of floor slabs by utilizing recycled plastic bubbles. Since the development of BubbleDeck® ten years ago in Europe, international communication has allowed knowledge of this technology to end up here at the new LaBahn Arena.

BubbleDeck® is a structural integration method that links air, steel and concrete in a two-way structural slab. Reinforcing steel holds hollow plastic balls in place in the slab, which are as strong as traditionally poured decks. The final resulting structure eliminates the use of excess concrete while maintaining biaxial (two-way) strength. BubbleDeck® also minimizes the number of panels necessary for construction as a result of specifically sized panels.

According to J.H. Findorff & Son Inc., the commercial contractor working on the LaBahn Arena, BubbleDeck® was first investigated in the U.S. in 2007 during a College of Engineering capstone class. This class specifically involved students from several universities throughout the world working to complete a project. In the class, the use of BubbleDeck® was one solution brought up by a student from Germany. J.H. Findorff & Son Inc. decided to further research the benefits of the technology and ultimately introduced the idea to GRAEF Engineering, who is responsible for the structural engineering aspect of the LaBahn Arena.

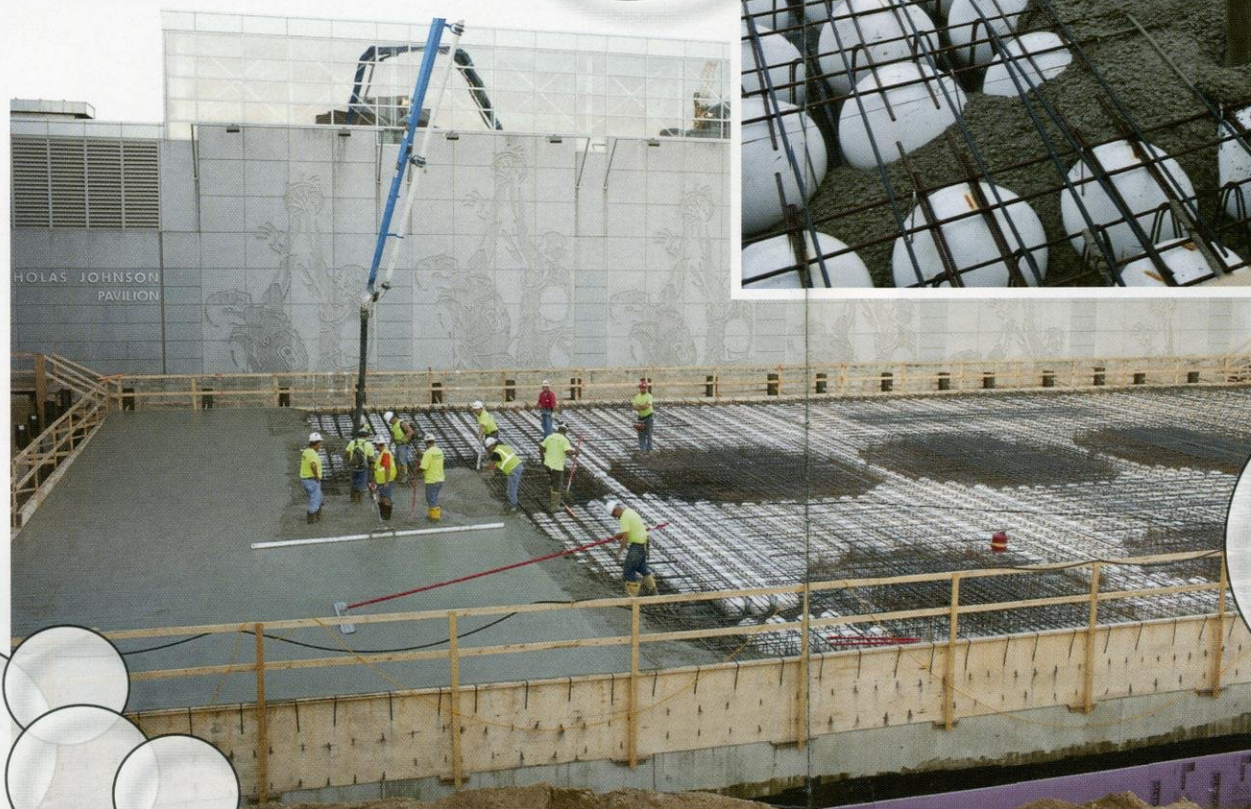
The LaBahn Arena is a four level hockey and swimming facility for the UW-Madison Women's and Men's Hockey and Swim Teams and will be adjacent to UW-Madison's Kohl Center Arena. It is the first project in the United States to implement this BubbleDeck® system. The project utilized the

method of bubbles to build an underground walkway, which is beneath a thoroughfare that is required to support 80,000-lb. emergency vehicles.

J.H. Findorff & Son Inc. anticipated very few issues with the installation of the technology at the LaBahn Arena. BubbleDeck® technology has been tested carefully and proven to be highly successful in Germany, The Netherlands, Denmark and in North America. Bob Hougard, the Senior Project Manager on the installation, explained to J.H. Findorff & Son Inc. his research done several years ago at a job site in Canada where BubbleDeck® was being used. Hougard says it was "a cost-effective alternative to mild, reinforced concrete decks" for this specific project and saved between \$2.00 and \$2.50 per square foot of deck area.

With only edge forming at the perimeter, a decreased number of beams, along with coverage

Construction workers pouring concrete over the bubbles to form the reinforced slab of steel, air, and concrete.



The foundation of the LaBahn Arena made of steel, air, and concrete.

"Using BubbleDeck® means that floors can be constructed 20% faster than alternative construction methods"

"BubbleDeck® reduces the total amount of construction materials while also utilizing recycled materials"

"BubbleDeck® eliminates up to 35% of concrete used in structural projects"

of typically 350ft² per panel, using BubbleDeck® means that floors were constructed 20 percent faster than conventional construction methods. In the structure, 1kg of recycled plastic replaces 100kg of concrete. No matter the breadth of the project, there are four simple steps: shore, set panels, install supplemental rebar and pour to quickly install concrete decks. Construction duration became a major factor in the last few days of the LaBahn project. Bob Hougard says the "short window of time to remove all sidewalks and earth retention" as a challenge, but fortunately "[we] were able to do the excavation, waterproof it and restore the site before

the first hockey game" in the fall when the site is heavily trafficked. The time constraints that exist for projects such as at the LaBahn Arena make the usage of BubbleDeck® a necessary replacement of conventional concrete decks.

Among the extensive advantages that the system offers, the BubbleDeck® is sustainable. BubbleDeck® reduces the total amount of construction materials while also utilizing recycled materials, hence lower energy consumption and reduced CO₂ emissions compared to conventional methods.

The remarkable debut of BubbleDeck® technology at UW-Madison confirms the importance of sharing the international usage of technology and ideas across the world. The BubbleDeck® technology system is a strong example of what we can learn from networking. As countries become more interested in and open to inventions overseas, the construction process will become more effective in terms of structural stability, time and cost-effectiveness. **WE**

Written by: Elizabeth Puck
Photos provided by: J.H. Findorff and Sons
Design by: Max Burton

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Working with Languages

Although it doesn't seem to be a part of the job description, language plays a big part in an engineer's career.

It seems like the technical skills that we learn as engineering students take up the majority of our study time. Not to say that having a technical understanding of the world isn't important, but it's only part of the job. Engineers in any setting must be able to communicate. Having a strong technical background allows engineers to communicate with each other, but that is not enough. After all, the point of any product an engineer creates, improves or maintains is to benefit the people that use it. So while there is a technical language that needs to be learned, there's also a need to simply be understood by the people around us. Between the daily homework assignments, monthly midterms and the craziness of trying to find an internship at the career fair, the grind of everyday life as an engineering student takes its toll, and it seems like the purpose behind our studying often goes missing.

Eyleen Chou, a former UW-Madison engineering student understood this, "I was applying to jobs and going to the career fair, but I didn't really feel like any of the opportunities seemed to be right." Eyleen, having done 3 trips abroad via Engineers Without Borders during her time as an undergraduate, said that when she found an opportunity to go to Haiti after graduation, she jumped all over it. Eyleen worked for Meds & Food for Kids (MFK), a non-profit organization aiming to curb malnourishment in the children of Haiti by developing a form of Ready to Use Therapeutic Food (RUTF). RUTF is an easy-to-consume mixture of various ingredients high in proteins and carbohydrates. Within a few weeks, 85 percent of severely malnourished children treated with the RUTF (called Medika Mamba in Haiti) had recovered, gaining as much as 1-1.5 kg in much needed weight.

Eyleen worked in a peanut factory in Port-au-Prince, Haiti sorting and processing the peanuts, the main ingredient for Medika Mamba. There were many social and linguistic obstacles she says, "It's an American organization based in Haiti, so automatically you have English, French and (Haitian) Creole." The numerous communication barriers made the first few days tough on Eyleen. However, being completely immersed in the Haitian culture, Eyleen found that she was quickly able to understand. "Every day going to the factory from seven to four, you're speaking Creole, because that's what everyone speaks... When you're in that context where you're forced to figure things out and learn on your own, I think it's a really great way to learn a language."

After finishing her work with Meds & Food for Kids, Eyleen was able to benefit from her understanding of Haitian Creole. She found a job opportunity with Inveneo, a technology

company that connects remote parts of the world via broadband Internet. It wasn't her technical background that Inveneo saw in Eyleen, she had very little experience with information technology; Eyleen had the language skills that they needed. Inveneo sets up wireless networks and trained the local Haitian people how to do it themselves. In order to communicate the sometimes incredibly complicated tasks necessary, a strong understanding of the native language and culture is invaluable. Eyleen, through her time traveling the country administering Medika Mamba, had both of these skills. She spent roughly a year helping train information technology to some of the Haitian people with Inveneo, she has now been hired full time, starting in April.

As engineering students, we learn how to understand everything around us through a scientific perspective so that when we enter into the real world we will have the technical skills



to make things and fix things, but we also need to be able to communicate with people. There is nothing like the challenge of communicating with someone who lives in a different culture. By learning a foreign language, one learns much more than just grammar and syntax. It is a great way to, as Eyleen Chou says, "exercise that other half of your brain," and hey, it just might open you a door to a new career. **we**

Article by: Nik Flahavan
Photography provided by: Eyleen Chou
Graphic Design by: Tom Bernath

a taste of *culture*

discover the world right here on campus

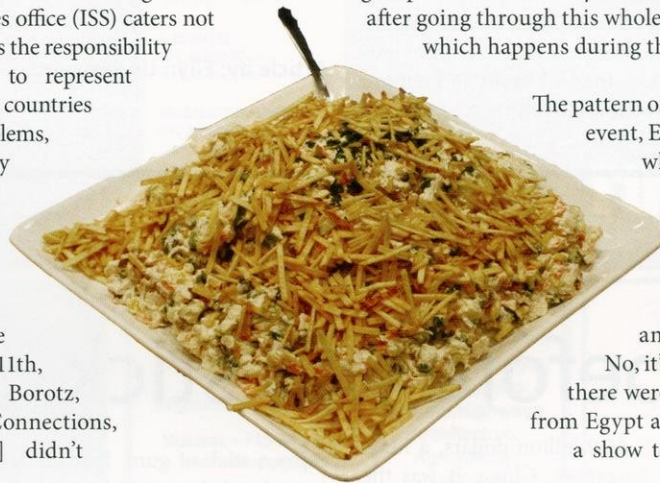
The drum beats are barely audible over the tapping of the crowd as it does the Samba! It is the Taste of Cultures – Discover Brazil, and it will include, as all the Taste of Cultures do, a discussion on the people, a discovery of tradition, local food and, of course, dancing!

UW-Madison is home to more than 4,000 international students. Given this huge diversity, spreading awareness about them is a great deal of work. The International Student Services office (ISS) caters not only to individual students but also takes the responsibility of giving ethnic groups a chance to represent themselves. ISS teaches about foreign countries and cultures, their traditions, problems, foods, festivals and dances, anything they might want to share! The Taste of Cultures event is put on twice a semester and each one focuses on a specific country.

The event started in 2001, after the terrorist attacks on September 11th, and has continued ever since. Jaime Borotz, associate director with WUD Global Connections, says, "The international [students] didn't have much voice following the attacks; they were alone and no one really understood their perspective. It was under those circumstances that Taste of Cultures started. It was a platform where international students could keep their point of view and express their opinions." In these last years, the event has seen changes and the focus has now moved to culture, traditions, and infrastructure; what happens now is more of a celebration of that country, an energy-filled event where people learn about the country and enjoy their time.

How do they choose which country to highlight? There are quite a lot of factors that are considered in making this decision. "First the size of the UW-Madison population from that country is considered," Borotz says. All the presenters and organizers are natives from of the chosen country, so the interest level of people in taking others through an enchanting tour of their native country is indeed the most important. She says, "Usually, ISS sends an email to all the students of that country and depending on the replies decides on the country. Also, after every event, there is an evaluation where people are asked about which other countries they would want to be covered and these statistics also influence the decision." As most folks at UW-Madison would agree, no event here is

a hit if it doesn't have food. The availability of ethnic food, from the Wisconsin Union or an outside source, is another very important factor. Unfortunately, importing very expensive specialties from halfway across the world is not really practical, but Taste of Cultures manages to find nearby sources. Furthermore, the event is a collaborative effort and many other organizations are involved, especially the dance and music groups. The availability of these groups must also be considered. It is after going through this whole process that countries are selected, all of which happens during the summer.



An example dish offered at the Discover Brazil Taste of Cultures event put on twice a year by the Office of International Student Services

The pattern of the event is left to the organizers. At their event, Egypt had a presentation and short videos, while Brazil had a panel discussion. A brief discussion of the major religions and languages of the country ensued, its culture, tradition, geography, and other lesser known things. But the most awaited and amazing part of the event comes in the end.

No, it's not food, it's the dance. In recent events, there were traditional forms such as belly dancing from Egypt and Samba from Brazil. And it is not just a show to watch from the audience, everyone is welcome to join in! In fact, Brazil even had a Samba instructor. The experience of Taste of Cultures on the whole is extremely enriching – not only do you get to learn from people of different places, but you

get to experience the culture firsthand.

The Taste of Cultures events on campus provide people with the chance to experience cultures from around the world, and also provide students with a chance to interact and learn from their peers. The unique events are truly one of a kind, and bring a global perspective to the UW-Madison campus. **We**

Article by: Yaman Singh Sangar
Photography by: Tirupan Mandel
Design by: Evan Owens

Madison's Sister Cities

Sisters can agree that although they share many differences, they have benefited in unimaginable ways through their relationship together – Madison's Sister Cities are no exception. The relationships Madison has gained through its Sister City program has advanced our city while helping cities across the world. Explore our Sister Cities below:

1 Arcatao, El Salvador

We go way back: Voted to become a Sister City in 1986 to bring attention to the severe brutality civilians endured by their government during the civil war. Currently, Arcatao is still given attention by the U.S. government which supports educational programs teaching citizens the dangers of and safety needed for mining.

2 Camaguey, Cuba

She's a treasure: Sunken pirate ships can be viewed in some of the 35 scuba diving sites off the coast of this city. Today, through Madison's support medical supplies have been delivered to Camaguey's pediatric hospital.

3 Mantova, Italy

Sister Love: Romeo was banished to the town Mantua which native Italians refer to as "Mantova" in Shakespeare's famous Romeo and Juliet. Madison's vibrant atmosphere meets its match in Mantova, the musical hub of Northern Italy.

4 Freiburg, Germany

University Cities: Freiburg's connection to Madison is just too obvious as it is a famous University town. In addition, the University of Freiburg has a history of excellence and is a top research institution, similar to UW Madison.

5 Vilnius, Lithuania

Shared Past times: UW Madison's Baltic Summer Studies Institute is a major cultural pathway between the two cities as it celebrates Lithuanian traditions right here in Madison. Ice-fishing is a very popular pastime in both Vilnius and Wisconsin.

6 Ainaro, East Timor

Helping Hand: Ainaro was occupied by the Indonesian Military and suffered near total destruction during a massacre in 1999. Funds raised in Madison helped renovate a memorial of the 1999 massacre. In addition, Madison has helped with medical, education, farming and women's projects.

7 Obihiro, Japan

On the same level: Madison and Obihiro have the identical latitude of 43 degrees north. Obihiro is located in a large dairy and agricultural region in Japan and its main breed of cattle is from Wisconsin.

Article by: Ellyn Underwood

Think. before you stick

It all started with widespread disregard and vandalism from a simple piece of chewing gum. In 1987, at a cost of \$5.0 billion dollars, a Mass Rapid Transit train was installed in Singapore, China. It was the largest public project done in Singapore at that time. The project was set to revolutionize movement about the city and expectations were high. The train was perfect, but the engineers did not account for the placement of chewing gum on the MRT door sensors. This action disrupted the function of the doors and even led to trains scheduling being completely off. Culprits were hard to track down and the repair of the door's sensors was costly. When Goh Chok Tong took over as prime minister in 1992, he enacted the total ban on the importation of chewing gum largely to prevent future vandalism.

Today, it is illegal to buy chewing gum in Singapore and is even prohibited to bring into the city. Medicated gums such as Nicorette

can be bought, but only with written consent from your doctor. Many closet chewers have to travel to nearby Johor Bahru, Malaysia to

enjoy a stick of gum. It is the law; rule breakers could be publicly named and shamed if they do not abide.

It's hard to believe that such drastic measures were taken over such a seemingly harmless thing like a piece of gum. The next time your favorite flavor fades away and the nearest garbage can is out of sight think before you stick.

Article by: Patrick O'Donnell

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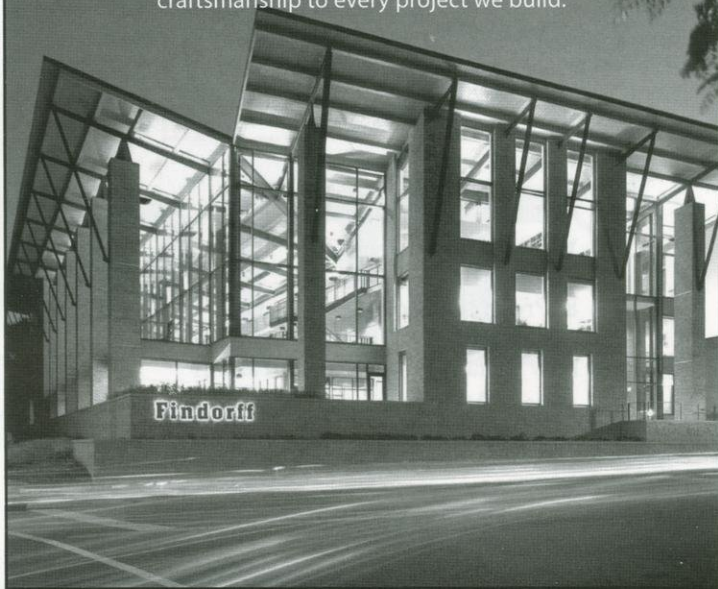
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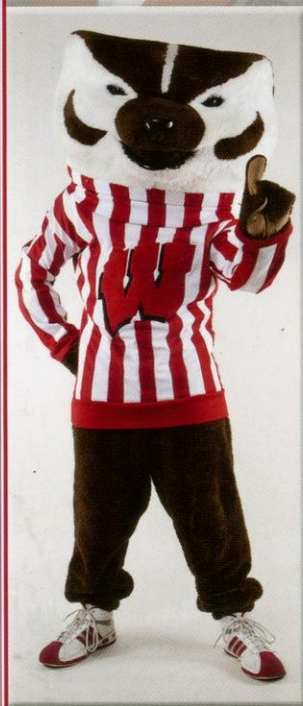


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