



LIBRARIES

UNIVERSITY OF WISCONSIN-MADISON

Wisconsin engineer. Volume 119, Number 1 December 2014

Madison, Wisconsin: Wisconsin Engineering Journal Association,
[s.d.]

<https://digital.library.wisc.edu/1711.dl/7P3DBZ6M5SIJV8I>

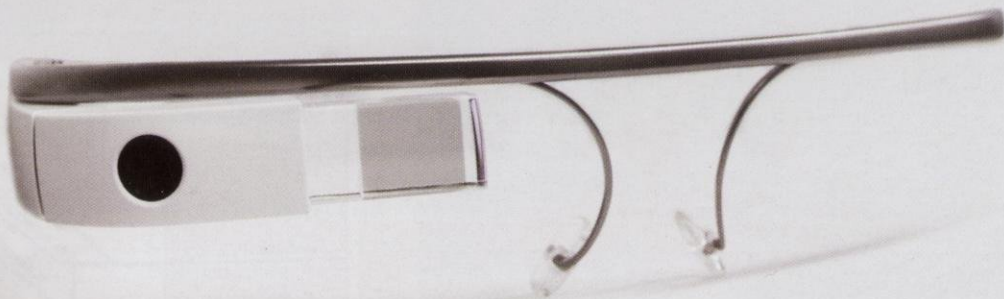
<http://rightsstatements.org/vocab/InC/1.0/>

The libraries provide public access to a wide range of material, including online exhibits, digitized collections, archival finding aids, our catalog, online articles, and a growing range of materials in many media.

When possible, we provide rights information in catalog records, finding aids, and other metadata that accompanies collections or items. However, it is always the user's obligation to evaluate copyright and rights issues in light of their own use.

wisconsin engineer

DECEMBER 2014 VOLUME 119, NUMBER 1



Google Glass p. 16

Also Inside: The Mighty Meal Worm p.9 • Engineering the Optimal Spring Break p.12

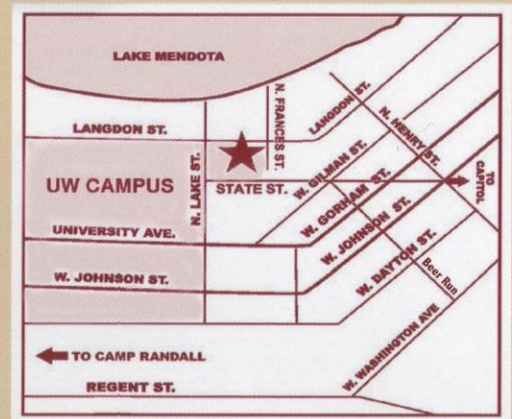
Campus Inn

"The 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

"Where to stay? The Campus Inn boasts an ideal location off Lower State Street near the Memorial Union."

—USA Today



Perfect Location. Unforgettable Service.



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
Guest Instructor
UW Engineering Professional Development
UW-Madison Graduate

wisconsin engineer

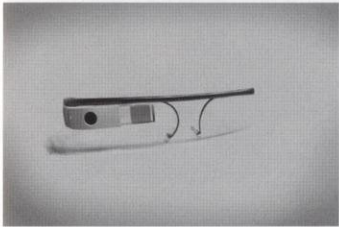
Published by the students of the University of Wisconsin-Madison

VOLUME 119, NUMBER 1

DECEMBER 2014

General

- 3 IceCube: Sub-Zero Science**
How one of earth's most hostile environments connects us to the cosmos
By Nathan Friar
- 4 The Memorial Union: Between the Phases**
The results of the phase I renovation, and a sneak-peak into the upcoming phase II features
By Brian Paulus
- 5 The Science of Ice Cream**
Professor Richard Hartel explains just how complex the candy industry really is
By Stephen Schwartz
- 6 Beyond the Ice Bucket Challenge**
Learn how an online fad has brought countless support to research that may save thousands of lives
By Alex Belich
- 8 Small Bugs, Big Gains: The Mighty Meal Worm**
Two UW-Madison students work together on a project to encourage entomophagy in food-insecure regions
By Stacy Montgomery
- 9 Rough Around the Edges: Humanities in Context**
Considering the future of the George L Mosse Humanities building
By Jacob Perterson
- 10 Engineering the Optimal Spring Break**
Planning your next spring vacation with the help of Six Sigma
By Rick Zuern
- 11 Ebola Scare: Are Our Hospitals Prepared?**
Looking at Ebola preparedness from the point of view of health care providers
By Brendon Grill
- 16 Looking into the Future**
Could Google Glass be the next big technological trend?
By Brian Zhou
- 18 Job Interviews Made Easy**
The things everyone needs to know to make intimidating job interviews seem easy
By Alex Chay
- 19 Not Taking Money for Granted**
Four UW-Madison professors are developing a device that could reshape the world of medical imaging
By Jon Smet
- 20 Working Smarter, Not Harder**
The LeadOff System from Sensori Athletics is making practice into a science
By Matt Latuszek
- 22 Student Org Spotlight: Institute of Industrial Engineers**
Learn more about the biggest industrial engineering club on campus and how it can help connect students on campus
By Mikaela O'Keefe



Google Glass could be utilized to further advance industries such as medicine and military.

Cover photo by Ciara Lotzer.

Web Exclusives

Find these articles at
www.wisconsinengineer.com

- The Global Office: Cultural Differences and Their Effects on Business**
An engineer and an intern share their experiences abroad and ways to better prepare for international business
By Jessica Thomas
- The Advent of Wearable Technology**
The past, present and future of Wearable Technology
By Ryan Breon

Become part of the longest running club on campus!
 Join the **Wisconsin Engineer Magazine**
 Meetings every other week in the Tong Auditorium, ECB

more info at www.wisconsinengineer.com

Wisconsin Engineer Staff



Editors-in-Chief:
 Jon Miller
 Nick Schoenheider

Business Heads:
 Becca Aronson
 William meyers

Graphic Design Editors:
 James DeBano
 Ryan Krull

Photography Editors:
 Abby Schaefer
 Alex Sleinhaver

Writing Editors:
 Alyssa Hantzsch
 Charlie Duff
 Justin Alt

Web Head:
 Justin Russo

Copy Editor:
 Kelly Stretz

Web:
 Mitch Samuels
 Sam Calmes

Graphic Design:
 Cassidy Schneider
 Christopher Bradley
 James Mai
 Jason Wan
 Jing Li
 Margaret Butzen
 Maxwell Jin
 Michael Khor
 Tanae Swenson
 Tom McAdams

Photography:
 Matt Henricks
 Heather Schumaker
 Ciara Lotzer
 Sakura Kawano
 Catie Qi
 Nicholas LePar
 Kyle Pedersen
 Jolene Enge
 Joanne Lee
 Evan Verploegh
 Margo Labik
 Cody Schwartz
 Nathaniel Corey

Writing:
 Alex Belich
 Alex Chay
 Anastasia Montgomery
 Brandon Grill
 Brett Adkins
 Brian Paulus
 Brian Zhou
 Jacob Peterson
 Jessica Thomas
 Jon Smet
 Matt Latuszek
 Mikaela O'Keefe
 Nathan Frair
 Rick Zuern
 Ryan Breon

Writing (continued):
 Stephen Schwartz
 Zach White

Business:
 Brenden Pittman
 Paul Miller
 Matt Gullixson
 Tyler Libbey



The *Wisconsin Engineer Magazine*, a member of the Associated Collegiate Press, is published by students at UW-Madison. Philosophies and opinions expressed in this magazine do not necessarily reflect those of the College of Engineering and its management. All interested students have an equal opportunity to contribute to this publication.

Faculty Advisor: Steven Zwickel **Publisher:** American Printing Company, Madison, WI **Web address:** <http://www.wisconsinengineer.com>

Correspondence: *Wisconsin Engineer Magazine*; 1550 Engineering Drive; Madison, WI 53706 **Phone:** (608) 262-3494 **email:** wiscengr@cae.wisc.edu

The *Wisconsin Engineer* is published four times yearly in October, December, March and May by the Wisconsin Engineering Journal Association.

Subscription is \$12 for one year. All material in this publication is copyrighted.

ICECUBE: SUB-ZERO SCIENCE

The IceCube Laboratory at the Amundsen-Scott South Pole Station, in Antarctica, hosts the computers collecting raw data.

How one of earth's most hostile environments connects us to the cosmos.

It's not often that the continent of Antarctica is thought of as much more than a barren tundra, filled only with endless frozen landscapes and conditions so inhospitable that few think to venture there. Despite the location, this extreme environment is currently the site of one of the most comprehensive particle physics experiments in history. Titled "IceCube: The South Pole Neutrino Observatory," this 20 year-in-the-making project is changing the way we look at the universe.

Commonly just called IceCube, this project's mission is to detect and monitor tiny subatomic particles called neutrinos. These massless particles are everywhere, and billions pass through you undetected every second. Neutrinos are produced by events and bodies throughout the cosmos that are already subject to intense research, such as black holes and supernovas. Funded by the National Science Foundation and originally conceptualized in the 1980's, construction was finally completed in 2010 and IceCube is now fully operational. It is the hope of those involved with IceCube that their work can shed light on these fantastic celestial objects.

Located at the South Pole, IceCube itself consists of a telescopic array that covers one cubic kilometer and is housed completely underneath the Antarctic ice. It is not the typical type of telescope that most people associate with large mirrors set in elevated locations. Instead it consists of visible light detectors called digital optical modules (DOMs for short) that are set on 86

strings. The detectors are placed 60 on a string, and then lowered into holes that have been dug into the ice by heated drills. The DOMs can be described as computerized eyes that are set to be very light sensitive. These DOMs are buried a mile under the ice and make up the largest neutrino detector in the world.

UW-Madison freshman Maggie Beheler-Amass, an ex-intern for IceCube who started working with the team in high school, describes just how sensitive these modules are; "If one of these DOMs was on the moon, and you extinguished every single light source on earth, and then lit a candle, the DOM would be able to detect the light produced by that candle." This sensitivity is used to detect a tiny light emission that is given off when a neutrino passing through the ice hits the nucleus of an atom. These light emissions are called cascade events, and major ones are named after characters from the children's show Sesame Street, such as "Big Bird, Bert and Ernie." More Sesame Street characters will be used when other significant cascade events are recorded.

Notably the most intriguing feature of the IceCube telescope is its location at the South Pole. When asked why this location was chosen, Beheler-Amass presents a variety of reasons; "Ice is exceptionally clear, and this medium allows us to capture the light emissions easier than in air. There is also not a high degree of ambient light, so it's easier for the remote location limits the amount of interfering

"...a novel astronomical messenger to explore the universe."

The deployment of each of the 86 IceCube strings lasted about 11 hours. In each one, 60 sensors called DOMs had to be quickly installed before the ice completely froze around them.

The IceCube Collaboration in Madison, April 2013.



neutrinos you might have" says Beheler-Amass.

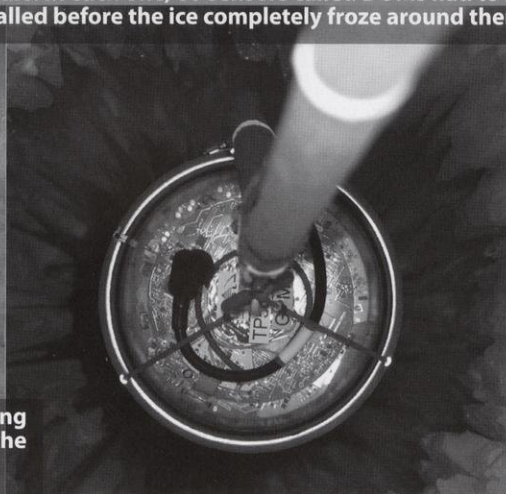
The organization called the IceCube Collaboration is responsible for analyzing the data collected by the detector. It consists of researchers from 12 countries and over 40 institutions, with UW-Madison taking the lead. Scientists use these cascade events and vector calculations to trace the neutrinos back to their origin point, thus giving a relative area in interstellar space to search for the emission source. Since it must be operated and maintained year round, many of these researchers take turns visiting the Antarctic site and working directly with the detector. Despite the freezing temperatures, short showers, and cramped quarters, researchers still find ways to entertain themselves, says Beheler Amass. "They have a game they play called the '300 Challenge.' When the temperature drops to -100° Fahrenheit they sit in the sauna until the temperature reaches 200°, then run outside and around the South Pole." Clearly, they know how to keep their spirits up in such punishing conditions.

Like a neutrino hitting an atom, the future of the IceCube project looks very bright. The IceCube collaboration will continue its mission to identify neutrino producing celestial bodies, but there are already plans in development to expand upon it. Titled PINGU, which stands for Precision IceCube Next Generation Upgrade, with any luck this expansion will allow scientists to measure the mass of neutrinos. PINGU will hopefully be recommended for funding in the coming years, and keep Antarctica on the map as the prime location to advance mankind's understanding of particle physics. **WP**

Written by: Nathan Friar

Photography by: WIPAC, IceCube/NSF, Catie Qi

Design by: Cassidy Schneider



Members of the IceCube Collaboration pulling cables from the sensors deployed down in the ice to the IceCube Lab's Servers.

THE MEMORIAL UNION: Between the Phases

The results of the phase I renovation, and a sneak-peak into the upcoming phase II features.



The renovated Memorial Union is now open.

Two years ago, Madison's beloved Memorial Union began to undergo phase I of a major renovation process on the west half of the building. Today, this portion of this renovation can be appreciated and enjoyed by all. However, by the fall of 2015, a new wave of renovation and remodeling will commence.

The spark of energy for this extensive project started in 2005 when the campus wide Master Plan was reviewed. More information on the Master Plan can be found in a previous Wisconsin Engineer Magazine article called, "A Master Plan for the Future." At that time, it was affirmed that the Memorial Union was an essential part of UW-Madison and that it needed to be preserved philosophically and symbolically. Mark Guthier, the director of Memorial Union, explains that the \$100 million reinvestment is "not an expansion opportunity, but instead a preservation opportunity." Preserving historical places on campus such as Memorial Union can make powerful

contributions towards keeping the UW-Madison spirit alive and strong.

Anyone that has a couple of minutes to meander over to the Union is quickly taken with the refined splendor of the building. Upon entering the west entrance of the phase I renovation, one can see all the way through the building and out to Lake Mendota. Walking down the hallway towards lake, one enters the new Sunset Lounge, a relaxing study space completely surrounded by windows (as seen in figure 1). Emerging from the Sunset Lounge and looking up, there is an outdoor seating area off of the second level of the theater wing which provides beautiful views of the terrace. Turning around and heading down the stairs on the east side, one encounters the Brat stand serving delicious food to those enjoying their day at the Union (as seen in figure 2). Heading towards the water, the Outdoor UW base catches your eye. The list of new and improved features goes on. There could be many

imaginative descriptions of the updated Union included in this article, but they are far better to be experienced firsthand.

The real mysteries lie in the future of the east side of the Union. As with phase I, the remaining renovation of the Union is going to prioritize preserving many of the iconic features of the building: The Rathskeller, Great Hall, Tripp Commons, and several other meeting rooms will be renovated with new wiring and plumbing systems, but will retain the same vibe that has been adored over the years. There will also be some rearranging of the remaining spaces throughout the east side to make room for a new Italian dining concept and the addition of a coffee house and pizzeria that will open to the outdoors.

In addition to the interior work, the Terrace will be remodeled and a new park will be created. The Alumni Park will be a lush green space that includes open lawns, interactive exhibits,

and recognition for many of the significant contributions UW-Madison alumni have made to the world. This park will merge into the terrace's three tiers and swing over to the Red Gym, replacing the parking lot currently located between the two buildings. Other exterior upgrades include construction of another food stand to complement the Brat stand and a grander stage on the terrace with a permanent canopy. This stage will hopefully be big enough to

▶ **"We are very thankful for all the leadership and involvement the students have provided throughout the project. They are the ones that really keep us energized and focused."**

- Mark Guthier

accommodate much larger ensembles, potentially including the UW Marching Band. While these upgrades and restorations will be beautiful once they're complete, good things take time. Phase II of this project is anticipated to start Labor Day of 2015. On that day, Memorial Union will block off the east side of the building and the Terrace to begin the renovation. The west side will remain

open during this time and accommodations will be made to set up temporary food services such as a mini-Rathskeller operation and an ice cream shop.

If everything goes according to plan, the Terrace will be reopened before the summer of 2016 and the entire first floor will be functional before Labor Day of 2016. The remaining floors and Alumni Park will continue to be under construction until the fall of 2017. That being said, the timeline of phase II relies heavily on the severity and duration of winter conditions, thus making it difficult to accurately predict the exact completion dates.

While the Union is under construction, there will be plenty of chances for students to provide input on what they want to see in the building. Keep an eye out for online surveys, furniture testing days, and information sessions. Student input was highly regarded for phase I and will play an important role in shaping phase II. "We are very thankful for all the leadership and involvement the students have provided throughout the project," says Guthier. "The students are the ones that really keep us energized and focused."

What does all of this mean for current UW-

Madison students? It means that until the fall of 2015, it would be wise to spend every sunny afternoon enjoying the terrace and studying in your favorite places throughout the Union before construction begins once again. It also means that during phase II of the renovation and remodeling, students can still be involved in the Union by using the beautiful phase I renovations and voicing their opinions for the next part of the project. Most importantly, it means that at the end of it all, another symbolic bond between generations will be refreshed and will continue to grow in the years ahead. **WE**

Written by: Brian Paulus

Photography by: Kyle Pederson

Design by: Jason Wan



The Sunset Lounge in the renovated Memorial Union.

The Science of Ice Cream

Professor Richard Hartel breaks down the science surrounding our favorite desserts and explains just how complex the candy industry really is.

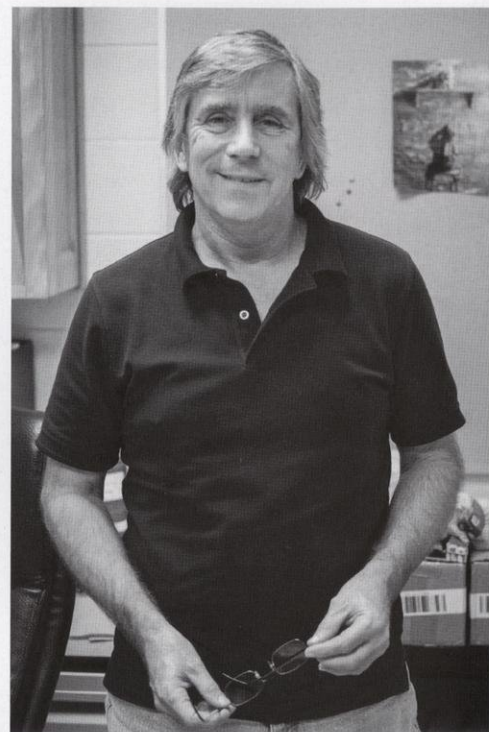
To many, being surrounded on all sides by mountains of sweet treats ranging from massive, fist-sized jawbreakers to delectable chocolate-covered malted milk balls sounds like a twisted fantasy ripped straight out of Roald Dahl's "Charlie and the Chocolate Factory," but to some, it is simply another day on the job. Richard Hartel, professor of food engineering in the departments of biological systems engineering and food science, has spent the last 28 years at UW-Madison researching the intricate science that governs the taste of such essential foods as ice cream, candy and chocolate. Stacks of these addictive treats overflow his shelves leading one to believe they are walking into the office of Willy Wonka, rather than that of a highly renowned scientist. Despite residing in, quite literally, a fortress of temptation, Hartel says he rarely succumbs to the enticing allure of his collection; rather, he explains that the treats are reserved for the food science classes he teaches.

For example, Hartel leads a candy science and technology course which, while known for being fairly challenging, is also a lot of fun. "Every class, every candy, there is a different set of important scientific principles that we cover," Hartel says, and after learning these concepts, the students get to try samples and experience, first-hand, how they translate into the actual properties of food such as texture or taste. In addition, students get to spend time in the lab, actually making the different sweets using the techniques and scientific principles they learned in lecture. "You'd be surprised! There is a ton of science in candy," Hartel explains, "It's microbiology, it's chemistry and it's engi-

neering or physics," all of these different disciplines are necessary to understand the complex reactions that take place during the formation of some of the world's most coveted bonbons. Besides food science, students can actually work towards a degree in food engineering which straddles the College of Agricultural and Life Sciences as well as the College of Engineering—providing students with access to the resources of both. This fairly unknown major requires students to complete similar classes to that of a chemical engineer while also working their way through a portion of the food science curriculum.

In addition to his undergraduate students, Professor Hartel oversees a number of graduate students who, like him, have taken a liking to the scientific principles governing the world of sweets. Maya Warren, one of Hartel's Ph.D. students, spends her days investigating the intricacies that surround one of the most complex foods there is: ice cream. Referred to as "Dr. Ice Cream" by Hartel, the titular researcher currently looks into a phenomenon apropos of tiny fat globules which affect pivotal characteristics of ice cream products. Each globule is initially only about one micron in size, but during the formation process, these globules bunch together forming clusters ranging from 10 to 100 microns in size. The extent of this clustering effect varies between brands which has far-reaching implications for the product. Hartel's lab runs an experiment where samples of ice cream are left on a mesh screen at room temperature and allowed to melt for a couple hours. Some samples melt and drip right through the screen as one would expect, however, in a surprising discovery, some samples melt but resist dripping though completely—they leave a layer of residual foam of melted ice cream on top of the screen. "It's these clusters of fat globules and air bubbles, and as they collapse there's enough structure to resist the force of gravity," Hartel says, "Basically we work on structures of ice cream and how the structures influence things like shelf life and texture and melting characteristics."

Professor Hartel hopes that by researching the complex nature of fat (saturated fat especially) in ice cream and understanding what exactly it is doing, then it may be possible to come up with ways to decrease its content but still maintain desirable textures and other sensorial properties. Hartel is able to sell his proposals by highlighting these health-related reasons,



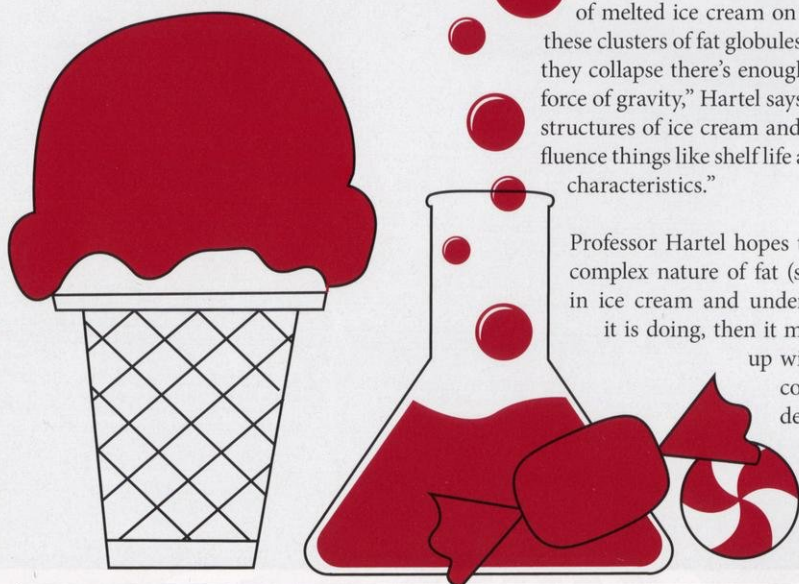
"You'd be surprised! There is a ton of science in candy!"
— Professor Richard Hartel

but he admits that he is also simply interested in the science behind all these delicious treats. Take storing chocolate for example; Hartel explains how the white haze that develops on the surface is called bloom, and despite the fact that chocolate has been around for a couple hundred years, "We still really don't understand what's going on." It is these kinds of scientific wonders that keep Professor Hartel entrenched in his work and eager to continue exploring. But despite all of the discoveries he has made or awards he has won, Hartel still ensures to make teaching a priority and claims, "My biggest accomplishment comes back to the students." **WE**

Author: Stephen Schwartz

Photographer: Nicholas LePar

Graphic Design: Tanae Swenson



Beyond the Ice Bucket Challenge

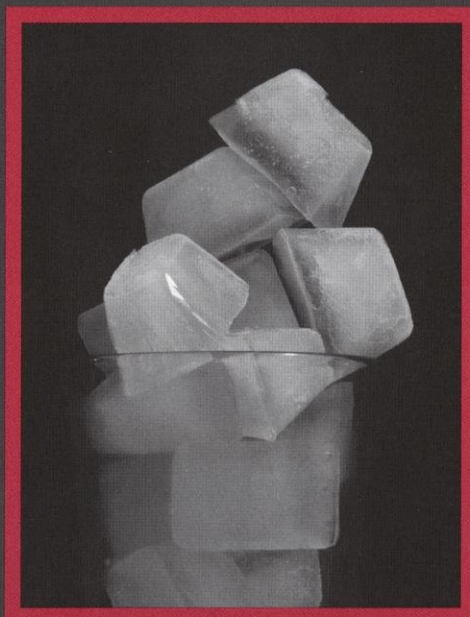
Learn about Lou Gehrig's disease and how a simple online fad has brought countless support to research that may save thousands of lives.

People have dumped over 6 million gallons of ice water onto their heads in the past three months in what has become known as the ALS Ice Bucket Challenge. This quickly turned into the summer's biggest fad as social media users around the world posted videos of themselves completing the challenge on Facebook and Twitter. Although Ice Bucket Challenge posts on social media have finally begun to dwindle, the amount of awareness raised for ALS by the craze has propagated an ongoing ripple effect.

The disease was first made known by Lou Gehrig in 1938. With a batting average of .363 and 49 home runs in one season, Lou Gehrig had become a baseball legend. Suddenly, Gehrig started to slip, getting progressively slower and weaker. Finally diagnosed with ALS, Lou Gehrig passed away three years later. Today, about 5,600 people are diagnosed with ALS every year.

Many have heard of the challenge and ALS, or at least of Lou Gehrig, but do people really know what the disease is? ALS, or amyotrophic lateral sclerosis, is a terminal neurodegenerative disease that targets the nerve cells in the brain and spinal cord. The name itself captures the essence of the disease, coming from Greek: 'a' meaning 'no,' 'myo' meaning 'muscle,' and 'trophic' meaning 'nourishment.' Altogether, that is 'no muscle nourishment.'

The human body consists of involuntary and voluntary muscles. Involuntary muscles carry out bodily functions such as digestion and pumping blood. On the other hand, voluntary muscles provide conscious functions, such as walking, speaking, and even breathing. ALS targets the muscles that provide voluntary movement and muscle strength. The motor neurons responsible for sending signals to the muscles die out, and the muscles deteriorate with them. There is no clear-cut timeline for the progression of the disease, but it does come in multiple stages over the course of about five years. The early stage of the disease often comes before diagnoses, being characterized mostly by weakening muscle



"The progress made by researchers would not have been possible without the massive public support [through the Ice Bucket Challenge]."

strength and stamina. The middle stages see more widespread symptoms: some muscles become fully paralyzed, standing up becomes difficult without assistance and throat muscles make eating difficult. During the late stages of the disease, ALS patients lose the ability to speak, eat and drink by mouth, and use most of the voluntary muscles. The disease becomes terminal once the ability to breathe is lost; respiratory failure and pulmonary infection then lead to death.

ALS is a disease that kills an estimated 15 Americans every day due to a lack of effective treatment. The fact that the exact cause of ALS remains unknown is the greatest challenge in developing a treatment. Dr. Masatoshi Suzuki, an assistant professor of comparative biosciences in the University of Wisconsin-Madison School of Veterinary Medicine says, "There is no powerful treatment, but only one drug approved by the FDA that can extend a patient's life by up to six months." Due to this terminal disease's severity

and lack of treatment, innovative methods are being researched and tested. Suzuki's research focuses on using stem cells to support the damaged nerve cells.

"90 percent of cases are sporadic, meaning the cause is unknown," Suzuki says. "On the other hand, 10 percent of causes are related to mutations of genes." Inherited ALS, which results in gene mutation, is the type of ALS mostly used in research. Suzuki and his team genetically modify rats to have the same gene mutations that cause ALS in people. The researchers then take adult bone marrow stem cells and implant them directly into the affected muscles. Instead of replacing the genetically damaged cells, a common approach taken when working with ALS, the stem cells are meant to keep the neurons healthy and alive longer. The progress made by researchers would not have been possible without the massive public support.

The spike in awareness caused by the ALS Ice Bucket Challenge has greatly helped the push towards finding a treatment for the disease. According to the ALS Association, the Ice Bucket donations have reached \$88.5 million. "The ALS Ice Bucket Challenge has been a good advertisement to spread the knowledge to the public and increase the amount of supporters" says Suzuki. However, awareness tends to be a double-edged sword, as people speak out against animal testing and the use of stem cells. Nevertheless, research continues at an ever-increasing pace in order to find a cure that would save thousands of lives for years to come. ■

Written by: Alex Belich

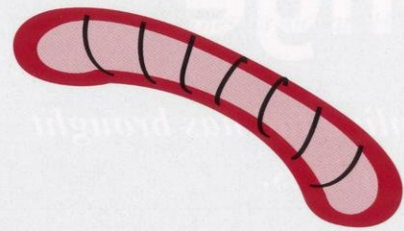
Photography by: Abby Schaefer

Design by: Maxwell Jin

Starting from disease onset, patients normally survive for only four to five years.

Small Bugs, Big Gains:

The MIGHTY MEAL worm



This just in: Gordon's is now serving mealworms.

Before calling the FDA, a disclaimer must be noted: although mealworms are nutritious high in protein, Gordon's has not yet introduced this trend to the cafeteria. However, UW-Madison Ph.D. students Valerie Stull and Rachel Bergmans have found that these little bugs might be an innovative way to solve the food insecurity problem in underdeveloped African countries.

Bergmans, a second year UW Epidemiology Ph.D. student in Population Health Sciences, met her colleague, Stull, a UW Ph.D. student in the Nelson Institute's Environment and Resources, because of their similar interests in food insecurity and health. After reading an article published by the United Nations, highlighting that food insecurity could be alleviated with the consumption of insects, Bergmans and Stull were inspired to bring this idea to life by creating the company MIGHTY MEALworm.

MIGHTY MEALworm is a program designed to bring mealworm farming to regions without the consistent ability to provide food for their people. The program plans to work with women's cooperatives in Zambia by training these women to create their own locally sourced kits for mealworm farming and teaching them how to properly raise the worms. MIGHTY MEALworm chose Zambia as the first frontier since entomophagy (the eating of insects) is already prevalent, but still not on an agricultural scale. The program has the potential to grow even larger. If MIGHTY MEALworm were to succeed in Zambia, many other African countries could adapt the program in order to supply their people with a wholesome protein source that requires few resources.

Since 80% of the world's population already eats insects, it's a no-brainer to implement these critters



into impoverished countries' diets. However, some problems arise from this idea: "People are consuming insects all over the world, but they are collecting these insects from the wild, which risks ecological damage," explains Bergmans. "What MIGHTY MEALworm proposes is increasing access to insect farming."

So how exactly does one "farm insects"? Mealworms thrive in dry, soft, contained environments with easy burrowing and feeding access, so all that is needed to raise these bugs is a little cage with a bed of oatmeal. Part of the MIGHTY MEALworm program involves teaching the women's cooperatives how to make their own cages for the mealworms out of resources readily available in the area, such as wood or plastic water jugs, and how to monitor the worms' growth and health to ensure a nutritive product. The training will allow the cooperatives to become self-sufficient, giving the worm farming a

longer lifespan than a simple dumping of these resources onto the people.

Stull's previous international work experience gave the program a connection to the University of Zambia, which directed Stull and Bergmans to the cooperatives in the area. The two made a trip to Zambia to ask the locals if it was plausible to introduce the insects as an additional protein source. Similar to what one would assume a western coun-

try's response would be to such a proposal, some groups rejected the idea immediately, finding the idea of eating worms on a daily basis as

repulsive. Bergmans took this rejection in stride, though, noting, "People

are waiting to hear results from the Climate Quest competition in order to continue on with their project. The next phase of MIGHTY MEALworm consists of researching the growth of the worms in adverse environments to see if those worms are still as nutritionally beneficial as their lab-reared counterparts. However, until receiving further funding, Stull and Bergmans are not able to move forward.

Although the barriers seem extensive, many of the people Stull and Bergmans interviewed responded enthusiastically to the idea. This gave Bergmans and Stull more motivation to continue investing their time and all the resources they manage to find into the project: "It's been really interesting collaborating with Valerie and bridging

our two different fields to come up with

MEALworms thriving in oatmeal.

ple initially rejected the potato because it was the wrong color, even though they knew it was more nutritious - and there was even a movement to eat rats, but people obviously didn't pick up on that. You can't just force people to eat a food they don't like."

Another barrier to the adaptation of mealworms comes from the transition of having the insects go-

ing from being a side to the central part of a meal. Bergmans and Stull found that in Zambia they eat termites - "enswa" as the locals call it - but only during the rainy season when the termites are easily gathered, and only as a snack. With such an existing trend, it could be difficult to apply this cultural change on a national scale.

Although the barriers seem extensive, many of the people Stull and Bergmans interviewed responded enthusiastically to the idea. This gave Bergmans and Stull more motivation to continue investing their time and all the resources they manage to find into the project: "It's been really interesting collaborating with Valerie and bridging

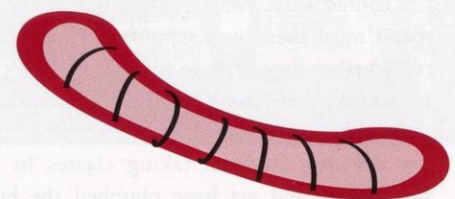
are waiting to hear results from the Climate Quest competition in order to continue on with their project. The next phase of MIGHTY MEALworm consists of researching the growth of the worms in adverse environments to see if those worms are still as nutritionally beneficial as their lab-reared counterparts. However, until receiving further funding, Stull and Bergmans are not able to move forward.

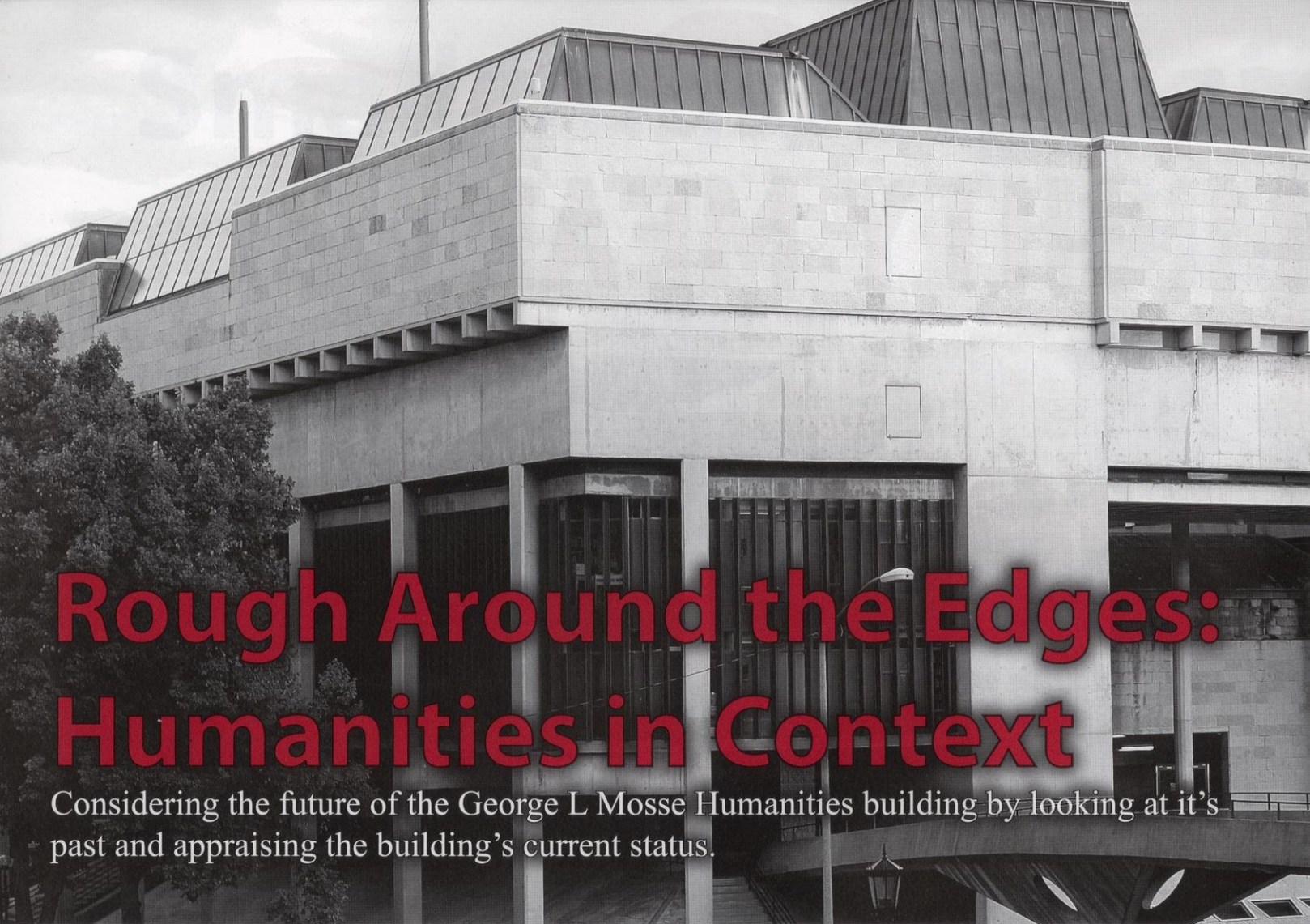
With further funding, the program could take a big step towards encouraging insect farming in Zambia, and perhaps expand to other resource-lacking areas. With the implementation of MIGHTY MEALworm, resource sustainability and food security could be attained in these food-scarce regions. If these regions of Africa had their own Gordon's, Bergmans and Stull would see to it that the bugs had a place in the food line. Though mealworms are small, the potential is big - watch out, they might be coming to a dining hall near you!

Written by: Anastasia Montgomery

Photography by: Margo Labik

Design by: Brent Grimm





Rough Around the Edges: Humanities in Context

Considering the future of the George L Mosse Humanities building by looking at it's past and appraising the building's current status.

The George L. Mosse Humanities building, designed by the architect Chicagoan Harry Weese, has become as signature a part of campus as the Red Gym, Memorial Union or Bascom Hall itself. Though, the building's status as a unique part of UW-Madison's history doesn't confer any special affection to students who will gladly climb on Abe's lap after graduation. In fact, little love is lost. It's been compared unfavorably with a bunker and in jest, labeled the "Inhumanities" building by the faculty. But is it decrepit enough to go the way of the old Union South, which was demolished in 2009?

Walking the plaza, one feels squeezed in by the sheer amount of concrete—concrete above and below, concrete to the left and right, concrete plazas, concrete bridges. Credit must be given to the designer's imagination with the form: harshly angled staircases, pre-casted concrete cells above and canted walls. People, in one way or another, spend most their lives supported by the material whether they drive to work or walk to class. It's strange then to see it in such a massive pile.

For decades, students taking classes in music, history and art have plumbed the build-

ing's depths for music practice rooms, scaled the red-painted staircases to the art studios above and navigated the maze-like hallways in search of their history lecture. They quickly learn that the stairwells are suffocating on sunny days, while the basements are certainly home to a few rats. Microclimates abound: the room ahead could be freezing or temperate.

In places, the art rooms are held up above the music school by a series of circular pillars, ensuring that the floor freezes from winter winds. Passageways that should logically exist don't, leaving circuitous routes as the only option to get from point A to B.

Because of these gripes, Humanities has never been a particularly functional building. For several years now, the structure has been slated for demolition as part of the Campus Master Plan. With West Campus projects like the new Union South and Wisconsin Institute of Discovery complete, the building stands a better chance of being demolished or rehabilitated than in years past, but it's fate remains uncertain.

Of course, rumors naturally have arisen to ex-

plain how such an impractical building could have been made. A common one is that it was built to withstand rioting. While it was constructed between 1966 and 1969, at the height of student activism in Madison, the claim is unconfirmed. Still, the time period was one of the most formative in the University's history, seeing bombings, riots and daily protests by students against the Vietnam War. Today it stands as a relic from that tumultuous era. The austerity of the building's raw concrete, in unforgivingly straight lines, certainly explains the rumors origin.

The building does possess a harsh kind of beauty in line with the Brutalist style it was constructed under. The movement's loosely defined, but a few central characteristics are efficiency, functional materials, facilitating "mass movement" and repetition of geometric themes. A few examples are the Washington D.C. Metro—another Weese commission—and Habitat 67 in Montreal. It conforms to the style well, especially in regard to mass movement. While humanities may not be successful at intra-building travel, it does succeed at inter-building travel. With two bridges, outdoor walkways and dozens of staircases, it may be one the most efficient shortcuts



The center of the building is features a courtyard, which some consider to be a bit of an “intimidating” place to study.

on campus. Though humanities may not be the most comfortable building, keep in mind that it hasn't exactly collapsed into a pile of rubble.

Another note: in the 1950's the Red Gym—back when it was as reviled as the Humanities building is today. People thought it was antiquated and dilapidated. The Campus Master Plan called for the gym to be razed. Today, students and faculty alike treasure it, and the space serves a brand new function. So, given time, opinions may soften and buildings can be given new purpose.

“... in the 1950's the Red Gym - back when it was a gym - was as reviled as the Humanities building is today.”

With the demolition date uncertain, the faculty and the student body may have to just deal with this eccentric building for the time being. One solution: retrofit the interior and remodel exposed exterior concrete. Should one of the departments receive a new building, repurpose the old space, maybe into meeting rooms for student orgs. If the sun needs to set on the building, allow the public to comment freely so that everybody can voice their opinions. Should it be torn down though, the new one should at least have a small gallery dedicated to the old. WP



Narrow hallways and ominous coves are some of the many peculiarities of the building.

Written by: Jacob Peterson

Photography by: Evan Verploegh

Design by: James Mai



The Brutalist-style building is scattered with artwork throughout the unusual layout.

Engineering the Optimal Spring Break

Planning your next spring vacation with the help of Six Sigma.

A student's life during the regular semester is often fraught with chaos, stress, and uncertainty. The spring semester, in the heart of winter, can be some of the most challenging months of a student's education. Fortunately, students are offered a well-known and well-received respite in the middle of the semester – spring break.

But, is a week-long vacation enough to counteract months of stress associated with higher education? A trip planned on the fly can still generate net returns in leisure, but there is a more structured approach to planning a spring break. In the interests of maximizing leisure outputs and minimalizing capital and exhaustion inputs, it is recommended that the student utilizes an abridged version of the Six-Sigma DMAIC development cycle – Define, Measure, Analyze, Improve, and Control.

DEFINE

The first step in a DMAIC analysis is to Define the problem – what are the goals of the project? This is the simplest element in our analysis – how can the beleaguered student achieve the highest degree of satisfaction and relaxation in a single week of spring break? How can this task be achieved at the lowest possible cost to the student? Though most Six Sigma analyses are engaged with a customer in mind, the student should adopt and operate under the mindset that they are working for themselves.

Now that the problem is well-defined, the next step is to identify the available resources at the student's disposal. Monetary assets are the most basic, obvious and critical example. Currency can be applied as a solution for transportation, habitation and recreation challenges, among others. A forward-thinking student should consider short-term investment strategies to maximize the available capital to apply to such challenges. The student will invariably have some assets beyond liquid capital, though their utility in vacation planning typically varies on a case-by-case basis. Perhaps the student has networked sufficiently among their peers to secure access to personal transportation, such as a car, truck or other vehicle conducive to vacation travel. Securing these professional relationships early can make the development process run far more efficiently than attempting to foster them close to project deadlines.

MEASURE

The next phase in DMAIC, Measure, is the stage where the student should prepare to evaluate

their current situation and performance, and ultimately, attempt to quantify the problem. The student should examine their ongoing obligations to course work and extracurricular activities with the future goal of establishing stress and exhaustion coefficients attributable to both. More quantifiable data allows for a more precise final exhaustion model. The student should track time spent working and in class, weighing these values based on their (often inverse) relationship with spare time. Note that physical fatigue is significant enough to be included in these calculations as well; net caloric intake, average physical exhaustion per day and average hours slept per night are all crucial metrics. The most successful models may also integrate pedometer or step-counter data maintained by the student throughout the semester.

At the same time, the student should begin to develop a leisure model to counteract the problem of exhaustion. This step is more reliant on judicious estimates of the leisure value

of different activities over a vacation, and should not be considered "final" until later stages. It is up to the student to identify which activities will maximize their individual leisure models, as there is a high degree of variation in these results from study to study. For example, while an afternoon spent on the lake may be the highlight of one student's vacation, thus generating large leisure returns, a student who fears large bodies of water may have negligible (or even negative) returns from the

Students maximize their leisure returns by measuring, analyzing, improving, and controlling their leisure model.

same activity. Techniques for developing specific spring vacation plans are intentionally omitted from this analysis, and are left as an exercise for the student.

ANALYZE

The Analysis phase of Six Sigma DMAIC demands that the student compile all of the data gathered in the Measurement step and integrate it into net exhaustion and leisure models. In the student's case, the desired outcome is at least a perfect balance between the negative exhaustion coefficients and positive leisure coefficients, so that they sum to at least zero – where the residual exhaustion effects are eliminated from the model. Identifying possible sources of variation in these coefficients is also critical, especially when developing leisure models. A plan for a sunny week on the beach can rapidly cascade from leisure to exhaustion for a variety of reasons, from rainy weather to an unfortunately timed shark attack.

IMPROVE

Once an elementary analysis of the exhaustion and leisure models is complete, the onus falls unto the student to improve and optimize their returns. While the base goal of a spring break vacation is a net cancellation of exhaustion terms, it should be obvious to the student that higher leisure returns are more advantageous if they can be achieved – surplus leisure values are essential to counteracting the exacerbated exhaustion values associated with returning to campus from break. Planning vacations with friends and fellow students has historically shown great leaps in the efficiency of leisure models. Adding in failsafe capabilities and backup strategies for vacation plans will minimize the risk involved, stabilizing the leisure model to yield a more predictable (and positive) result.

CONTROL

The final step in DMAIC, Control, directs the student to account for any potential defects and ensure that their leisure model is correctly applied.

Verification that anticipated capital expenditures do not exceed the student's budget is critical – failure to do so will quickly reduce the effectiveness of the leisure model, potentially contributing to the exhaustion model instead. Once these plans are finalized, the student should ensure that they execute thorough documentation procedures to improve efficiency and streamline designated leisure processes. It is recommended that the student consider a Gantt chart or another similar organizational tool to track their vacation progress throughout the week. Secure tickets, visas, contracts, agreements and other deliverables as early as possible to maintain excellent records for the student's reference before, during and after the trip. By following these procedural guidelines, the student is virtually guaranteed to maximize their leisure returns on invested capital and exhaustion. The method outlined above has been met with varying degrees of success when applied in industry as well – though it is worth noting that fatigue models will take a

vastly different form for non-student analysts, and could likely benefit from the utilization of proprietary software packages. In the end, the more successful the application of these methods, the more prepared the student or industry professional will be to approach the final weeks of the semester. ■

Written by: Rick Zuern

Photography by: Alex Steinhauer

Design by: Brent Grimm

Ebola Scare: Are Our Hospitals Prepared?

Looking at Ebola preparedness from the point of view of health care providers.

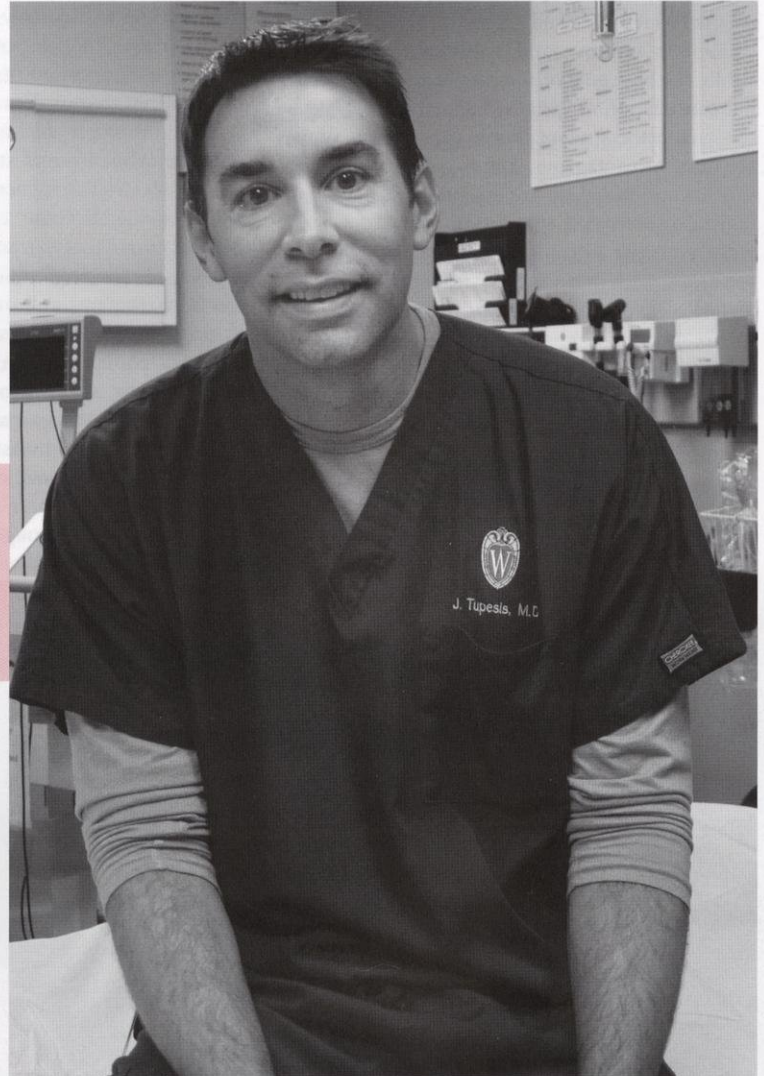
Since the most recent outbreak in Guinea in late 2013, Ebola has become an increasing threat to populations in West Africa and to humans around the world. National news outlets following this story have capitalized on the public's fear of the disease, causing Americans to begin to question how safe they are in the face of infectious disease. When the first diagnosis of Ebola on American soil occurred in Texas earlier this year on September 28, the question got put into the spotlight: are our hospitals and medical staff properly prepared for an outbreak of Ebola in the United States?

The Ebola virus is a disease that is currently being dealt with as an epidemic in West Africa. The virus causes fever, weakness, vomiting and diarrhea, among other symptoms. It is highly infectious, being spread through almost all bodily fluids including saliva and sweat. Infection is possible when the virus is able to enter either an open wound or an exposed mucous membrane. The current epidemic has taken over 3,500 lives as of the end of September, with a fatality rate estimated at 70 percent.

Hospitals have protocols for diagnosing and preventing the Ebola Virus Disease; these guidelines are based on official Centers for Disease Control and Prevention (CDC) protocol. At an initial assessment and interview, the patient is screened for symptoms associated with Ebola. The major identifying factor, however, is a recent visit to an Ebola-infected area. Immediately after a suspected case is identified, the patient is isolated and public health agencies are contacted. The patient is then tested to confirm or deny a suspected diagnosis and treated at the discretion of the physicians involved in the patient's care. Extreme caution is taken when dealing with the infected patient, and the CDC recommends a buddy system to ensure that no health care provider makes a mistake that could infect themselves or others outside the isolated area. Nurses and doctors check each other for appropriate use of protective gear before entering an infected area.

Despite all the precautions that hospitals take in these situations, not every case is caught in time. What went wrong, then, with the Texas man who was released from the hospital when he exhibited clear signs of Ebola and had indicated a visit to West Africa? The official statement released by the hospital claimed that it was not a provider error but instead a failure of the hospital electronic system. While it is possible that this was truly a computer error and not a failure of protocol or staff, many prominent groups such as National Nurses United (NNU) are raising legitimate concerns over the status of health care efficacy. According to a poll conducted by NNU, 80 percent of nurses claim they were not told about specific policy regarding Ebola, and 87 percent claim that they were not educated by their hospital on Ebola or about techniques for assessing potential Ebola risk.

To gain some insight into hospital staff's preparedness for an Ebola outbreak, the magazine sat down with an emergency room nurse for an exclusive interview. When asked whether she is confident in her hospital's ability to properly identify and isolate an Ebola patient, she responded, "Yes and no. We failed the first Ebola drill because we failed to ask about travel status. We passed the



Dr. Janis Tupesis, M.D. takes a break from his busy day in the emergency department at the University of Wisconsin Hospital.

second test and got the patient into isolation in an appropriate time." When asked about her hospital's ability to treat Ebola, she asserted that treatment was not her primary concern because of the attention national agencies would give the case. She also stated that her colleagues follow the CDC protocol rigidly, and that her only minor concern is that security isn't currently assigned to guard isolation rooms.

Despite these concerns, she stated confidence in future drills and in broader American health care infrastructure. At her hospital, all staff have since been trained specifically in the event of a potential Ebola case, and educational posters have been put up to remind nurses and doctors of the appropriate steps that must be taken with every incoming patient. While the NNU poll

showed that 40 percent of nurses didn't have proper isolation equipment, our contact has been assured of isolation room readiness. She concluded, "The drill made our staff apprehensive, but specific Ebola education has made us determined to respond in an emergency."

Dr. Janis Tupesis, Head of Global Health Programs for the Department of Emergency Medicine at the University of Wisconsin Hospital, is equally optimistic about our health care system. Pointing out that many hospitals differ from each other, Dr. Tupesis claims that a larger hospital, such as the one on campus, is not necessarily better prepared. He states, "The bigger facilities sometimes have a great education base, while smaller hospitals are administratively more manageable." When asked about protocol at UW-Hospital, Dr. Tupesis denied shortfalls, referencing an abundance of caution in safety standards. "We have an incredibly wonderful medical and health infrastructure here in the US," says Tupesis, citing our resources and high level of training.

However, compared to most hospitals in African countries, American medical facilities are very well-equipped. Dr. Tupesis has been working for eight years with the Health Education and Relief Through Teaching (HEARTT) Foundation in Liberia, where, he unequivocally stated that their hospitals are in poor shape. When he started working with this organization, the entire country of 4 million had less than 50 physicians. "Even simple resources like gloves are severely limited. I don't think I've ever seen a gown in the eight years I've worked there," Tupesis says. There is no perfect health care system and no protocol can account for every possible situation, but the greatest assets that

"The risk in the US is not high, but it's a different world than it was 100 years ago. It's one 10 hour plane ride away. That's the thing that's a little bit scary."

- Dr. Janis Tupesis

American hospitals have the resources and training of their staff. Increasing awareness, coupled with the lack of confidence from health care staff, has definitely caused a positive change in our hospitals. The skills of our doctors and nurses are increasing daily. The simple fact that we have an electric grid puts us ahead of even large Liberian cities. "The risk in the US is not high, but it's a different world than it was 100 years ago," concludes Dr. Tupesis, "It's 1 ten hour plane ride away. That's the thing that's a little bit scary." Because of this proximity, there will always be a risk that Ebola will continue to enter the United States. It's possible that our hospitals will never be as equipped to deal with this risk as we would ideally like them to be, but the United States is quite likely one of the best-prepared countries in the world to face the increasing threat of Ebola. **WE**

Written by: Brandon Grill
Photography by: Jolene Enge
Design by: Jason Wan

Exterior view of the American Family Children's Hospital located at 1675 Highland Avenue in Madison, Wisconsin.



Looking into

Could Google Glass be the next big technological trend?

With smartphone, laptop and tablet market demands now established, there is no doubt that technology giants like Google, Apple and Microsoft are all trying to stay ahead of one another and looking towards the future, trying to create the newest and hottest piece of technology to put out on the market. But could the answer be literally right in front of our eyes? Google Glass, the rare, exclusive and rather pricey augmented reality eyewear could be finding its way into the likes of Wal-Mart and Best Buy at some point this year. Luckily, instead of paying \$1,500 to find out more about the fancy eyewear, the magazine spoke with the Internet of Things lab at UW-Madison, which has a pair of the elusive glasses on hand.

The Internet of Things lab provides opportunities for students at UW-Madison to learn about cutting-edge technologies through hands-on experimentation and applied research. The technologies found in the lab range from Oculus Rift, a virtual reality headset for video gaming, to the Xbox Kinect, a motion sensor that could be re-designed for physical therapeutic purposes. One of the current research projects that the lab is working on is based on expanding the augmented capabilities of Google Glass. Thomas Yen, a faculty member of the department of biomedical engineering and lab manager of the Internet of Things, was willing to sit down and share how the lab is doing their part in developing the future of augmented reality.

“Currently, the research plan is for our students to establish an augmented reality of the UW-Madison campus on Google Glass with bubbles of information popping up, potentially identifying campus buildings like Van Hise when you pass them,” Yen says. “This feature could be advanced to human recommendations or comments about the identified location, using apps like Yelp for restaurants.” In addition, other future potential applications of the technology that the lab identified include teaching residential surgeons through first person video in surgical settings, aiding military operators with coordination on the battlefield, recording video from an officer’s point of view during arrests and pulling up patient medical records in hospitals.

The work that Yen’s lab is doing, along with the work of other software developers and research labs spread across the world, is helping Google push this piece of technology as both a professional and consumer-friendly product. Yen predicts, “You could see this on store shelves as soon as Christmas.” He also believes that the price will come down to a (marginally) more reasonable \$999 for consumers when they do hit shelves. If you want a pair today, Google allows anyone to sign up for their “Explorer” program, which is meant to help Google obtain market research and usage opportunities of the technology, as long as the user has \$1,500 to shell out for the eyewear. Needless to say, Google is making the technology easier to obtain than in years prior.

Currently, the present capabilities of Google Glass hardly seem to be worth the hefty price tag attached to them. When activated, the eyewear projects a virtual screen out and to the upper right of the user’s field of vision. Responsive to gestures, touch, and voice, the eyewear is capable of shooting video, taking photos, assisting navigation, reading text messages and e-mails, and accessing Google’s search engine if Wi-Fi is present. However, today’s smartphones have all of these features, and then some. In addition, there are some current concerns related to Google Glass, including the requirements of pairing it with a smartphone and an inability to connect to wireless networks that require authentication. Recommending caution, Yen warns, “Just because you can wear it doesn’t mean it is the best way to use it.”

▶ “[Google Glass could be] on store shelves as soon as Christmas.”
- IOT Lab Manager Thomas Yen

Side-by-side comparison of Google Glass and regular glasses.



the Future

The potential capabilities of augmented reality and functional applications, though, are what really has technology geeks buzzing and industries like healthcare and military excited. If Google does identify a demand in the marketplace for Google Glass, expect other tech companies to quickly follow suit. Companies like Apple and Samsung are already exploring the demand for wearable technology by launching smart-watches

into the marketplace. While the release of new technologies is exciting, it is impossible to predict whether consumers will be willing to adapt to a culture where technology is worn, not carried. Google Glass may provide a crystal clear projection, but the future of the glasses seems murky to say the least.

The Internet of Things lab is open to all students at UW-Madison with a passion for technology as an extra-curricular activity. More information about the lab can be found at <http://iotlab.wisc.edu>. In addition, anyone interested in becoming

a Google Explorer and getting their hands on Google Glass can find more information at <http://www.google.com/glass/start/how-to-get-one>. **WE**

Written by: Brian Zhou

Photography by: Ciara Lotzer

Design by: Maxwell Jin



Just an example of what an ABC of Wisconsin Member company can do.



Free enterprise at it's best!

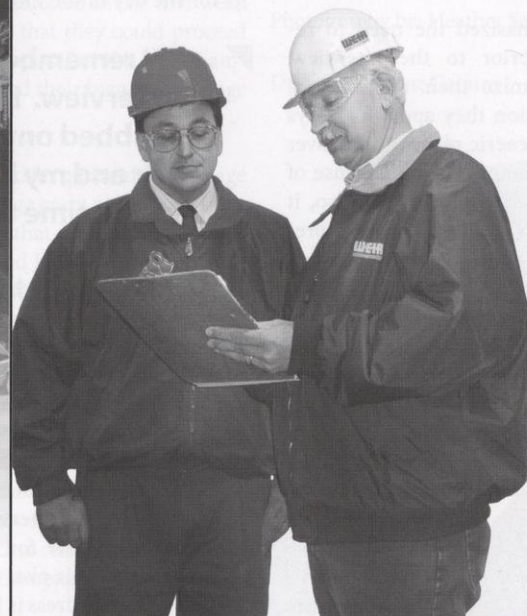
Go to www.abcwi.org to learn more about ABC of Wisconsin and why almost 800 companies belong. *Merit Shop is building America.*

Weir Minerals Division

Excellent Minerals Solutions



Performance.
Not Promises.



WARMAN.
Centrifugal Slurry Pumps

GEHO.
PD Slurry Pumps

VULCO.
Wear Resistant Linings

CAVEX.
Hydrocyclones

FLOWAY. PUMPS
Vertical Turbine Pumps

ISOGATE.
Slurry Valves

MULTIFLO.
Mine Dewatering Pumps

HAZLETON.
Specialty Slurry Pumps

LEWIS PUMPS™
Vertical Chemical Pumps

BEGEMANN PUMPS™
Centrifugal Process Pumps



www.weirminerals.com

Job Interviews Made Easy

The things everyone needs to know to make intimidating job interviews seem easy.

As the interviewing process heats up, students are frantically preparing their résumés in an attempt to woo a potential employer for an internship, co-op, or even full-time position. Earning the interview may seem to be the most difficult part of the process, however it is just the beginning. The most important step in getting hired for that elusive position is to impress during the interview, which is not an easy task. However, John Archambault, the Assistant Dean for Student Development is here to provide advice and some personal stories to help students be successful.

First and foremost, Archambault implores interviewees to stay relaxed during interviews. "I remember my first college interview," he recalls. "I was so nervous. I grabbed onto the arms of the chair and my hands were white by the time the interview was done." Archambault notes that the best piece of advice for students would be to relax and remember that they are interviewing the company as much as the company is interviewing them.

The idea that the interview is a "two-way street," is one of the hardest parts to grasp about the interview process. While the company is determining if the candidate would be a good fit, the candidate should, in turn, be interviewing the company to determine if it would be a suitable environment for them.

Archambault also emphasized the need to research the company prior to the interview. "People need to customize their résumé and cover letter to the position they apply for," says Archambault. Using a generic résumé and cover letter may cost you a chance at a job because of the competitiveness of the job market. Also, it is important to research the company and prepare in order to avoid giving generic answers. Archambault recommends giving very specific answers, as generic answers tend to dissuade employers from hiring. Understanding what the company does beforehand shows initiative and an eagerness to work for them. Preparing for questions prior to the interview will give the candidate more



Junior student Mingrun Du getting dressed up for an interview.

confidence and make the interview go much smoother. "Know how to answer a question," says Archambault. Students need to prepare for questions and think of specific answers that best shows their strengths. For example, instead of the interviewee saying they work well with people, it would be much better to give specific examples of having to work as a team. In fact, if the interviewee cannot give a specific example, it would be best to highlight a different strength with an example.

As for the day of the interview, Archambault has

➤ **"I remember my first college interview. I was so nervous, I grabbed onto the arms of the chair and my hands were white by the time the interview was done."**

- John Archambault

several tips to make a good first impression on the interviewer. Dressing appropriately is the first step in making a good impression, but it depends on the location and job. Business casual is good for an interview; however if a tour of a facility follows the interview, it would be better to wear clothes safe for that environment. Archambault says it is okay and a good idea to ask what appropriate dress is for the interview. Other

important aspects of making a good first impression include having a firm handshake and making good eye contact. "I would always be sure to follow up with a thank you," says Archambault regarding the conclusion of the interview.

With this expert advice from Archambault, any candidate can succeed in their interview. It is important to stay calm during the interview because this is the interviewee's opportunity to show their strengths and determine if the company is a good fit for them. Candidates should research the company before the interview to understand what the internship entails. Preparing for the questions is also a must, as companies are looking for specificity in their answers. Lastly, making good first impression with the interviewer is key to a successful interview. Following these easy steps will give a potential intern the best chance to get that desired position.

Written by: Alex Chay

Photography by: Catie Qi

Design by: Christopher Bradley

Not Taking Money for Granted

Four UW-Madison professors are developing a device that could reshape the world of medical imaging.

Even the most innovative minds can't turn their dreams into a reality without first finding a way to fund their ideas. UW-Madison professors Paul Campagnola, Kevin Eliceiri, Jeremy Rogers and Timothy Hall have faced this challenge multiple times throughout their careers, but they recently experienced the great satisfaction of securing funds for their work. This past August, the team of four won a prestigious \$820,000 grant from the National Science Foundation (NSF) to cover the developmental costs of a new multi-scale medical imaging platform they are creating - beating out hundreds of applicants from renowned universities across the nation. Thanks to a bright idea and months of perseverance, the team of four was able to navigate their way through the challenging application process before winning over the NSF's judge's panel.

“This idea was just waiting to be done, and we happened to have the right team.”
- Professor Paul Campagnola

The device that Campagnola and his team are developing aims to fully integrate multiple medical imaging devices into a single platform. Currently, medical imaging devices are specifically engineered to visualize tissues on either a small, intermediate or large size scale. These three scales are achieved by using either enhanced optical scattering (small scale), harmonic generation (intermediate scale) or ultrasound (large scale) imagery. Since each device has its own specific scale, delicate tissues must be transferred from one device to another during experiments. As a result, most researchers choose to focus their studies on only one of the systems to avoid damaging the tissues. “The three technologies don't communicate and, what's worse, the people don't communicate either,” says Campagnola.

Campagnola and his team are seeking to bridge the gap between the separate-scaled imaging devices by making it possible to visualize different size scales on a single imaging platform. Their collaborative efforts trace back two years to when Campagnola and Eliceiri worked together to compare tissue imaging on microscopes and ultrasounds. After Rogers and Hall were added to the team, the group possessed expert knowledge in each of the three separate size scales used in medical imaging devices. By pooling their knowledge, they dis-

covered a way to bring the three size scales together. “We found similarities between ultrasound, harmonic generation, and optical scattering that no one had ever thought to look at,” Campagnola says. Once they worked out the details of their development plan, the team knew they were ready to seek funding. The team decided the NSF provided the best route for them.

Each year, the NSF receives grant proposals from universities and research institutions across the country as a part of its Major Research Instrumentation program (MRI). According to NSF's website, the program seeks to “increase access to shared scientific and engineering instruments” by funding some of its applicants' projects with \$100,000 to \$4 million on the condition that each applicant's university agrees to match 30 percent of those funds. With an extremely competitive pool of applicants and a rigorous application process, the team knew that it would be tough to win this grant from the start.

Before submitting their grant proposal to the MRI program, Campagnola and his team had to first be selected from the entire group of UW-Madison applicants. Because each university can only submit three grant proposals for consideration, the team of four had to compete against nearly twenty other UW-Madison teams. The team submitted their two-page proposal in November and found out they were selected in the first week of January. After hearing that they could proceed and submit their final proposal to the NSF, Campagnola and his team faced their biggest challenge of the process.

“We had about three weeks to go from a two-page white paper to a full 15-page grant proposal,” Campagnola recalls. During that time, Campagnola, with help from Rogers and Hall, did the technical writing for the final grant proposal. Meanwhile, Eliceiri raced around campus in an effort to make sure UW-Madison would match 30 percent of the NSF's grant. “Kevin [Eliceiri] knows absolutely everyone on campus,” Campagnola says. “He went around, raised all the money, and got letters from anyone he could think of who would possibly use the device.” Finally, on the day of the deadline, the team of four submitted their final proposal and had a chance to relax. “It was a rough couple of weeks,” Campagnola says.

Months passed by and, in the middle of July, the

NSF officially accepted the team's grant proposal. Reflecting on the past two years and the steps that have brought his team to this point, Campagnola recognizes the importance of working with Eliceiri, Rogers, and Hall on this project. “This idea was just waiting to be done, and we happened to have the right team,” Campagnola says. “It was the right people and the right project.”

Now with \$820,000 to spend towards their new multi-scale imaging platform, the team looks forward to taking the next steps in the development process. As a start, the team plans on renovating their lab space and ordering new equipment before beginning the construction phase in early 2015. Looking into the future, Campagnola is focusing on the positive effects that his team's device will have on global health, saying, “The impact on cancer, I think, could be very significant.” **WE**

Written by: Jon Smet

Photography by: Heather Schumaker

Design by: Brent Grimm

Pictured Above: Lab equipment from UW-Madison research labs.

Working Smarter, Not Harder

Practice makes perfect, right? At least, that's how the saying goes. Any baseball or softball player will tell you that hours of training are crucial for improvement. Months upon months are spent preparing for the season, often in less than ideal conditions, all with the hope of becoming a better player once game time rolls around. But what if there was a way to see whether all those extra swings in the batting cage actually made a difference before going up against the competition? Technology is making its way onto the field with the LeadOff System, a dynamic sensor designed to give athletes a better way to train.

Created by the sports technology company Sensori Athletics, the LeadOff allows baseball and softball players to capture thousands of data points from a single swing. The system itself consists of a small sensor surrounded by a rubber mold, which is attached to the end of a bat. This sensor passes on data related to a player's swing, including bat speed and the angle of the swing, to the LeadOff application, available for free on iPhones and iPads. By providing baseball and softball players with a consistent stream of data collected every time they swing, the sensor makes it possible for them to track

The LeadOff System from Sensori Athletics is making practice into a science.

▶ **"We want to be in the background as a resource and let the coaches do what they do best: coach."
- Sensori Co-founder Greg Roble**

exactly how they have improved following weeks of practice in addition to pointing out their remaining weaknesses.

Although the data is a great way to track a player's progress over time, the hard part is figuring out which data is most useful. Greg Roble, a Customer Development Associate and co-founder of Sensori Athletics, described the importance of translating the

data. "You need to present the data in a way that is useful for the coaches and players. Nobody is going to waste their time with data they don't understand," says Roble. "I could give you hundreds of data points related to the angle of a swing, but if you don't know how that relates to hitting a ball, then it's not helping anyone."

Sensori Athletics continues to shift its focus

toward coaches across all levels of competition. "Not only does the data need to be clear so that coaches can adjust based on the progress of their players, but the equipment also needs to be intuitive. We want to be in the background as a resource and let the coaches do what they do best: coach," says Roble.

The LeadOff has already caught the eye of

Assistant UW Softball Coach Randy Schneider, a swing expert who uses the device to enhance the way he teaches his players about hitting. Schneider has provided Sensori Athletics with a tremendous amount of feedback, helping to fine-tune the LeadOff for what coaches and players most want to see.

Founded in 2012, Sensori Athletics has experienced tremendous growth thanks to a variety of campus organizations committed to supporting student entrepreneurs and bringing their business ideas to life. The team won \$7,000 after the LeadOff placed 2nd in the 2014 Qualcomm Innovation Challenge at UW-Madison, an annual event which



challenges students to develop wireless products with market-ready business plans.

Not only did the competition provide financial support crucial for any start-up, but it also served as an opportunity for Sensori Athletics to explain the impact of the LeadOff to investors and executives outside of the baseball and softball community. "Since we work so much with coaches and players it was nice to get the chance to step back and think about how we could communicate the benefits of the LeadOff to someone that isn't as familiar with baseball or softball," says Roble.

While perfecting a business plan is important, logistics and funding are two key issues every start-up faces. As a member of the Student Business Incubator, Sensori Athletics enjoys free office space and customized business support.

The Morgridge Institute for Research is another on-campus resource that has aided Sensori Athletics in the design and production of the LeadOff.

For now, Sensori Athletics continues to develop and perfect the LeadOff, using valuable consumer feedback every step of the way. By giving baseball and softball coaches across the country the knowledge and technology they need to track player performance and improvement, the LeadOff is making sure that practice really does make perfect. **WE**

Written by: Matt Latuszek

Photography by: Nathaniel Corey

Design by: Brent Grimm

Right: Sensori Co-Founder Greg Roble with the LeadOff sensor.

Left: The unobtrusive LeadOff sensor provides a unique and simple way for athletes to study how to improve their hitting.



STUDENT ORG SPOTLIGHT:

INSTITUTE OF INDUSTRIAL ENGINEERS

COMMUNITY
OUTREACH

ACADEMIC
DEVELOPMENT

SOCIAL
DEVELOPMENT

PROFESSIONAL
DEVELOPMENT

Learn more about the biggest industrial engineering club on campus and how it can help connect students on campus.

At a university as big as UW-Madison, finding students with academic interests compatible with yours is often quite difficult. Entry-level classes usually have hundreds of students, and there is little time to interact with one's peers. It is easy to slip through a semester without establishing any meaningful connections with classmates. The Institute of Industrial Engineers (IIE) has a mission to change that. IIE's president, Aaron Strawman, says, "My favorite part of the club is the pathway that it provides to meet your classmates and people who have similar interests to you in a more casual setting." The connective environment of the Institute of Industrial Engineers relies on four core pillars: professional development, social development, academic development and community outreach. Each of the pillars provides members with a unique way to build connections.

The main goal of the professional development sector of IIE is to prepare its members for a career within the field of industrial engineering. They do this through multiple presentations by

companies who hire industrial engineers. This allows members to learn about specific companies and what a future career would look like. "There are plenty of opportunities for members to network [at these events]" says Strawman. For Distinguished Members, students who have fulfilled multiple participation requirements, there are added career development perks. IIE sends out a résumé book of Distinguished Members to its sponsors, with whom they have long term, stable relationships. Being included in this book sets IIE members apart from other industrial engineering undergraduate students.

"There are plenty of opportunities for members to network"
- Aaron Strawman

Equally as important as networking with companies is networking with fellow industrial students. To ensure this happens, they place an emphasis on social events. These range from a Halloween social, complete with costumes and prizes, to a variety of intramural sports including flag football and basketball. Strawman chuckled that "you would have to be trying not to meet people at flag football."

Another fun way that the members get to

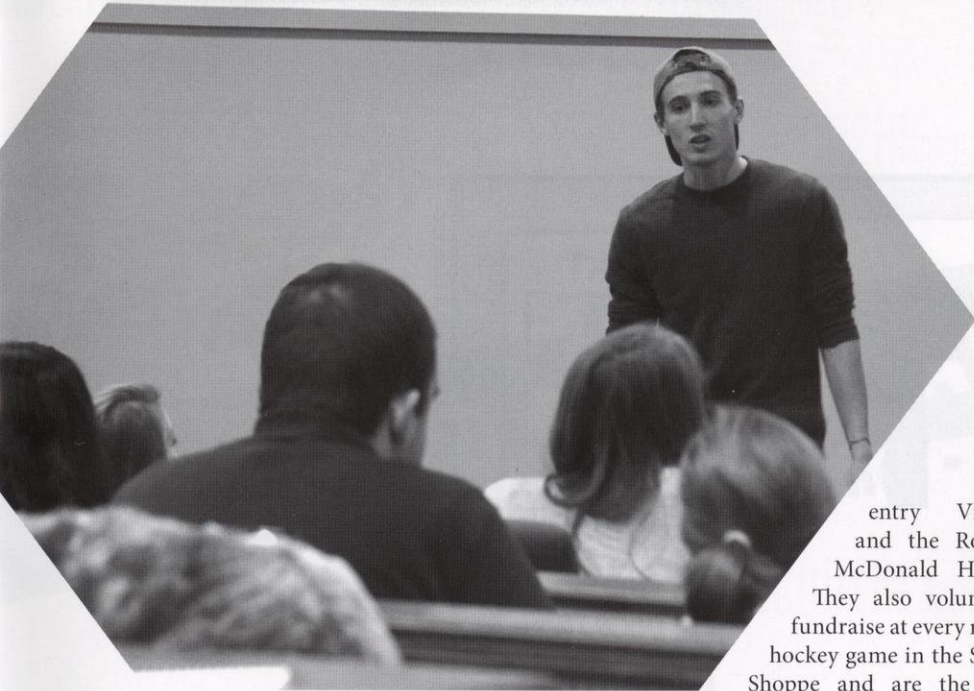
Senior Annie Reagan discusses her experience working at GE with IIE members, attributing to IIE's professional development pillar.

- Date of the Job: Summer 2014
- Things I worked on include: Managing 50+ hourly workers daily, m... around the factory
- What I learned: Developing relationships are crucial
- What I liked: Got to be in the middle of the action, always problems to solve
- What I didn't like: Long hours, stressful environment
- Would you recommend: Yes



GE imagination at work





As a part of their four pillar mission statement, members of IIE discuss upcoming social events.

know each other and their community is through volunteering and community outreach. This aspect of the club is meant to help get IIE's name out in the community in a positive light and to give its members a chance to give back. The club has a strong relationship with Cov-

entry Village and the Ronald McDonald House. They also volunteer/fundraise at every men's hockey game in the Sweet Shoppe and are the sole providers of ice cream at the Kohl Center. This year, they're adopting a highway in Middleton. "It's good for club members to get that opportunity," says Strawman, "In college, it can be harder to find time to volunteer so we made it a pillar to make sure that people are doing it."

The last way IIE connects its members together is through academic development, where the club makes an effort to link itself to the industrial and systems engineering department on campus. One unique thing that IIE holds is an advising night where students bounce ideas off of each other. "We get our peer's perspective on which classes to take, which not to take, recommended professors and other little tips or tricks that really help out," Strawman explains. Another way that members get an 'insider perspective' is through presentations given by students about their own internship and co-op experiences.

From scooping ice cream to networking events to flag football, the UW-Madison chapter of the Institute of Industrial Engineers has it all. They provide their members with a myriad of ways to connect with companies, their peers and the community. Whether you are trying to learn more about industrial engineering, meet people with compatible interests or just have some good clean fun, investigate the IIE website, www.iieuwmadison.org, and attend an event! Connections are just around the corner. **WE**

Written by: Mikaela O'Keefe

Photography by: Matt Henricks

Design by: Margaret Butzen



MAKING THINGS **BETTER** IN WISCONSIN

For more than 50 years, Signicast has been making investment castings better in Wisconsin. And, for just as long, we've been supporting talented Engineers from Wisconsin schools with internships and employment.

To learn more, call (262) 673-2700 or visit www.signicast.com, today.



MADE BETTER FASTER SMARTER IN AMERICA

ISO 900:2008
with Design

Wishing the Engineering Students and Graduates Future Success

Wisco Industries, Inc.
www.wiscomade.com

Join one of the leaders in this exciting market! Realtime is actively seeking:

- ◆ Electrical Engineers with a Power Emphasis
- ◆ Civil Engineers

Contact: David Conklin, P.E., Vice President
608-662-6820; dconklin@rue-inc.com

8417 Excelsior Dr., Madison, WI 53717 A QUANTA SERVICES COMPANY

Brian Schroeder
GEICO Field Representative

216 North Midvale Boulevard
Madison, WI 53705

Tel: (608) 242-9322 Fax: (608) 442-8073
Claims: 1-800-841-3000
BSchroeder@geico.com

Summers Christmas Tree Farm
4610 Rocky Dell Road
Middleton, WI 53562
www.summerschristmastreefarm.com

Choose and Cut Christmas Trees
Spaded Live Trees

Owners: William B. Summers For Information: Judith Summers 608/831-4414

Reliability and Integrity in Structural Solutions

Structural Steel, Bridge & Ancillary Inspections
Welding and Structural Bolting
Hydraulic Steel Structures

Nondestructive Testing
Technical Training

Fish & Associates Inc.
Partners in Structural Solutions
608.831.3238
www.fishassoc.com
Madison, WI | Milwaukee, WI | Minneapolis, MN

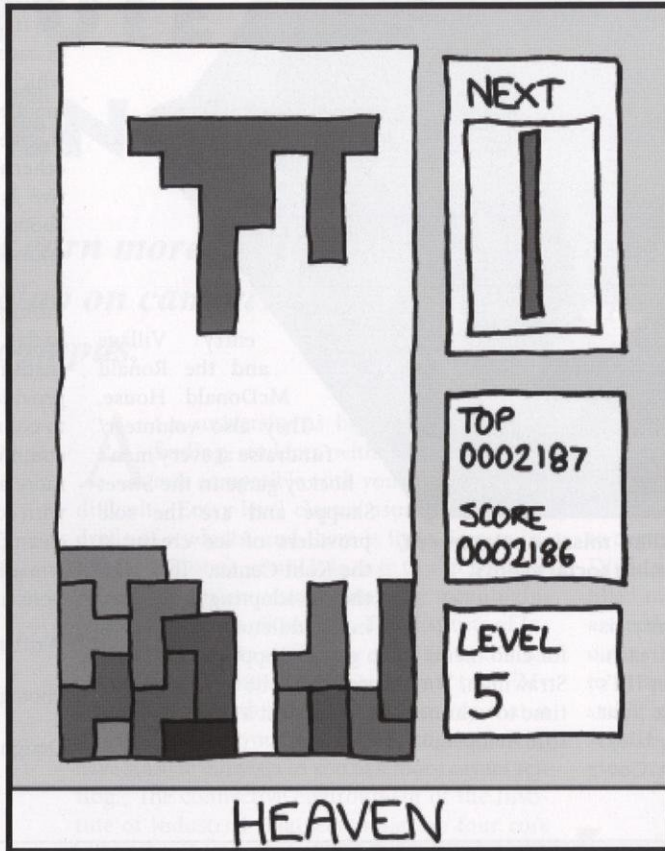


Image used under Creative Commons Attribution-NonCommercial 2.5 License

Comic provided by xkcd - check out xkcd.com for more!

Randall Park Rentals

Located right near Engineering Hall

Renting for Fall 2015
Studios - 3 Bedrooms!

FREE HEAT!



CALL (608)251-2715
www.colonial-management.com



**Take
10% Off
Any Order
Over \$20**



311 N. Frances St • (608) 286-1000

**At Silver Mine Subs,
We engineer great subs**

* Does not include tax or delivery fees. May not be combined with any other offers. Expires 12/21/2015

Web Exclusive Content

Find this exclusive web content at www.wisconsinengineer.com

The Global Office: Cultural Differences and Their Effects on Business

An engineer and an intern share their experiences abroad and ways to better prepare for international business
By Jessica Thomas

The Advent of Wearable Technology

The past, present and future of Wearable Technology
By Ryan Breon

THIS COULD BE YOUR ADVERTISEMENT

Businesses • Apartments • Organizations

Advertising in the Wisconsin Engineer is a great investment, whether you are interested in easily reaching more than 6000 engineering students or simply supporting a worthy organization. The Wisconsin Engineer provides the most direct means of communication with the engineering community at the University of Wisconsin-Madison.

For more information on advertising, including current rates and deadlines, as well as our online ad offerings, please contact us at

advertising@wisconsinengineer.com

or visit www.wisconsinengineer.com!

Wisconsin Engineer Magazine
Room M1066
Engineering Centers Building
1550 Engineering Drive
Madison, WI 53706

Presort Standard
U.S. Postage
PAID
Madison, WI
Permit No. 658

Check us out online!

**Making Engineers
Cool Since 1894**

**the
university
book store**

uwbookstore.com



Join the **wisconsin** engineer on

Linked in

Keep up with the magazine ■ Stay in touch with the staff
See the new issues first as they come out



THE REGENT
APARTMENTS



Make the Move to **ENGINEERING ROW!**

Discover apartments reserved for engineering students: *The Regent's Engineering Row.*
Your own bedroom, kitchen, and classmates down the hall for studying and socializing.

LEARN MORE AT

info.stevebrownapts.com/engineeringrow



800.456.0223 or 608.258.4900

South of Campus: Corner of Randall and Regent

