University of Nebraska - Lincoln DigitalCommons@University of Nebraska - Lincoln

BSE Department Magazine

Biological Systems Engineering

Fall 2014

DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING NEWSLETTER, FALL 2014

Follow this and additional works at: http://digitalcommons.unl.edu/bsedeptnews

"DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING NEWSLETTER, FALL 2014" (2014). BSE Department Magazine. 12.

http://digitalcommons.unl.edu/bsedeptnews/12

This Article is brought to you for free and open access by the Biological Systems Engineering at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in BSE Department Magazine by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.



Biological Systems Engineering



UNIVERSITY OF NEBRASKA-LINCOLN FALL 2014



From the Department Head



Hello again, and welcome to the latest edition of the BSE Department Newsletter. We hope that you find the stories and articles to be interesting

and informative. Activities in the department continue at a fast pace. Our student numbers have climbed

again. Fall enrollments have been released;

while UNL enrollment is up 3.1%, BSE has 71 Mark Riley AGEN students (a growth of 29%) 284 BSEN students (a growth of 15%), and 93 MSYM students (a growth of 2%) for a total of 448 students (WOW!). The growth of College of Engineering programs this year is 8.5% and CASNR programs is 6.6%; currently BSEN is the second largest major in all of Engineering (although this is an artifact of how students in Lincoln and Omaha programs are counted separately. If counted together across campuses, Civil Engineering and Computer Engineering would be larger than BSEN). The freshmen AGEN/BSEN 100 course has outgrown our largest lecture room (Chase 116) with 100 students in BSEN and 19 in AGEN.

Since our last newsletter, we haven't hired any new tenure track faculty, but we have a number of searches in the works. Two positions are open for irrigation engineers to be located at North Platte (West Central Research and Extension Center) and Scottsbluff (Panhandle Research and Extension Center). Several more positions have become available through the IANR Phase 2 faculty hiring process; we will be initiating those searches soon. BSE will also be participating in the College of Engineering hiring process. With all of the new students joining our program, we are going to need these additional faculty.

This past year, we have had a remarkable amount of awards bestowed upon our faculty, students, and alumni. The faces on the cover of this newsletter are some of those who have been recognized for their outstanding contributions to the profession. We have tremendous faculty, staff, and students, and it is heartwarming to see them receiving their deserved acknowledgement from the profession.

This past July, Dr. Dennis Schulte retired after 36 years on the faculty. More on his career and retirement can be found on page 15. Dr. Schulte's impact on our students, faculty, and staff cannot be measured, but it is clear that he has tremendously influenced our student-centered culture. We have been able to encourage him to stick around to teach his Animal Waste Management course one last time this Fall semester, but otherwise he is stepping back from duties. Thanks for all your excellent work Dennis!

For you, dear reader, thank you for your interest in our programs. We hope you enjoy the newsletter and please do stop by the department when you have a chance.

Best regards, Mark Riley

U.S. News & World Report **College Ranking List**

2015 U.S. undergraduate biological/agricultural schools: **BSE ranked 6th!**

2015 Best U.S. Graduate Schools for biological/ agriculture engineering: **BSE ranked 9th!**

Biological Systems Engineering Department Newsletter

Mark Riley..... Editor Julie Thomson..... Editorial Coordinator Sheila Smith Graphic Artist Lance Todd Cover Art Contributors: Bethany Brittenham, Evan Curtis, Eileen Curtis, Christopher Davidson, Tim Dornbos, Tom Franti, Shane Forney, John Gilley, Ryan Hanousek, Derek Heeren, Stuart Hoff, Loren Isom, Paul Jasa, Ben Joekel, Deepak Keshwani, Emily Klimisch, Mike Kocher, Kye Kurkowski, David Mabie, Amber Patterson, Andrea Spader, Lance Todd, Michael Van Liew, Justin Williams

> Any mention of trade names in this publication does not imply endorsement by Biological Systems Engineering Department or the University of Nebraska.

Archives Past issues are on the web at bse.unl.edu/news

What's New? Update your profile at: bse.unl.edu Inclusion in the newsletter is optional.



Farm Manager Stuart Hoff working in the field.

Extension Engineer Paul Jasa shows Turkish visitors no-till soil sample.

University of Nebraska Rogers Memorial Farm Research, Extension & Teaching

The Rogers Memorial Farm is operated as a research and demonstration farm by the Biological Systems Engineering Department, cooperating with several other University departments and USDA agencies. The department has dedicated this farm to soil and water conservation activities, evaluating and demonstrating both cultural and structural practices. Several University classes use the farm as an outdoor laboratory for real life situations and experiences. The Farm regularly hosts tours, field days, and visitors from around the world.

Corn, soybeans, grain sorghum, and wheat are all grown using continuous no-till production systems and controlled wheel traffic. The use of continuous no-till began with research established in 1981 to compare and evaluate various tillage systems. As with many no-till studies, the soil building benefits of no-till were not readily seen in the first few years of the research. With the improved soil structure, infiltration has increased greatly and runoff has almost been eliminated. As such, more water is available for crop growth, and the farm yields are far above the county averages.

Across the years, rainfall simulators have been used on other plots to evaluate erosion and runoff from different tillage systems and to look at water quality concerns. Runoff and leachate studies have been conducted to evaluate nitrogen and phosphorus losses from land application of manure, compost, and fertilizers. A solid-set irrigation system has been used to evaluate irrigation scheduling methods, deficit irrigation, and impacts on water quality. Research and demonstration of structural conservation practices have included different terrace layouts, types, and outlets. Woodland and windbreak renovation and establishment practices are being evaluated, using both the farmstead and the riparian areas along a creek. Projects are in place to demonstrate and evaluate stiff-grass hedges and riparian buffers for both erosion control and water quality concerns. A constructed wetland is being used for household wastewater treatment and includes several smaller cells for other wetland and water treatment studies.

Some production related research is conducted using strip trials, just as many farmers would do on their own farms. Hybrid and variety comparisons, row spacing and population studies, planting date comparisons, equipment evaluations, cover crops, and fertilizer trials are examples of some of the cultural production practices being evaluated. Results from this applied research are used to fine-tune the farm's general crop production, add to demonstration aspects of the farm, and to support Extension programs.

For more information, contact Stuart Hoff, Farm Manager (402-472-6332 office) about the farm production or Paul Jasa, Extension Engineer (402-472-6715) about no-till or the demonstrations and research on the farm.

The Farm's Website is: http://bse.unl.edu/rogersfarm/

For current weather and weather history at the Farm (updated hourly, available with about a 2 hour delay): http://www.wcc.nrcs. usda.gov/scan/site.pl?sitenum=2001&state=ne



Liska's *Nature Climate Change* Article Draws Attention to UNL Research

Adam Liska, Assistant Professor of Biological Systems Engineering, and Agronomy and Horticulture, George Dempster Smith Chair of Industrial Ecology, and Program Coordinator for the Energy Science Minor, received national and international media attention as lead author for a research article published April 20 in the peer-reviewed journal Nature Climate Change. Associated Press coverage of the article "Biofuels from crop residue can reduce soil carbon and increase CO2 emissions" appeared in multiple publications, including USA Today, The Guardian, US News, and The Washington Post. Network coverage of Liska's research resulted in Steven Colbert airing the item on the April 22nd Colbert Report. Coverage of Liska's research can be found on multiple sites from Time *Magazine* to *National Geographic*. *Nature Climate Change* has developed a page to track the response to this article: (www. nature.com/nclimate/journal/v4/n5/nclimate2187/metrics)

UNL Today reported (http://news.unl.edu/newsrooms/ unltoday/article/study-casts-doubt-on-climate-benefit-ofbiofuels-from-corn-residue/), "The researchers . . . used a supercomputer model at UNL's Holland Computing Center to estimate the effect of residue removal on 128 million acres across 12 Corn Belt states. The team found that removing crop residue from cornfields generates an additional 50 to 70 grams of carbon dioxide per megajoule of biofuel energy produced. Total annual production emissions, averaged over five years, would equal about 100 grams of carbon dioxide per megajoule—which is 7% greater than gasoline emissions and 62 grams above the 60% reduction in greenhouse gas emissions



Corn residue baled in an irrigated field at ARDC in October 2010.

as required by the 2007 Energy Independence and Security Act." The study found the rate of carbon emissions is constant whether a small amount of stover is removed or nearly all of it is stripped. "If less residue is removed, there is less decrease in soil carbon, but it results in a smaller biofuel energy yield," Liska said. The study also suggests mitigation strategies.

In the media coverage, some industry researchers claimed their studies refuted the UNL findings and would be subsequently published. A *Scientific American* article in April of 2014 reports on the reaction: http://www.scientificamerican.com/article/industry-lashes-out-at-corn-biofuel-study/. Liska told *UNL Today*, "If this research is accurate, and nearly all evidence suggests so, then it should be known sooner rather than later, as it will be shown by others to be true regardless. Many others have come close recently to accurately quantifying this emission." He reports that *Nature Climate Change* will publish three critical comments on his article and his response in the November issue. "Two related research articles are also in preparation which further support our findings based on field measurements and model validation, and a related book chapter is in press."

Students Work to Improve Water Quality



Under the direction of **Dr. John Gilley**, BSE students applied their engineering skills on a summer project to measure water quality on cropland areas to reduce the transport of pollutants in runoff. The research took place at the University of Nebraska Rogers Memorial Farm, a no-till research farm.

Pictured left to right: Mitchell Goedeken, Lucas Snethen, Kevan Reardon, Ethan Doyle, Eric Davis, and Nicole Schuster.



Dr. Tom Franti on sabbatical in Montreal.

Welcome to the Present Online Ecological Engineering

Developing a new undergraduate course for BSE is just one of the g oals Dr. Tom Franti has for his professional development leave at McGill University this fall. He also wants to experience Montreal and French-Canadian Quebec, and enjoy the perspectives of a different culture. The new course is entitled "Introduction to Ecological Engineering." Dr. Franti is designing the course with faculty from the Bioresource Engineering Department at McGill University, with the goal of both departments teaching the course simultaneously, which will allow students from the two departments to collaborate on projects and other learning. The course will introduce students interested in water and environment to the new discipline of Ecological Engineering. Welcome to the present: International, realtime, online learning focused on training engineers for the future. To learn about Dr. Franti's cultural experiences living in Quebec you can read his blog: Quebecophile for A While, at <quebecophile.blogspot. com>.





Van Liew Teaching in China



In the spring of 2014, **Michael Van Liew** spent 10 weeks at Northwest Agricultural and Forestry University (NW A&F) in Yangling, Shaanxi Province, China, teaching courses and presenting seminars in the field of surface water hydrology. Courses that he taught primarily to graduate students included engineering hydrology, surface runoff water quality, and watershed modeling. These courses not only introduced concepts and methods that are commonly used in North America to address issues in hydrology, but also helped to strengthen the students' ability to communicate in English. Mike's experience represents one of many ways that constructive bonds are being built today between UNL and NW A&F.





The Missing Link in Fiber Production BSE Collaboration with BastLab

By Michael Kocher

In 2012–13, UNL granted me a sabbatical to work with BastLab in Omaha to develop and test equipment to decorticate bast fiber crops. Decortication refers to "threshing" the stalks of fiber crops (vs. seed crops) to remove the woody, core fibers in the middle of the plant stalk from the long, strong, bast fibers located in a ring at the exterior of the stalk. Mechanized decortication has been recognized as a key "missing link" in modern natural fiber production; it has been exciting for me to play a small part in potentially transformative technology. I helped refine the design of the decorticator machine, obtained quotes to select a fabricator, and worked with the fabricator to answer questions regarding building the machine, a process that took longer than anticipated. The machine was not finished before my sabbatical ended, and I have continued my collaboration with BastLab.

The decorticator and a conveyor have been built, and testing has commenced. The first round of tests involved simple things like determining the relationships between the variable frequency drive (VFD) controller settings and the machine speeds (linear speed of the belt conveyor, and rotational speed of the breaker roller in the decorticator). Next were preliminary tests to determine the "sweet spot" of decorticator operating conditions, or the combination of operating conditions that gave "good" decortication, including thickness of the stalk mat fed into the decorticator, size of the gap the stalks feed through, spring force applied to the grip roller as it rolls over the stalks, and rotating speed of the breaker roller. I am working with BastLab on plans for graduate research projects to further define optimum operating conditions for the many potential markets for both core and bast fibers. Many factors require study, such as quantity (yield), strength, length, and cleanliness, and may vary depending on the fiber specifications for the application or end-product. At some point, there may be a call to develop equipment for in-field decortication of bast crops.

There are many opportunities associated with bast crops in the future for Nebraska farmers, helping to diversify and improve our agricultural industry and economy. Bast crops are known for their low input (fertilizer, water, etc.) needs, and high biomass output. Since transportation costs for the fiber can be high, it is likely that processing facilities will be developed near or in the growing regions, moving good jobs into rural America. Enduses for natural fiber span a variety of markets, from non-woven mats, to high-strength, low-weight fibers for composites, to spun fibers for textiles. As specific markets for both the core and bast fibers develop, additional projects will be needed to determine optimum operating conditions for the decorticator and associated processing machinery. As American natural fiber production and supply increases, replacing imported natural fiber, the security of the natural fiber supply for American industry also improves. Will Nebraska one day be recognized around the world as the "capital" of the natural fiber industry?

Conference of Food Engineering 2014



Breakout technical session on food safety.

Dr. Jeyam Subbiah was the Organizing Committee Chair of the 12th Conference of Food Engineering (CoFE 2014), held at the Embassy Suites-Old Market in Omaha, April 7-9. CoFE is a biennial event, attracting food engineers from all around the world. This specialized conference provided opportunities to discuss cutting-edge research in depth in the area of food engineering and allowed for peers to give and receive feedback. An outstanding panel of speakers in three General Sessions and 14 Concurrent Technical Sessions was featured. Themes for the General Sessions were Food Safety Engineering, Simulations in Advanced Food Engineering, and Food for Health. There were 55 renowned speakers and 38 poster presentations. The conference was well attended by 140 participants (65 from academia and government, 34 students, and 41 industry participants). Dr. Scott Lineback from ConAgra was the co-chair, and the UNL Food Processing Center helped with the logistics of organizing the conference.

2014 Nebraska Manure Demo Day

The place to be when you want the scoop on poop!



Ranked 1st in the nation in commercial red meat production and 6th for swine production, Nebraska is, not surprisingly, in no short supply of manure. In fact, manure is produced by the tons every day in Nebraska; therefore, it is beneficial to consider the myriad uses of manure and its potential as a commodity. Connecting livestock producers who have manure with crop producers who can use it as fertilizer is a primary goal of the UNL Animal Manure Management (AMM) team. Such was the focus for the 2014 Manure Demonstration Day held in Lexington, NE on July 29, which featured 16 demonstrations, a trade show, educational sessions, and equipment vendors to display and demonstrate the applicability of their equipment to the almost 300 local producers in attendance.

Educational sessions, in which presenters discussed topics, included "Managing What We Can't See in Manure," and "Connecting Manure and Fields." **Dr. Amy Schmidt**, BSE Assistant Professor and Livestock Bioenvironmental Engineer, was a presenter at the Nebraska Manure Demonstration Day, along with a number of other experts from UNL Extension, USDA-ARS, and other Nebraska agencies and organizations. During her talk, she discussed a question she often hears from producers and custom manure applicators, "Can crops tell the difference between manure and commercial fertilizers?" Schmidt explained to the nearly 100



Dr. Amy Schmidt and Dr. Charles Shapiro present at Manure Day.

attendees at her talk that while the major nutrients in manure and commercial fertilizers are basically the same-nitrogen, phosphorus and potassium-what we get from manure are living organisms and organic matter that you don't get from inorganic fertilizer. She went on to explain, "The microorganisms in manure help convert nutrients in the soil to a usable form and break down organic matter. This in turn improves soil structure, water infiltration and retention, and can break down soil contaminants. There is also a greater residual effect on later crops than with inorganic fertilizer." While manure nutrient content can be highly variable, and the availability of those nutrients is dependent on soil temperature and moisture, she stressed that the bottom line over many long-term studies and trials is that manure is more beneficial than commercial fertilizer at improving soil's physical, chemical, and biological properties. "So, although crops cannot distinguish between nutrients coming from manure versus inorganic fertilizer, they certainly respond more positively to the improved soil structure and fertility that comes with utilizing manure as a soil amendment," concluded Schmidt.

If you would like to learn more and watch some of the Nebraska Manure Demonstration Day archived presentations please visit the event webpage: http://water.unl.edu/manure/ nebraskamanuredemo.



Manure Day equipment demonstration.

Furthering Research in Gene Delivery & Tissue

Engineering



The Pannier Lab is under the direction of **Dr. Angela Pannier**, BSE Biomedical Engineer and Associate Professor. Research in the Pannier Lab is dedicated to investigating innovative biomaterials and gene delivery systems to advance biotechnology and tissue engineering, such as developing delivery strategies to genetically modify stem cells, creating tissue engineering scaffolds for culture models of bone growth plates and pig embryos, developing nanoparticles for oral gene therapy and vaccination, and developing nanostructured surfaces for medical devices. To achieve these aims, Dr. Pannier and members of her lab collaborate with researchers at the University of Nebraska Medical Center, the U.S. Meat Animal Research Center, and other UNL departments. Research in the Pannier lab is currently funded by the American Heart Association, National Science Foundation (NSF), the Nebraska Research Initiative,



IANR-ARD grant initiative, and Tobacco Settlement Funds. For NSF funding, Dr. Pannier's CAREER award was featured on NSF Science 360 news. For her research area, Pannier and Pannier Lab Manager **Sarah Plautz** work with post doc researchers, graduate students and undergraduates. The Pannier Lab is where many undergraduates (over 20 so far!) gain their first experience in research. Projects have ranged from developing corn proteinbased microspheres as a potential method to deliver genes to the body to using hydrogels to better understand growth plate development. Students may start out washing dishes, but by the time they are seniors, they are ready to compete for graduate positions anywhere in the U.S. To learn about the facilities, publications, and people in a lab devoted to engineering biomaterials and gene delivery, go to: http://pannierlab.unl.edu/index.shtml.



Numerous University of Nebraska-Lincoln faculty, graduates, and students were honored at the international conference of the American Society of Agricultural and Biological Engineers held in Montreal, Canada in July. ASABE annually gives out three Gold Medal Awards as its highest level of distinction; two of the three went to BSE faculty members:

Suat Irmak, H. W. Eberhard Distinguished Professor in BSE, received the John Deere Gold Medal, honoring achievement through engineering for improved manipulation, use and conservation of soil water, which has resulted in applications of a new concept, art or science that advanced agriculture. Irmak



also received the Heermann Sprinkler Award, which honors professionals in research, development, extension, education or industry that have made significant contributions to the improvement of efficient and effective sprinkler irrigation. And his refereed journal article, "Development and evaluation of ordinary least squares regression models for predicting irrigated and rainfed maize and soybean yields" in *Transactions of the ASABE*, July 16, 2014, received an ASABE Superior Paper Award.

David Jones, Associate Dean, College of Engineering, received the Massey Ferguson Educational Gold Medal, which honors those whose dedication to the spirit of learning and teaching in the field of agricultural engineering has advanced agricultural knowledge and practice, and whose efforts serve as an inspiration to others.





Jones and Irmak received their awards from ASABE President **Lalit Verma**, the first Ph.D. graduate of the BSE Department. Verma also received an ASABE award in Montreal: the James R.

and Karen A. Gilley Academic Leadership Award.

Curt Weller, jointly appointed in BSE and Food Science and Technology, was one of twelve members in the international organization to be installed as an ASABE Fellow. Another so honored, **Randy Taylor** of Oklahoma State University, Lalit Verma & Dr. Curt Weller



received his doctorate at UNL's BSE Department. Weller also received a Presidential Citation for his support of the agricultural and biological professional engineering exam.

L. Verma, R. Hoy, J. Kreider (SMV Technologies)



Michael Kocher biologic



advance agricultural and biological safety and health. He also accepted an ASABE Superior Paper Award for "Testing the Fuel Efficiency of Tractors with Continuously Variable and Standard Geared Transmissions" on behalf of **Christopher Howard**, **Michael Kocher**, himself, and Erin Blankenship.



The UNL Extension publication "Stormwater Sleuth and Running Rain" won ASABE's 2014 Educational Blue Ribbon. It uses the title characters to teach educators and students about effective stormwater management practices. Authors recognized were **David Shelton**

Roger Hoy, Professor

Nebraska Tractor Test

the SMV Technologies

Ergonomics, Safety and

recognizes outstanding

Health Award, which

contributions that

Laboratory, received

and Director of the

BSE professor and Extension agricultural engineer, Erin Bauer, associate Extension educator; Kelly Feehan, Extension educator; Katie Pekarek, assistant Extension educator, and illustrator, Ami Sheffield.

Lauren Wondra, a recent recipient of her B.S. in Biological Systems Engineering and current BSE graduate student, is an officer in the national student organization.

In just its second year of competition, the UNL student team placed first in the Fountain Wars. The team is advised and mentored by **Derek Heeren**.

Matt Helmers



Matt Helmers of Iowa State University, a Ph.D. graduate of BSE, received the G.B. Gunlogson Countryside Engineering Award in recognition of excellence in environmental engineering.

Accolades

Suat Irmak



Dr. Suat Irmak received the Award of Excellence presented by the Western Association of Agricultural Experiment Station Directors for the outstanding progress and impacts of the project, "Microirrigation for Sustainable Water Use."

At the Interdisciplinary Faculty Retreat, Suat Irmak and Angela Pannier presented (separately)

their innovative and collaborative works.

Angie Pannier, Santosh Pitla, Jeyam Subbiah, and Jeff Woldstad were named to the ARISE (Adopting Research-based Instruction Strategies for Enahncing STEM Education) 2014 Professional Development Program led by Lance Perez.

Angie Pannier





Jeff Woldstad



Rick Stowell



Rick Stowell was inducted into the Rural Builder's Hall of Fame in March in recognition of leadership, service, and outstanding contributions to the rural construction industry. Last year, Stowell received the President's Special Service Recognition Award for "Innovation in Developing the Odor Footprint Tool" from the Nebraska Planning and Zoning Commission.

Thomas Franti



Yiqi Yang



Long Publication's Gold Award from the Association of Natural **Resource Extension Professionals** was presented to Steven Rodie, Thomas Franti, Allison Bennett, Kelly Feehan, David Shelton, Katie Pekarek, and Anne Moore for their "Rain Garden Design" guide.

Yiqi Yang has partnered with researchers from the University of Nebraska Medical Center to develop a novel mesh that will reduce complications associated with hernia repair surgeries. The project is funded through a \$100,000 grant from the University of Nebraska's Nebraska Research Initiative and is lead by David Oupicky, professor of pharmaceutical sciences at UNMC, and includes researcher Mark Carlson, professor of surgery at UNMC.



Dr. Angela Pannier and her group's research was featured as a video, "Gene delivery tool," on the National Science Foundation's Science 360 News Service: http://news.science360. gov/files/. Spring 2014, Pannier received an Achievement Award from UNL's Nebraska Center for Materials and Nanoscience for outstanding service in materials and nanoscience educational outreach. She also received the William E. Brooks Leadership Fellow, a 4-year program, from the College of Engineering.

Tim Martin



Tim Martin received the 2014 UNL College of Engineering Outstanding Graduate Research Assistant Award.



Daran Rudnick

Daran Rudnick received the 2014-15 UNL Maude Hammond Fling Fellowship.

Deepak Keshwani



Deepak Keshwani received the College of Agriculture Sciences and Natural Resources Award for Superior Academic Advising, at the CASNR Week Awards Banquet in April.

The Mechanized Systems Management Club was recognized as an Outstanding Student Organization.

Lauren Wondra



Evan Curtis



Lauren Wondra received the Outstanding Teaching Assistant Award and the Student Leadership Award.

Aaron Vancura received the Outstanding Student Organization Officer Award as a Quarter Scale Team captain.





Amber Patterson and Julie Thomson were also recognized as Outstanding Staff.



Fountain Wars Team Takes 1st Place

The UNL Fountain Wars Team took first place in Montreal at the 2014 American Society of Agricultural and Biological Engineers (ASABE) International Meeting!

Fountain Wars is a hands-on competition in which a team of up to six students designs a fountain to complete challenges using the necessary PVC pipes, couplers, fittings, valves, nozzles, and pumps to assemble their design on-site. After making a brief, marketing-style promotion, the entire fountain is constructed in a 120-minute period. Teams may get help for construction from "ringers." Awards are based on scores of the written report, oral presentation, construction, technical tasks, and aesthetic display segments of the event. In addition to a first place rank, the Fountain Wars Team also won the Economy of Design award.

This year, the challenge was to design a fountain capable of balancing two leaking buckets, with one containing an unknown weight, in addition to launching a parachute. Both tasks require all energy to originate from a water pump.

The BSE team chose a Mario game theme for the aesthetics portion of the competition. For the Balance Beam task, their design focused on only filling the bucket not containing the unknown weight to keep the balance beam within 6" of level. Toggle switches regulated the flow rate via irrigation valves for both slow and fast flow pipes. The Parachute Launch task utilized a wooden triangular prism launching platform. Bungee cords connected the launch base containing the parachute to a breakaway honda attached to a bucket. As the bucket fills, the breakaway holds until maximum tension is achieved. The release then flings the parachute skyward.

A special thank you to all 2014 sponsors: **Dr. Deepak Keshwani**, Flowserve, Reams Sprinkler Supply, The Flatwater Group, Diamond Plastics, **Dr. Joe Luck**, Wish Nebraska Inc., **Dr. Dean Eisenhauer**, ASABE Nebraska Section, and EA Engineering. Additional technical expertise was provided by **Alan Boldt, Scott Minchow**, and **Dr. George Meyer**.

Fountain Wars Team. Front: Co-Captain **Bethany Brittenham**, Lauren Wondra, Co-Captain Julia Burchell, Advisor Dr. Dean Eisenhauer. Back: Advisor Dr. Derek Heeren; Ringers: Andrew Volkmer, Sam Marx, Ryan Freiburg, David Mabie.





Back row: Ian Schuster, Micah Bolin, Aaron Vancura, Turner Hagen, Zach Wacker, Kye Kurkowski, Luke Prosser, Ethan Mosel. Front row: Dr. Joe Luck, Travis Classen, Ryan Hanousek, Jake Walker, Robert Olson, Keith Prothman, Joe Timmons, Dr. Roger Hoy.

2014 Quarter Scale Teams Win Many Awards

The UNL Quarter Scale Tractor Team experienced another successful year at the ASABE international competition in Peoria, Illinois, coming in 10th overall, two places higher than last year. Along with the A-team's solid presentation, the X-team took an impressive 4th place finish, only 15 points short of a top three ranking in a 2800 point competition.

The teams also received individualized awards. **Micah Bolin**, X-team captain, accepted the honor for the winning Design Presentation. **Joe Timmons**, A-team module lead for the operator's station on the 2014 tractor, accepted the Ergonomics Award, which is bestowed upon the team who developed the most user-friendly and comfortable tractor. The 2014 tractor placed 5th in the pulling competition and 4th in design judging, both vital aspects of the competition. These numbers were all complimented by numerous comments from judges and opposing team members on the industriousness, cosmetic appeal, and thought put into the tractor design. Team captains for 2014 were **Joe Timmons, Zach Wacker, Aaron Vancura**, and **Kye Kurkowski**.

Design for the 2015 tractor is well under way, and it is assured that this tractor will be just as innovative as past years. Captains for 2015 are **Caleb Lindhorst, Jake Walker, Luke Prosser,** and **Robert Olsen**.

The team would like to thank the BSE Department for the chance to represent UNL at an international competition, an outstanding way to coach engineering fundamentals, practical application, and teamwork to aspiring engineers, qualities that allow them to become successful in their future careers and their lives. Special thanks also go out to **Dr. Roger Hoy** and **Dr. Joe Luck**, team advisors.

BIOLOGICAL SYSTEMS ENGINEERING



Lalit R. Verma, Ph.D., P.E., ASABE Fellow, is the 2014 Biological Systems Engineering Hall of Fame inductee. Verma received his B.S. from J.N. Agricultural University, India, and his M.S. from Montana State University, Bozeman, with both degrees in agricultural engineering. He was the first Agricultural Engineering Ph.D. graduate of our department and received his degree in 1976 for his work on storage of mechanically formed hay packages developed under the guidance of Ken Von Bargen.

Verma is professor and head, Department

of Biological and Agricultural Engineering, at the University of Arkansas (U of A), Fayetteville, Arkansas. He was previously in this same role at Louisiana State University (LSU). He progressed through the academic ranks as a professor, with activities in teaching undergraduate and graduate courses and mentoring and advising students.

Throughout his career, Verma has provided leadership in the development and promotion of biological engineering as a science-based discipline. In particular, he coordinated the transformation of small agricultural engineering programs at both LSU and the U of A, public land-grant universities, into vibrant and growing biological engineering programs by providing leadership in the development of skill competencies and accreditation criteria.

He has also served as interim dean and associate vice president for academic programs from 2008 to 2010 at the U of A, Dale Bumpers College of Agricultural Food and Life Sciences, and U of A Division of Agriculture,

and managed college renovations and the implementation of distance education programs.

Verma is internationally recognized for his research in rice and forage post-harvest engineering and technology. He has served as principal or co-principal investigator on various sponsored research projects, and his numerous publications include refereed articles, proceedings papers, and book chapters. He is the recipient of the 2014 James R. and Karen A. Gilley Academic Leadership Award in recognition of his visionary leadership at two universities, for the

successful curricular integration of biological engineering, and for his exemplary service to ASABE.

A 39-year member of ASABE, Verma has played a significant leadership role within ASABE through the years. He served as ASABE President for the 2013-14 year and is now the immediate Past President. A few of the numerous committees on which he has held office include: Fellows, Crop & Feed Processing & Storage, Engineering & Technology Accreditation, Academic Program Administrators, and ASABE Foundation Board of Trustees. He served as a Member of the ABET Board of Directors representing ASABE from 2004-2010.

In addition to having been named Louisiana State University H. Rouse Caffey Endowed Professor, 1996 to 2001, Verma is a Fellow of the Institute of Biological Engineering and the American Institute of Medical and Biological Engineering. From ASABE he has also received two Presidential citations and the Ford New Holland Young Researcher award. He was named an ASABE Fellow in 1999.

Don't miss the Biological Systems Engineering Hall of Fame **Banquet on the East Campus November 7** Details on back cover of this issue

Visit the Biological Systems Engineering Hall of Fame at Chase Hall, East Campus

Our Alumni

BSE Graduates Changing the World

Alumni Featured in ASABE Resource Named Nebraska Corn Board Executive Director



Management alumnus Kelly Brunkhorst's career was featured in the current issue of ASABE's Resource Magazine, which explores where careers in Agricultural Technology and Systems Management can take students. Kelly became

the executive director of the Nebraska Corn Board effective August 1, 2014. Previously the Director of Research for the Nebraska Corn Board, he has been engaged in research and grant writing, and leadership on issues related to transportation, industrial uses of corn, domestic and international markets since 2004. He represented the board on national research, production and stewardship committees, participated in two national strategic planning initiatives, managed the research and grant portfolios, promoted new uses of corn, worked with the elevators and cooperatives, maintained the data base of statistics, and tracked environmental regulations that effect corn, livestock, and ethanol.

According to Kelly, his strong agricultural roots are the result of being raised on a diversified farm and ranch operation south of Wauneta, NE, "Whenever you grow up in a community with a solid foundation of support through all activities it sets you on a good foundation for success in the future." He earned his State and American FFA degrees in high school. His mechanized systems management degree with a business option from UNL led to his managing a feed

BSE Mechanized Systems mill for Bartlett Foods, a privately-owned swine production unit, then becoming a district sales manager for Crow's Hybrid Corn Company before a position as the vice-president of operations and education for the Nebraska Grain & Feed Association.

> As a UNL student, Kelly lived in Ag Men fraternity, which is now Alpha Gamma Nu. He told Resource, "I appreciated the closeness of staff/students within the department at UNL . . . the friendships that I made in the fraternity and also the friendships with fellow students and staff. Many of those continue today in my role with the Nebraska Corn Board and the relationships with various departments within UNL." He advises students to think broadly, "Today we are seeing a great revolution in the adoption of technology within agriculture and the rate at which this adoption will only accelerate." A member of the BSE Advisory Committee and an advocate for the MSYM degree, Brunkhorst explained that this has broad application to many aspects of agriculture and technology.

Kelly describes his job, "In today's world, technology surrounds you. I may be interacting with staff for a cooperator within the U.S. or around the world via email. Or it may be meeting with researchers in helping direct new projects that the board has funded with the University in advancing agriculture. Or it may be interacting with those in the agriculture industry on applications of technology in today's agriculture industry. A part of it that I also enjoy is thinking forward, and that allows us as a board and

staff to think outside the box on new projects that meet the vision and objectives of the Board."



The Nebraska Corn Board mission is to carry out and participate in programs of research, education, market development and promotion to enhance profitability (viability) and expand the demand

and value of Nebraska corn and value-added corn products. The nine-member board collects and disburses the funds generated by the ¹/₂ cent-per-bushel corn checkoff. Retiring Executive Director Don Hutchens, who served as Kelly's mentor for 10 years, says, "I truly believe that Nebraska's corn checkoff program is in very good hands." According to Hutchens, Kelly has a solid base of economics, research, production and sustainability of the corn industry, and sound judgment, "He not only has the respect of our board and staff, but also that of the other states' and national cooperators."

Kelly lives in Lincoln with his wife, Carey, and their sons, Seth, 14, and Alex, 8; he enjoys "warm weather, cycling and stopping to grab photos of the landscape." The Resource article can be found at http://bt.e-ditionsbyfry.com/ publication/?i=222769, pg 23.





MSYM Student Picked for Leadership Mission

Mechanized Systems Management student Kerry McPheeters of Gothenburg, NE was selected as a delegate to the 2014 Corn Congress. Each summer, young leaders in agriculture attend Corn Congress in Washington, D.C., where corn grower leaders and staff from state and national corn associations gather for a series of action team and committee meetings and visits with their respective state's Congressional delegation. The Nebraska Corn Board sponsored nine delegates, from the LEAD program and FFA, to the second annual Leadership Mission after being selected through an application process to attend the Corn Congress.

Alum News

Andrew R. Anderson (BSEN, B.S., 2010; EnvE, M.S., 2011) is currently an extension associate in the Biological & Agricultural Engineering Department at North Carolina State University. Andrew is researching and designing urban stormwater best management practices, focusing on permeable pavement, bioretention, green roofs, and downspout disconnection. He and other full-time engineers and graduate students are working to improve industry design standards of BMPs to improve water quality in streams, lakes, and estuaries.

Kevin T. Fairbanks (AGEN, B.S., 1983) is a senior engineer at Xcel Energy. He lives in Red Wing, MN.



Nick Herbig (MSYM, B.S., 2014) was in the Sept/Oct issue of ASABE's *Resource Magazine.* "I have always had an interest in new agricultural technology. Growing up on the family farm, I was always trying to find new technologies that

we could implement," he told *Resource*. "The first class I took specific to my major convinced me that I had made the right choice. You guessed it—it had some technology components!" As a student, Nick participated in study abroad in Argentina, which you can read about in *Resource* (http://bt.e-ditionsbyfry.com/publication/?i=222769). After graduating, he returned to his family farm in Central City, NE. "Because I have such a passion for the farm, I am constantly thinking about things we can do to be more efficient and profitable—what new technology might be viable," he concluded.



Stop by the Larsen Museum on East Campus! Check out the recent updates! Tues.-Fri. 9-4, Sat. 10-2





BSE External Advisory Committee

The BSE Department held its External Advisory Committee meeting on August 8, 2014. 14 members were able to attend in Lincoln. At the event we discussed updates to the department including faculty and staff who have joined, recent retirements, updates to facilities, and changes to our currricula. Much of the meeting focused on our accreditation process for the AGEN and BSEN degrees and in receiving feedback on our MSYM degree.

We have added several new members to the group with the goal of providing a good balance of work areas connected to our majors (water, food/bioprocess, machinery, and biomedical). Those able to attend are pictured above. *Front row:* **Donna Lounsbury Lowe**, **Kim Cluff**, Judy Burnfield; *2nd row:* Mike Allen, **Jennifer Frey**, **Ryan Hulme**, **Wes Cammack**; *3rd row:* **Daryl Kottwitz**, John Davis, **Mark Eldred**, **David Milligan**; *back row:* Maury Salz, Jeff Christensen, and Dave Murray.

Members had excellent ideas for improving our program with much focus on further developing student communication skills. There also was much talk on having alumni and community partners serve as mentors to students throughout their undergraduate career but with emphasis on capstone experiences. There was a suggestion to host an alumni event on campus, perhaps in the spring to provide alums and friends of the department an opportunity to renew friendships and to see the new developments in the department.



Hubl Makes Franco's List

Emily Hubl, senior, BSEN from Lawrence, NE is among those recognized as outstanding agents of character and integrity by being named to "Franco's List" of UNL students that demonstrate the positive characteristics that are part of being a person of integrity. Named

after Juan Franco, UNL vice chancellor for student affairs, selection is awarded for each student's commitment to living a life of integrity in accordance with the "Show Your Red" movement and its six building blocks: citizenship, dependability, commitment, respect, openmindedness, and care. The focus is to recognize students for actions that frequently go unnoticed on campus and in the broader community. Recipients were nominated by a UNL community member and were ultimately selected by a council of their peers, the vice chancellor for student affairs' Character Council. Emily was also on the Dean's List the past three years.

Our Faculty and Staff

Dr. Dennis Schulte, Holling Family Distinguished Engineering Educator, Retires By Tim Dornbos, Senior BSEN



Schulte, Edible Car Contest MC.

Dr. Dennis D. Schulte has been positively impacting the lives of those around him for decades by forming relationships that truly matter. Whether he is interacting with a student, family member, or co-worker, Dr. Schulte has always made time for those around him so that they are taken care of. In light of his retirement, it is time to reflect on an astounding career, and an even better person.

Schulte grew up a farm kid in northeast Nebraska. When he moved to Lincoln in 1963 to attend the University of Nebraska as a chemical engineering student, he had no idea he would switch his studies to agricultural engineering and later become a highly respected professor in Biological Systems Engineering. At the time, he was budgeting \$1.50 per week for three games of bowling in the basement of the city campus union. During his freshman year, Schulte tried out for the Nebraska baseball team and played for three weeks, but he was cut. "I could not hit a Division 1 curveball," he explained. He began working as a residence hall assistant (RA); Husker linebacker Barry Alvarez was a resident on Schulte's floor. He became an ASUN Senator for two years; a close friend was ASUN president at the time. Schulte laughed, "We thought we ran the campus back then." Schulte squeezed five years of school into four while working an internship in Chicago for Case IH during two summers. "If it wasn't for grad school, I would have gone back to Case IH. Everybody there wanted to help you by sharing their knowledge. They wanted you to come back to work with them," he said of his internship experiences.

During his last year at UNL, Schulte decided to attend graduate school because he was hooked on research. He and Ruth were married in 1969 and drove through three days of snow to Cornell University in New York so that Dennis could conduct environmental research under a National Academy of Engineering professor; quite the honeymoon. After receiving his M.S. and Ph.D. degrees from Cornell, Schulte got a position at the University of Manitoba, Winnipeg. For roughly five years, he experienced a wonderful team and student oriented atmosphere (an environment many BSEN students at UNL are familiar with).

In 1978, Dr. Schulte returned to Lincoln as a BSEN professor. The first class he taught was BSEN 441: Animal Waste Management. (Coincidentally, this is the last class he is teaching in BSE this semester.) Those who had Schulte as a professor know his kindness and true caring about individuals. As he reflects, he often credits his time as an RA, his family, his students, and his involvement in NSE (New Student Enrollment) as reasons he was able to work as effectively as he did. He is a wonderful ambassador for the BSE Department, and it is evident that he has great pride in all things BSEN. Although many are sad to see Dr. Schulte retire, it is easy to think of how much he contributed to BSE, and all past, current, and future students and faculty are forever indebted. He received many awards for his work as engineer, educator, and advisor: http://bse.unl.edu/dschulte1.

There is excitement on Dr. Schulte's face when he lists his plans for retirement, which include spending more time with his children (Marc, Amy, and Joel) and grandchildren, traveling with Ruth to New York City (for the first time since graduate school) house projects, a little more golf, a little more faith, and some baseball. He looks forward to attending Big Ten baseball tournaments.

On behalf of the Department of Biological Systems Engineering, thank you for your constant dedication to education, and your devotion to those around you. Congratulations on your retirement, Dr. Schulte!

Some of Dr. Schulte's "Favorites"		
Class (as a student)	Fluid Mechanics at UNL with Keith Newhouse	
BSEN Activities	-Meeting Alumni (big deal to see what former students are doing in the real world). -Learning practical engineering from his children.	
Husker Team	Scoring Explosion (1983 Huskers)	
Husker Players	 -Dave Rimington (can a center line up offside?) -Bob Brown (first pulling guard in the game), -Wayne Maylen (still holds single season and career tackles record by a DT at Nebraska) 	

New to BSE



Dustin Dam joined BSE in July as our Systems Integration Engineer. For the past two years he's taught Labview and instrumentation classes and done research support for Electrical Engineering in the Walter Scott building. He spent three years in Austin, TX, at National Instruments after graduating from UNL with a B.S. in Electrical

Engineering. Dustin grew up in Sydney, NE, and lives in Lincoln with his wife and infant son. He is providing research and instruction support to BSE; his office is 140 Chase Hall.



Dr. Sibel Irmak joined BSE over the summer as a research associate professor. She received a Ph.D. in chemistry from Cukurova University (Adana, Turkey). Dr. Irmak's research interests include developing novel catalysts for converting lignocellulosic biomass compounds into biofuels and value-added products, hydrogen production from lignocellulosic

biomass, extraction of health-beneficial products from various sources, and advanced oxidation processes for remediation of wastewater. Her work includes research in the Industrial Agricultural Products Center.



Brandi Shepler started in April as the new Personnel Generalist for the Filley Hall Business Center and is officed in Chase 221. She comes to us from the Missouri Department of Transportation, where she was a Human Resources Specialist for 7½ years. Originally from Plymouth, NE, Brandi received her B.A. in Business Administration from Doane College. She and her husband, Travis, have a two-year-old daughter, Mahra.

Our Students



Biomedical Engineering Student Developing Prosthetics Materials

Ben Joekel is a senior Biological Systems Engineering major with an emphasis in Biomedical Engineering. He spent this last year as a research assistant at the University of Nebraska Medical Center– College of Dentistry in Lincoln, working in the Biomaterials Lab with Dr. Mark Beatty in Adult Restorative Dentistry. The primary focus is on the development of facial prosthetic materials for patients who have suffered severe tissue loss, with a goal to develop long-lasting and color-stable artificial replacements to improve patients' quality of life. and other environmental factors. At the end of the project, color and hardness changes over an extended period of time will be analyzed to determine if these materials would be a viable skin replacement. The Biomaterials Lab also tests many facial and dental materials for mechanical properties and improvement in a clinical setting (including stress, strain, modulus, creep, hardness, and wear). Ben's long term aspirations are to attend dental school and use his engineering skills in the dental field. Ben reports that this research opportunity has given him a substantial amount of experience to further his engineering/dental education.

Ben's main project has been making pigment samples of platinum silicone elastomer to be subject to UV radiation emitted by the sun

Intern Work with the U.S. Army Corps of Engineers



Bethany Brittenham spent the summer as an Engineering Student Trainee for the U.S. Army Corps of Engineers: Northwestern Division, Omaha District, Hydrology Branch, River and Reservoir Engineering Section, a perfect fit for her BSE environmental emphasis area. Her report follows:

"A majority of my work involved hydrologic and bank characteristic

surveys of the Missouri River and its confluences to model river structure and flow, using sonar and GPS to model flow rates, river depth, and create water surface profiles. The Missouri is in a constant state of flux between aggradation and degradation based on location. One of the goals of the Corps is to ensure the river is navigable for commercial barges as well as private boats while maintaining constructed habitat for fish and other species in chutes, backwaters, and bends. My favorite experience was surveying the Yellowstone River below Intake Dam in Glendive, Montana. Every spring, the Yellowstone floods, and, due to a pending project, it needed to be evaluated. The land and weather was beautiful, and surveying became more like being paid to hike along the river bank than work. I also found some great rock the region is known for—Moss Agate.

Primarily, this internship solidified my interest in field work while developing a host of different marketable skills. I am proficient in setting up and running GPS surveys with Trimble units as well as basic trouble shooting. In the office, I developed skills using HYPACK for confluence modeling of the river bottom to track the formation and movement of sandbars and develop water surface profiles and received brief instruction in software (i.e. WinRiver, HEC-RAS, DSS, and Microstation). While I am in no way an expert, a basic knowledge now will make more in-depth learning less of a foreign language. Overall, my internship with the Corps provided a cradle to grave introduction to river system modeling and maintenance."



Precision Agriculture Sprayer Research

Graduate student **Shane Forney** is working with **Dr. Joe Luck**, BSE Precision Agriculture Engineer, to conduct research on sprayer variables (i.e. nozzle size, spacing, angle, blockage) and uniformity. The project is possible due to Deere & Co. funding, the Apache sprayer, contributed by Riggins Ag Equipment, and nozzles supplied by TeeJet Technologies. The research is intended to provide supporting evidence to revise the ISO Standard 5682-2, which specifies methods for measuring the performance of a horizontal boom sprayer. As variables are adjusted, the effects are studied to understand the sensitivity of sprayer performance and how each variable affects spray distribution.



Mechanized Systems Management at Exmark

Justin Williams is a senior in Mechanized Systems Management with an emphasis in production. He served in the U.S. Coast Guard active duty for three years prior to coming to UNL. His summer internship was at Exmark Manufacturing in Beatrice, NE. Exmark is a division of Toro but still manufactures its own product and is one of the leading competitors in the turf management and lawn care sectors in both commercial and independent consumer markets. His position was in the engineering test lab designing different types of fixtures for numerous kinds of tests. "This internship taught me many different things, but one of the main things is that the opportunity to learn is endless. There was so much to learn at Exmark, I'm sure I didn't learn half of what they had to offer in just three months," says Justin. "The experience was great; the



people were very understanding and willing to work with me. I would recommend it to anyone considering the field of testing."

Justin reports, "One of my main projects was to design and build a controllability/obstacle course to take current new products and competitor machines through to test handling, speed, and other machine factors to determine whether changes were needed. I really enjoyed the project as a whole just for the simple fact that all the responsibility was on me. I had to coordinate with multiple contractors to make sure I met deadlines and they produced the final product that I had designed. It took weeks and weeks of designing, planning and building, but in the end the final product was even better than I had imagined."





Opportunities in Ag Engineering

Ryan Hanousek is a junior majoring in Agricultural Engineering with an emphasis in equipment testing. Originally from Cairo, NE, Ryan says, "Over the past year I have had many experiences here at UNL." His recent internship was working for CNHi in the Davenport, Iowa area on 2016 Case Mid-Range Combines as a design engineer on the cleaning system. "Over the summer, I was able to work on many different projects; I learned a lot and would recommend everyone have an internship during their college career." Ryan is a member of ASABE and is on the UNL Quarter Scale Tractor Team; he attended the 2014 Competition in Peoria, Illinois last May.

During his sophomore year, Ryan was one of six students across the nation selected to attend the Farm Foundation roundtable invitation-only conference in Houston, where leaders from the agricultural industry meet and discuss future issues within the industry. Hanousek attended with Vice Chancellor Ronnie Green and fellow UNL student Maci Lienemann. He was also featured in the March 2014 issue of John Deere's *The Furrow Magazine*. The article, titled "40 Chances," discussed his involvement with Agriculture Future of America's 40 Chances Fellows program and his future plans after college. The program was developed with the Howard G. Buffet Foundation, based on Buffet's collection of 40 stories about his efforts to end world hunger and the idea of "40 productive years." Ryan told *Furrow*, "Being an ag engineering major puts me in a key position to help fight global hunger by developing new equipment and farming practices, or adapting equipment for small farms." As one of 40 Fellows selected in 2012, Ryan says the group is "motivated and future oriented, thinking about what's to come in the next 40 years."

Photo courtesy of Furrow Magazine.

It's Water Rocket Science!

Part of the MSYM 109 curriculum is studying forces and projectile motion. Instructor **David Mabie** created the Water Rockets Competition Lab as an opportunity to apply these principles in a fun and exciting way. The competition is judged on three components: maximum flight time, target accuracy, and creativity. The winning team not only gets bragging rights, but also receives a perfect score for the week's lab report.

The competition is an effective way to provide students the opportunity to combine and apply the concepts they've learned in an experimental



outdoor laboratory. The students must consider how different forces (such as air resistance, variable rocket weight, and rocket stability) will affect the rocket's ability to achieve maximum flight time and target accuracy, while also contending with the surrounding environment (i.e. trees and buildings). The rockets use water and air pressure as fuel to generate thrust, allowing the students the ability to adjust fuel levels and weight. At this point, students are able to estimate the maximum height of the rocket using kinematics and projectile motion equations (from measuring the time the rocket is in the air).





Undergraduate Summer Research

Christopher Davidson, a junior BSEN major emphasizing biomedical engineering participated in a summer research experience for undergraduates (REU) program through the National Nanotechnology Infrastructure Network (NNIN). REU had 11 different sites; Chris was located at the University of Minnesota in Minneapolis, where he worked with Dr. Stephen Campbell. His project dealt with creating diamond-like carbon (DLC) to use as a biocompatible coating for an in vivo integrated brain-scanning device used for brain stimulation. He made many thin-film DLC samples (50-100 nm thick) using different recipes and characterized their properties. "This was my first time conducting an independent research project, so it was a little intimidating. However, my Principal Investigator (PI) and the Minnesota Nano Center staff were extremely helpful and made it a very smooth process," he said.

As a nanotechnology REU, almost all lab work was done in a cleanroom (an enclosed area with controlled pollutant levels, such as dust or chemical vapors) which required special suits to prevent pollution from their clothing, skin, or hair. The samples created had such tiny features that any small particle could contaminate them. Chris says he was introduced to the biomedical applications of nanotechnology, "A few other projects similar to mine included creating a nanofluidic device for high throughput drug screening and microfabricating cell arrays to study the movement of individual tumor cells." He gained hands-on experience with many common machines and processes in the field of nanotechnology, including photolithography, chemical vapor deposition, sputtering, and scanning electron microscopy.

Chris states an added value to the experience, "Most importantly, this REU gave me an idea of what to expect in graduate school. I took part in multiple panel discussions with current graduate students, listened to presentations from countless graduate professors, and even got to work directly under one of them. It also gave me the opportunity to experience life at a different university."

Environmental Engineering at Cargill



Emily Klimisch is a senior Biological Systems Engineering major emphasizing environmental engineering, with a minor in Spanish. This past summer she worked for Cargill Meat Solutions in Dodge City, KS as an Engineering Intern and spent the prior summer studying abroad in the beautiful coastal city of Bilbao, Spain. "The preferable summer seems obvious, but the time I spent doing my internship in Dodge City was just as valuable and enjoyable as my trip to Spain," she says.

During her internship, she was able to

work on three major projects in a variety of areas and on various tasks. Three projects dealt with chemical safety, inventory, and environmental tracking, reworking the valve system in the cooler area, and the brine lagoon and evaporator. She enjoyed the importance and magnitude of the projects. She reports, "For the brine lagoon and evaporator project I was working toward environmental compliance with the EPA and dealing with nearly \$500,000 of repairs to gain over \$2,000,000 in salt recovery. It was a project that was given to me to provide a unique perspective, as well as a large investment of time to be able to explore and pursue all the options."

She says while her projects didn't deal directly with what she had learned in school, or even necessarily what she would want to do long term, "I was able to learn quickly and make an impact on the company within a short period of time. I became extremely marketable in any interview." She learned about the type of company she would like to work for, and the type of environment she can work well in. "Having an internship with Cargill was easily one of the best experiences I have ever had, and without a doubt, I encourage students to seek out internships early on," Emily said.

Scholarship News

Mechanized Systems Management students, **Jon Janhke**, of Bancroft, and **Matt Treadway**, of Ashland, received \$4,000.00 Engler Agribusiness Entrepreneurship Scholarships for 2014-15. The scholarships recognize students with high capacity to bring entrepreneurial talent to the marketplace, specifically focused on business development in the wide domain of agriculture, and were established in 2010 by a gift from the Paul and Virginia Engler Foundation.

2014-2015 SCHOLARSHIPS AWARDED

Warren P. Person Memorial	Dylan Smith (AGEN)
George Milo Petersen	Levi Schlick (MSYM)
Paul E. and Mary Beth Fischbach and Family	Mitch Maguire (BSEN) Jacob Harms (AGEN)
Mr. and Mrs. W.F. Hoppe, Sr. Memorial	Scott Bohn (MSYM)
John Sulek Memorial	Derek Durre (MSYM)
Fred R. Nohavec	Bethany Brittenham (BSEN)
Edgar Rogers Memorial	Justin Williams (MSYM) Ethan Mosel (MSYM)
Central Plains Irrigation Association	Riley Smith (BSEN)
Elenore Gakemeier Swarts	Rachel Morford(BSEN) Emily Klimisch (BSEN) Jared Beyersdorf (BSEN)
Lloyd W. and Margaret V. Hurlbut Memorial	Bemjamin Barelman (AGEN) Philip Hochstetler (AGEN)
Case New Holland	Greg Frenzel (MSYM) Marcus Sandberg (MSYM) Aaron Vancura (AGEN) Keith Prothman (AGEN) Adam Frerichs (AGEN) Dalton Dozier (AGEN) Kelsey Bohling (AGEN)
AGP Biological Systems Engineering Student	Derek Bracht (MSYM) Latham Fullner (MSYM) Dane Mangel (BSEN) Grant Zebold (BSEN)
Glen D. Chambers	Mitch Goedeken (AGEN) Hillary Stoll (BSEN)
John Deere	Kye Kurkowski (AGEN) Turner Hagen (AGEN) Sydney Alberson (AGEN) Jonathon Jahnke (MSYM) Eric Tubbs(MSYM) Kali Bohling (MSYM) Whitney Schultz (MSYM)
T-L Irrigation Company and Leroy W. and Jeane E. Thom	Mark Hilderbrand(AGEN) Matthew Erickson (MSYM) Shane Manning (AGEN) Jacob Hinrichsen (MSYM) Caleb Lindhorst (AGEN) Dillon Clayton (AGEN) Max Hjermstad (AGEN) Ryan Hanousek (AGEN) Justin Herting (AGEN) Ethan Nutter (MSYM)
Ivan D. Wood Memorial	Brady Shipley (MSYM) Kerry McPheeters (MSYM) Kevin Bahr (MSYM)
Ken Von Bargen Student Support	Kelby Radney (MSYM) Travis Classen (MSYM)
Dr. and Mrs. William E. Splinter	Paulina Guzek (BSEN) Emelia Germer (BSEN) Christine Shuster (BSEN) Joshua Murman (AGEN)
Dirk and Janice Petersen	Robert Olsen (AGEN)
Tom Thompson Memorial	Ian Schuster (AGEN)
Leonard G. Schoenleber	David Szalewski (BSEN)
Wayne E. and Virginia R. Thurman	Katelyn Watts (BSEN) David Bunker (BSEN) Erin Patton (BSEN) Julia Burchell (BSEN)
Glenn J. and Maria L. Hoffman	Jenna Feregrino (BSEN)
Orve and Scott Hedden Memorial	Zach Grunder (AGEN)

GRADUATION Spring and Summer 2014

AGEN

Thomas Bader Shane Forney Luke Stevens Wyatt Stubbs Joseph Timmons Joshua Tomjack Zachary Wacker

BSEN

Thomas Bainter Christopher Black Patrick Brown Ryan Burnett Bonnie Cobb William Denton Trevor Geary Christopher Gice Nathan Giles Richard Horrocks Mackenzie Hruby Emily Hubl Adam Koch

Tyler Kruse Mitchell Kuss Bryan Lee Natalie Lenners Angel Lowery Nathaniel Mannebach Amy Mantz Blakeley Marsh Brooke Micek Rebecca Nelson Alexander Pieper Quinton Reckmeyer Nikolai Reitz Nicole Schuster Scott Speicher Christopher Sullivan David Svoboda Andrew Taylor Nhat Tran **Emily Waring** Jacob Wilson Lauren Wondra

MSYM

Cass Anderson Spencer Baird Ryan Ehlers Austin Fricke Braylon Gierhan Zach Hansen Jacob Hennig Nick Herbig Reece Klug Colton Knickman Ethan Paasch Marcella Scharton Levi Schmeeckle Blake Wesely Greg Winz

THE DEAN'S LIST Spring Semester 2014

AGEN

Pedro Chabude Shane Forney Mitchell Goedeken Ryan Hanousek Mark Hilderbrand Philip Hochstetler Isaiah Krutak Shane Manning Tyler Manning Robert Olsen Luke Prosser Anna Sorensen Luke Stevens Wyatt Stubbs Joshua Tomjack Bennett Turner Aaron Vancura Jake Walker

BSEN

Ethan Adams Ellie Ahlquist Paula Andrie Freshta Baher Thomas Bainter Emily Bender Jared Beyersdorf Tasneem Bouzid Bethany Brittenham David Bunker Julia Burchell Madison Burger Ryan Burnett Brian Burris Courtney Cahoy

Erica Carder Kathryn Chrisman Hannah Christian Bonnie Cobb Kathryn Conroy Aaron Cronican Christopher Davidson Danielle DeGroote Dillon Drapal Graham Droge Drew Dudley Katherine Dudley Zachary Duncan Alexander Eggert Stephen Enke Collin Erickson Ryan Flynn Mitchell Frischmeyer Megan Gren Devin Grier Connor Hansen Erica Hedrick Bailey Heil Austin Helmink Charles Hinds Emily Hubl Sara Hutcheson Benjamin Joekel Emilie Johnson Hayden Kaderly Kathleen Kendall **Emily Klimisch** Adam Koch Jacob Lenz Todd Leutzinger David Lillyman

Brenden Lopp Megan Lush Mitchell Maguire Nathaniel Mannebach David Marshall Aaron Matzke Marissa McCormick Linkai Mei Brooke Micek Mackenzie Miller Hunter Miller Michael Moeller Ethan Monhollon Luke Monhollon Erik Moore Rachel Morford Mallory Morton Aubrey Mueller Samantha Nelson Rebecca Nelson Tuan Anh Nguyen Emily Olig Danielle Pessoa Cordeiro Anna Petrow Christopher Popp Ravi Raghani Kevan Reardon Quinton Reckmeyer Nikolai Reitz Nathan Rice Dylan Rogers Douglas Rowen Deidre Sandall Alvson Schulte Nicol Schuster Nicole Schwery

Cole Sievers **Riley Smith** Dillon Soukup Scott Speicher Hillary Stoll Christopher Sullivan David Svoboda Halle Swann David Szalewski Iared Thomsen **Emily Thrailkill** Anna Toner Nhat Tran Lindsey Trejo Claire Tunakan Kevin Vakilzadian Jordan Verplank Blake Wagner **Emily Waring** Katelyn Watts Mitchell White James Yong

MSYM

Kali Bohling Derek Bracht Benjamin Halvorson Jonathon Jahnke Nathan McCormick Ethan Nutter Jacob Rafert Whitney Schultz Thomas Urban Daniel Willer



223 L. W. Chase Hall P.O. Box 830726 Lincoln, NE 68583-0726 Non Profit US Postage **PAID** UNL

Linkedin

Īn





he next generation of BSE students could use your help. Your generous donations support student scholarships and special opportunities, as well as equipment for classrooms and laboratories. Please consider making a donation to the Biological Systems Engineering Excellence Fund to provide student programs and scholarships. If you prefer, you can establish your own fund and name it for a family member, friend or mentor.

To arrange a gift, contact: Josh Egley, (CASNR/MSYM) 402-458-1202 jegley@nufoundation.org OR Karen Moellering (COE, AGEN/BSEN) 402-458-1179 kmoellering@nufoundation.org

