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## DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING NEWSLETTER, Issue 3, Vol. 2, December 2007

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# DEPARTMENT OF BIOLOGICAL SYSTEMS ENGINEERING

ISSUE 3 VOL. 2

NEWSLETTER OF ACHIEVEMENT

DECEMBER 2007

## New Tractor Test Track Dedication

More than 200 friends, alumni, representatives from industry, and university dignitaries attended the official dedication ceremony for the new drawbar test track at the Nebraska Tractor Test Lab on Thursday, October 11. While 51 years may not seem old to some of us, in the concrete-years of the old track, it was bordering on ancient. The new track—wider (from 16 to 22 feet), longer (from 1,978 to 2100 feet), and thicker (from seven to nine inches)—can better accommodate the larger equipment being manufactured today. It also makes it possible for the Lab to test equipment other than tractors, such as road graders. HWS Engineering and TCW Construction did the design and construction of the new track. HWS Engineering also designed the previous track that was constructed in 1956.

Work began at the end of the spring testing season and, even with the inevitable weather delays, was completed on schedule late this summer. The track was poured in two sections: the main line was poured first, followed by four separate hand pours to make up the outer curves which have a 15% slope on the banked turns. A total of 1,853 cubic yards of concrete was used in the nine-inch thick doweled pavement. Because the track is at the same elevation as the surrounding land, good drainage is of paramount importance. Underlying the track is a 6-inch, two-layer, sub-base drainage system composed of 2,768 tons of crushed concrete aggregate. Three inches of fine aggregate were placed on the bottom layer to keep soil from migrating upwards, with three inches of coarse aggregate above for cross-slope drainage away from the track. A sub-drain carries water to a storm sewer on the inside oval of the track. These features were designed to minimize the effects of the freeze/thaw cycle on the track. The track cured for more than 28 days to obtain maximum concrete strength, and has a flexural strength of more than 750 psi, which is a stronger concrete than used in most airport runways, since it will carry heavier loads and be subjected to more stress from the test pulls. The first test rolled out on Monday, October 8, 2007. Cheers for another 50 years of excellence in tractor and machinery testing.



*Construction of the new track.*



*Charles Sukup, past President ASABE (left) and Jim Dooley, President-elect, ASABE (right) attended the dedication.*



*The staff of the Nebraska Tractor Test Lab.*



*The student staff of the Tractor Test Lab.*



*An alumni barbeque followed the dedication celebrations.*



UNIVERSITY OF NEBRASKA-LINCOLN

BIOLOGICAL SYSTEMS ENGINEERING DEPARTMENT

# From the Department Head



Ron Yoder

While attending a recent Institute of Agriculture and Natural Resources (IANR) planning meeting, it struck me how well the Biological Systems Engineering Department is positioned to address the challenges facing Nebraska, the nation, and the

world. The three theme areas that have been identified for the IANR are Quality Environment and Effective Natural Resource Management, Enhance Economically Viable and Sustainable Food and Biomass Systems, and Viable Communities and Appropriate Quality of Life for Individuals and Families. During the planning exercise it was apparent to me that these three theme areas align well with our planning in the Department, and with the direction of our teaching, Extension, and research programs. Our backgrounds, experience, and education in agricultural and biological systems engineering, and in mechanized systems management, are key to addressing the water issues, the environmental issues, the quality of life issues, the agricultural production issues, the bioenergy and bioprocessing opportunities, and the economic development challenges in Nebraska.

The breadth of our programs is highlighted in this issue as we detail the construction and dedication of the new Tractor Test Lab drawbar test track, and also welcome Dr. Angie Pannier, our new faculty member in biomedical engineering. The central theme of this issue is processing. Dr. Subbiah is featured in an article about a newer faculty member, Dr. Amezcuita is featured in our focus on an alumnus, the work of visiting scholar Laura Nystrom is described – all related to food and bioproduct processing. Additionally, five of seven graduate fellowship winners who are recognized in this issue are doing their research in the processing area. While the breadth of our programs often creates challenges for us relative to identity and resources, it is great to know that what we offer is attractive to undergraduate students (enrollment is up again this Fall semester – Mechanized Systems Management 8%; Biological Systems Engineering 12%), to the citizens of Nebraska, to industries in Nebraska and the region, to local, state, and Federal government agencies, and to others looking for educational opportunities or assistance in addressing the challenges of our times.

Ron Yoder

## Biological Systems Engineering Newsletter

Ron Yoder . . . . . Editor  
Gail Ogden . . . . . Editorial Coordinator  
Sheila Smith . . . . . Graphics and Design  
Contributors . . . . . Alejandro Amezcuita,  
Jeyamkondan Subbiah, Eileen Curtis,  
Dane Mosel

# Awards

Honoring Agricultural  
& Biological Engineers  
100 Years of Innovation



## ASABE Awards

This year's annual ASABE meeting was held in Minneapolis, Minnesota, during the week of June 18. The following Faculty and alumni were recognized at the meeting.

### President's Citation

Awarded for outstanding leadership and strong representation of ASABE in efforts to ensure the future of the Agricultural Engineering PE exam and in the evaluation of the potential for a Biological Engineering PE exam.  
Jerry Wille and **Ron Yoder**

### Educational Aids Blue Ribbon Awards

Web Pages: **Rick Koelsch**

Publications, Periodicals or Newsletter: **Tom Franti**

Films, DVDs, Satellite Conferences, Videotapes, and Electronic Presentations: **Matt Helmers** (alum, Ph.D., 2003), currently at Iowa State University.

### 2007 ASABE Fellows

**Gerald Riskowski** (alum, B.S., 1974, AGEN; M.S., 1976, AGEN), currently Professor and Department Head, Biological & Agricultural Engineering, Texas A & M University

### Heermann Sprinkler Irrigation Award

(Named for alumnus Dale Heermann, B.S., 1959, AGEN)

**Les W. Jochens** (alum, B.S., 1949, AGEN, and 2007 BSE Department Hall of Fame inductee.)

### G.B. Gunlogson Countryside Engineering Award

**Gregory D. Jennings** (alum, Ph.D., 1990), currently Professor and Extension Specialist working in areas of water quality, hydrology and ecological engineering, at North Carolina State University.

### FPSA Foundation-FPEI "Emerging" Food Engineer Award

**Terry J. Siebenmorgen** (alum, Ph.D., 1984), currently Professor and Director of Arkansas Rice Processing Program at University of Arkansas.

## EPA Award

At a recent meeting of the Heartland Regional Water Coordination Initiative project leaders and stakeholder advisory committee, the University of Nebraska–Lincoln was presented with the EPA Region 7 Regional Administrator's Leadership Award. The award reads: "In recognition of outstanding leadership through the Heartland Regional Water Coordination Initiative focusing on water quality improvement in the EPA Region 7 states." James Askew, EPA Region 7 Administrator, presented the award. **Rick Koelsch, Charles Wortmann, and Jamie Benning** were the UNL staff specifically recognized on the award. **Teshome Regassa** has since replaced Jamie Benning as the program assistant. UNL Extension played a key role in the Heartland Regional Water Coordination Initiative along with Iowa State University, Kansas State University, and the University of Missouri. The project is funded by the Cooperative States Research, Education, and Extension Service.



# Meet the Faculty

*This section features newer faculty members, highlighting their unique expertise and commitment to excellence. In research, teaching, and extension, our faculty provide the creative energy that makes this department so widely acclaimed.*



Dr. Jeyamkondan Subbiah

A faculty member since 2004, **Dr. Jeyamkondan Subbiah** has a shared appointment with BSE (55%) and Food Science and Technology (45%). The majority of his time (80%) is spent on research, with teaching rounding out the remainder. He is from Madurai,

India, and earned his agricultural engineering undergraduate degree in India. His M.S. in Biosystems Engineering was completed at the University of Manitoba, Canada, and then, while simultaneously working as a research engineer, Dr. Subbiah earned his Ph.D. in Biosystems Engineering at Oklahoma State University.

Dr. Subbiah's engineering research focuses on improving food quality and safety. Agriculture continues to be Nebraska's dominant industry, annually contributing more than \$14 billion to the economy and accounting for 31% of all employment in the state. Improving food quality and safety is essential to enhance the competitiveness of our agricultural and food industry in national and global markets. Dr. Subbiah's research projects can be grouped into three areas: spectral imaging to predict food quality, modeling for assessing food safety, and nonthermal processing to improve food quality and safety.

A cutting-edge technology with great potential in food and biomedical applications, hyperspectral imaging combines computer vision and near-infrared spectroscopy. Near-infrared spectroscopy measures the relative intensity of light reflectance from an object. Hyperspectral imaging kicks that up a notch by providing the same information on each and every pixel, enabling the researcher to collect more data from the imaged object. Dr. Subbiah is currently conducting research using hyperspectral imaging to predict beef tenderness.

Did you know that Nebraska is ranked seventh in national table-egg production? Dr. Subbiah is using near-infrared transmission spectroscopy in egg white processing, a highly mechanized process. As the speed of egg

breaking machinery has increased, the potential for yolk contamination in separating the yolk from the egg white has also increased. Machine imaging is being refined to recognize yolk contamination of the whites and also is applied to detecting cracks and defects in shell eggs. Candling is a labor-intensive operation to check the grade of the egg and for any visible defects. Image processing algorithms applicable to an automated process are being developed to detect cracks and defects and replace candling.

Process deviation and temperature abuse allow pathogens to grow to dangerous levels, and are major causes of food-borne illnesses. To analyze food safety risk, Dr. Subbiah and his colleagues are developing heat transfer models to predict the temperature distribution in food products during processing, and microbial growth models for real food systems under fluctuating temperatures. These models are integrated to determine population dynamics of microorganisms in food systems during process deviation. These models are currently being deployed on the web for processors to use in assessing food safety in their processing operations. Dynamic predictive models for growth have been developed for:

- *Salmonella Enteritidis* (SE) in egg yolk
- *Escherichia coli* O157:H7 in ground beef
- *Salmonella* spp. in poultry (ground chicken)
- *Salmonella* spp. in turkey
- *Salmonella* spp. in pork
- *Clostridium perfringens* in boneless ham

The third focus of Dr. Subbiah's research is nonthermal processing. Thermal processing, is an important unit operation in most food processing operations that provides microbiologically safe food products, although with lower nutritional and quality characteristics. Consumers are seeking novel, nonthermal processed products: minimally processed, fresh-like food products with natural flavor, color, and other quality attributes. More importantly, consumers are willing to pay a premium for food products that retain original fresh quality. This "niche market" in the food industry is looking for novel nonthermal technologies to inactivate pathogens and spoilage microorganisms. Some of the novel technologies that his lab

has been exploring are pulsed electric fields, high-pressure carbon dioxide, high hydrodynamic pressure processing, ultraviolet light, ozone, chlorine dioxide, and ultrasound. Different nonthermal technologies have different modes of inactivation mechanisms. Lab members are evaluating combined technologies that are complementary in their inactivation mechanisms to achieve synergistic antimicrobial (pathogen destruction) and quality (preservation) characteristics.

Currently, Dr. Subbiah's lab has two post-doctoral fellows, one research engineer, and five graduate students. The personnel bring diverse educational backgrounds—ranging from agricultural, biological systems, electrical, mechanical, and chemical engineering disciplines, to food science and technology, and computer science—and clearly exemplify the interdisciplinary nature of his research. Dr. Subbiah foresees the use of the hyperspectral imaging system for biomedical applications such as detecting skin cancer lesions. In addition, he would like to explore the feasibility of using nonthermal technologies as preprocessing of cellulose materials for biofuels production and for extraction of nutraceutical compounds (substances that are a food or a part of a food, and provide medical or health benefits, including the prevention and treatment of disease; Dr. Stephen DeFelix). For example, high-pressure processing will loosen tightly packed lignocellulosic structures and enhance the accessibility of hydrolytic enzymes. The net effect would be a greater conversion of cellulose to glucose and a higher ethanol yield from the subsequent fermentation. Pulsed electric field processing breaks down plant cell walls and improves the extraction efficiency and yield of nutraceutical compounds from agricultural and food products.

Dr. Subbiah has received funding from USDA National Integrated Food Safety Initiative, Nebraska Research Initiative, and commodity organizations such as National Cattlemen's Beef Association and Nebraska Beef Council. He and his colleagues currently have funding of slightly more than \$1 million from the National Cattlemen's Beef Association, the Nebraska Beef Council, USDA CSREES, and several other sources.

# Alumni News

## 2000s

**Sarah Anderson** (2002, B.S., BSEN) finished her Masters at the University of Florida and is a Water Resources Engineer Intern with Jones Edmunds in Gainesville.

**Jessica Graul** (2006, B.S., BSEN) is an Engineer-in-Training with Parsons in Denver, Colorado. She is working on remediation projects, many of which involve biological systems, to clean up ground water for the military.

**Craig Hanson** (2002, B.S., BSEN) was recently qualified as a Naval Nuclear Engineer by Naval Reactors in Washington, D.C. He is a Lieutenant on a nuclear submarine.

**Adam Huttenmaier** (2005, B.S., AGEN) was a Development Engineer for Motor Graders with Caterpillar in Peoria, Illinois. He recently accepted a new position with Cat as a Machine Power Development Engineer at the Proving Ground in Peoria.

**Isaiah LaRue** (2006, B.S., AGEN) successfully passed the FE exam. He is working as an applications engineer for Smith and Loveless in Lenexa, Kansas.

**Nicolaus McCreedy** (2006, B.S., BSEN) is a graduate student at Iowa State University, researching biofuel co-products as performance modifiers in asphalt pavements. He is working with lignin produced from a wet-mill ethanol process, with future work studying bio-oil and cellulosic ethanol derivatives. This new research area has caught the attention of the asphalt and biofuel industries.

**Jonathan Morse** (2003, B.S. and 2006, M.S., BSEN) continues to enjoy the challenges of life as a Ph.D. student studying Electrical Engineering and Computer Science at MIT, and anticipates doing so for the foreseeable future.

**Reggie Rector** (2006, B.S., BSEN) is an Applications Engineer for National Instruments in Austin, Texas.

**Adam Royal** (2000, B.S., AGEN) is a Performance Engineer with John Deere. He is working in the Experimental Product Verification and Validation department for self-propelled sprayers in Ankeny, Iowa. He and his wife, Kelly, have two daughters.

## 1990s

**Heather (Wilkinson) Geiger** (1999, B.S., BSEN) is a busy mom of three children in Littleton, Colorado. Her husband Neil, a College of Engineering alum, works for Lockheed Martin. They have started a business, Off the Record, LLC, to transfer vinyl LP's to CD.

**Tony Kaufman** (1998, B.S., BSEN) continues to find new challenges within 3M in Minnesota. He assumed the leadership position of Lean Six Sigma Black Belt in January. Tony is also involved in service as the United Way Chairperson for his Division (over 500 employees), and in the community with Relay for Life. Tony and his wife recently adopted their second child, Alita, from Guatemala.

## 1980s

**Kem Ahlers** (1982, B.S. and 1984, M.S., MSYM) works in the Building Construction Products Division at Caterpillar in Clayton, North Carolina. He is the Backhoe Loader New Product Introduction Manager, responsible for developing new backhoe loader models, putting them into production, and bringing them to the market. He and his family live in Apex, NC.

**Darin Sigler** (1988, B.S., MSYM) is employed as the Plant Manager in oilseed processing and commercial animal feed production with ADM Alliance Nutrition. The companies include Ag Processing, Central Soya, and Archer Daniels Midland. He is currently managing the plants in Grand Island and Cozad. He has also been a member of Kiwanis for the past eight years.

## 1970s

**Kathryn (Kit) Farrell-Poe** (1979, B.S., AGEN) holds M.S. and Ph.D. degrees from Purdue University. She is currently an Extension Water Quality Specialist and Professor of Agricultural and Biosystems Engineering at the University of Arizona-Tucson. Based at the Agricultural Research Center in Yuma, Kit is also currently the Southwest States and Pacific Islands Regional Water Quality Coordinator.

Though **Don Wilson** (1974, B.S., AGEN) studied agricultural engineering, his work history includes working in the fields of petroleum, civil, traffic, and forensic engineering. He is a production engineer in the Special Projects Group for Chaparral, a small independent oil and gas company in Oklahoma. As a "well doctor," he looks at the problems in oil and/or gas wells and how to maximize production. When a well is too old to be economical, he ensures that it is properly plugged and abandoned.

We enjoy keeping track of your career and life changes. Please go to:  
[bse.unl.edu](http://bse.unl.edu) and select Alumni Update under the Department heading. Inclusion in the newsletter is optional.

# Student News

## Summer Graduations

**Tyler J. Ruf,**

Cambridge, Nebraska, earned his B.S. in Mechanized Systems Management.

**Kara R. Niemeir,**

Fort Scott, Kansas, received her Master of Science in Environmental Engineering.

**Thesis title:** Validating the Odor Footprint Tool for Assessing the Odor Impact of Livestock Buildings in a Rural Great Plains Setting.

**Brian M. Bakke,**

Bellvue, Nebraska, received his Master of Science in Environmental Engineering.

**Thesis title:** The Effects of Loading Rate on Purple Photosynthetic Bacteria in Anaerobic Lagoons

Our apologies for accidentally omitting a recent graduate from the newsletter.

**Reynaldo Bismarck Mendoza Corrales**

received his M.S. in the summer of 2006. Reynaldo is teaching at the Universidad Nacional Agraria in Managua, Nicaragua. In addition to his university duties, Reynaldo is working with the International Center for Tropical Agriculture group to evaluate a sustainable land management project in Nicaragua, and is the coordinator for the consortium for the management of fragile soil of Central America.

**Thesis title:** Tillage Effects on Soil Quality Indicators and Nematode Population Dynamics in Loessial Soil Under Long-term No-till Production

## ASABE International Preprofessional Council

The ASABE International Preprofessional Council Officers for 2007-2008 include Garrett Pommeranz (2005, B.S., AGEN), First Vice President, and Dane Mosel, Parliamentarian, a junior MSYM major. They will facilitate programs for preprofessional students as part of the annual ASABE meeting.



## Quarter-scale Tractor Competition

The 10th annual ASABE Quarter-scale Tractor Design Competition was held in Peoria, Illinois, with 29 teams from the U.S. and Canada. The UNL team consisted of **Mark Tieszen, Grant Janousek, Bart Coffman, Dane Mosel, Leander Hopkins, Alex Austin, Jade Bender, and Chris Howard**. In the overall competition, the A Team placed 8th, and the X Team placed 4th. The team also won the Campbell Scientific Award, which goes to the team with the best data acquisition and presentation of the data. The prize for this award is a year's use of Campbell Scientific's top-of-the line data logger for gathering and reading information from sensors used for testing purposes.

The Quarter-scale team is open to all students on campus. They do all their own fund raising to build the tractor they take to the competition.

Learn more: <http://bse.unl.edu/qtrscale/>

## ASABE Student Branch



The annual fall barbecue of the student chapter of ASABE took place in front of Chase Hall this year. Preparing for their guests are, from left to right: **Dane Mosel** (Membership Chair), **Justin Vonasek** (Social Chair), **Isaac Mortensen** (Secretary), **Mike Rennau** (Treasurer), **Will Corman** (President), **Grant Janousek** (Vice President), and **Matt Giesbrecht**. The purposes of the club are to interact socially with departmental faculty members, and to meet professionals in the career fields of agricultural and biological engineering.



# FELLOWSHIPS

## Distinguished Fellowship Awards

During a luncheon on Thursday, September 27, in the East Campus Union, the College of Agricultural Sciences and Natural Resources recognized graduate students who have received fellowships for this academic year. Seven students from our department were acknowledged for academic accomplishments.

## John and Louise Skala Fellowships

Advised by Dr. Milford Hanna, **Govindarajan Suresh Babu** is researching the optimization and modeling of the extrusion process for producing environmentally friendly foam sheets containing a high concentration of starch or starch derivatives. He is developing a procedure to reduce the wave patterns produced by flat extrusion dies.

**Shah Huda** is exploring the use of agricultural by-products, ranging from chicken feathers to cornhusks, for use in industrial composites. His experience in the automotive industry, coupled with the desire for helping farmers, guides his research in developing materials made totally from renewable resources. Shah is a Ph.D. student being advised by Dr. Yiqi Yang.

**Ajay Kumar**, a student of Dr. Hanna's, was recognized for his research and teaching accomplishments. He finished his M.S. here, and is continuing on for his Ph.D., researching the gasification of biomass for hydrogen and synthetic gas production. He has published four journal papers, presented at seven professional meetings, and been a teaching assistant in departmental classes.

**Eric Newgard** is investigating the impact of each unit operation of the fuel ethanol process on the amount of hexane extractable lipids in the process stream. A Ph.D. student advised by Dr. Curt Weller, Eric has also worked with another Ph.D. student, Heartwin Pushpadass, on determining the material coefficients of corn and grain sorghum for the size reduction energy laws related to hammermilling.

**Heartwin Pushpadass** is researching the development of biodegradable films from corn starch and other renewable plant sources by extrusion. Once created, the films are tested and characterized for mechanical and moisture sorption properties, water vapor and oxygen permeability, solubility, and biodegradability. Heartwin is a student of Dr. Hanna's.

## Milton E. Mohr Fellowship in Agriculture

Understanding the relationships between plant physiology, soil/water dynamics, and the evapotranspiration (ET) process is the focus of **Denis Mutiibwa's** work as a Master's student. Advised by Dr. Suat Irmak, Denis is applying the Original Penman Monteith Model to directly estimate crop ET in south central Nebraska. Denis was last year's recipient of the department's Bill A. and Rita Stout Outstanding International Graduate Student award.

**Parikshit Ranade** is using a crop modeling approach to develop in-season irrigation management decisions, particularly the effect of timing and level of water stress on corn yields, in Western Nebraska. Pari is a Master's student, advised by Dr. Ayse Irmak.



*Laura pours grain sorghum into the bucket end of a seed scarifier.*

## Researching Plant Sterols

It takes a bit of travel to get to Nebraska from Finland, yet **Laura Nyström** was here for six weeks to research plant sterols in sorghum, a grain grown here, but not there. A doctoral candidate at the University of Helsinki, Laura's ongoing research is on plant sterol conjugates derived from wheat and rye. She met Dr. Curt Weller at the AACC International (formerly American Association of Cereal Chemists) meeting in September, 2006, and came at his invitation. He was interested in seeing how her work would translate to grain sorghum.

First, kernels of sorghum are milled in a process called scarifying. This removes the bran in layers and is stopped just before reaching the endosperm. The removed layers are analyzed for sterols. Sterols, odorless and tasteless, are found in all plants, and play a role in lowering human cholesterol. They may be added to enrich the nutrition in grain products, margarines, and yogurt drinks. Some commercial sterols already available include Corowise™, Cardio Aid™, Danacol™, ProtoCol, and ReduCol™. While foods with plant sterols are not as widely known in the U.S., they are well-known in Europe and sterols are approved as a food additive to help combat heart disease.

Laura was pleasantly surprised to see bicycles being used here, though there are more cyclists in Finland. She enjoyed her time in Nebraska, and survived some typical summer weather. After leaving Lincoln, she spent one week at the USDA/ARS lab in Wyndmoor, near Philadelphia, Pennsylvania, before returning home. After defending her dissertation in the fall of 2007, she plans to conduct research at the University of Helsinki.



Scholarship recipients, kneeling, from left to right: Ben Carlson, Grant Janousek, Laura Podany, Rob Corn, Travis Anderson. Standing, left to right: Sam Will, Colton DeBower, Tony Selting, Andrew Landgraf, Nate Stahr, Kurtis Charling, Megan Krause, Jamie Kathol, David Mabie, Jared Speichinger, Evan Curtis, Joseph Bremer, Bill Alms.

## Scholarships and Ice Cream

Set in the lovely East Campus Arboretum, this year's ice cream social and scholarship recognition celebrated the academic accomplishments of our students, accompanied by generous scoops of Dairy Store ice cream. As of September 25, 2007, a total of 57 scholarships had been awarded to undergraduate students from our Department. An additional six scholarships from the College of Agricultural Sciences and Natural Resources (CASNR) were also awarded this year. The combined total from BSE and CASNR was \$46,774. The College of Engineering awarded 27 scholarships for an additional total of \$56,500. The scholarships, listed by donor, and the recipients for the 2007-2008 academic year are:



Faculty ice cream scoopers: George Meyer, John Gilley, Mike Kocher, and David Jones.

<p><b>Paul E. and Mary Beth Fischbach and Family</b> Benjamin Carlson Corey Smith</p> <p><b>Glenn J. and Maria L. Hoffman</b> Stacey Joy Lisa Karel</p> <p><b>Mr. and Mrs. W. F. Hoppe, Sr. Memorial</b> Craig Brester</p> <p><b>Lloyd W. and Margaret V. Hurlbut Memorial</b> Megan Krause Andrew Landgraf</p> <p><b>Leslie and Harriet Jochens</b> Branden Baade Violetta Balayan Joseph Bremer Crystal Bryan Robert Corn Joseph Darrington Nguyen Thao Nguyen Michael Schaal</p>	<p><b>John Deere Mentor</b> Zachary Carlson Gary Garms Sean Gillilan Michael Hauger Daniel Jahraus David Jobman David Leinart Michael Peterson</p> <p><b>Fred R. Nohavec</b> Evan Curtis</p> <p><b>Warren P. Person Memorial</b> Stephanie Baird</p> <p><b>George Milo Petersen</b> Grant Janousek</p> <p><b>Edgar Rogers Memorial</b> Brian Dunekacke Dane Mosel</p>	<p><b>Leonard G. Schoenleber</b> Lisa Karel</p> <p><b>William E. and Eleanor L. Splinter</b> Drew Schulz</p> <p><b>John Sulek Memorial</b> Benjamin Robison</p> <p><b>Elenore Gakemeier Swarts Distinguished</b> Travis Anderson Brent Hall Nathan Stahr</p> <p><b>LeRoy W. and Jean E. Thom</b> William Alms Eric Eberspacher Aaron Fuelberth Kimberly Grieb Ryan Hillen Jamie Kathol David Mabie</p> <p>Andrew Olson Kayleigh Peters Laura Podany Jason Schafer Kyle Schmit Kyle Uhing Justin Vonasek</p>	<p><b>Tom Thompson Memorial</b> Joseph Holoubek</p> <p><b>Wayne E. and Virginia R. Thurman</b> Ryan Hulme Shannon Killion Isaac Mortensen</p> <p><b>Ken Von Bargaen</b> Jamison Kaliff</p> <p><b>Ivan D. Wood Memorial</b> Jordan Carlson Garrett Gustafson Daniel Malander Patrick Moser</p> <p><b>CASNR</b> Kurtis Charling Colton DeBower Robert Malm Jared Speichinger Isaac Welborn Samuel Will</p>
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# 100 YEARS

## As a University of Nebraska Department

1907 Farm Mechanics Department

1910 Agricultural Engineering Department

1990 Biological Systems Engineering Department



Leon W. Chase



J. Brownlee Davidson

### Chronology at University of Nebraska

- College of Industrial Arts 1877
  - Teaching in Engineering and Agriculture
- 1904 Farm Machinery Hall
- 1907 Farm Mechanics Department
- 1909 Colleges of Engineering and Agriculture
- 1910 Agricultural Engineering Department
- 1919 Chase Hall completed



### Oscar Van Pelt (O.V.P.) Stout

- 1888 Civil Engineer degree
- 1890-91 Instructor in Civil Engineering
- 1893 In Charge of Civil Engineering Department
- 1895 Agricultural Engineer in Agriculture School
- 1895 Irrigation Engineer in Experiment Station
- 1907 P.E. (First year of Engineering licensure in U.S.)
- 1912 Dean of the College of Engineering
- 1918-19 Major of Engineers U.S. Army
- 1920 Irrigation Engineer USDA
- 1928 Honorary Membership in ASAE
- 1932 Honorary Doctorate by University of Nebraska
- 1932 First Recipient of the Cyrus Hall McCormick Gold Medal from ASAE
  - Declared “Father of Agricultural Engineering”



Oscar Van Pelt (O.V.P.) Stout

### 1907 Farm Mechanics Department

- Associate Dean of Engineering—approval of Engineering courses
  - 3 years of Engineering courses
  - 1 year of Agricultural courses
  - Final year of Engineering courses

### Successful Model of Engineering and Agriculture

- Agricultural Engineering Departments with Engineering and Agriculture responsibilities have survived. Many of those in Engineering only have not.

### First Agricultural Engineers

- Oscar Van Pelt Stout (1895 School of Agriculture)
- J. Brownlee Davidson (ME 1904)
- Leon W. Chase (ME 1904)
- Jacob Waggoner (The first degree in Agricultural Engineering in U.S.; 1910 Iowa State College.)
- C.K. Shedd (1919 1st Engineer-in Charge of Tractor Testing)

### 1912 First NE Graduates with degree in Agricultural Engineering

- Ivan D. Wood
- Eber B. Lewis
- Claude D. Kinsman



Ivan D. Wood

### 1914 First M.S. in Agricultural Engineering in U.S.

- Ivan Wood
  - First Extension Agricultural Engineer

### L.W. Chase and J.B. Davidson

- 1903 L.W. Chase was Instructor in Mechanical Engineering
- 1904 J.B. Davidson was Instructor in Forge and Farm Machinery
- 1904 Davidson taught Farm Machinery and Chase taught Foundry and Forge
- 1904 Senior Thesis by Chase and Davidson—designed, cast, and assembled a 2-cylinder engine and tested using home-made prony brake.
- 1905 Davidson went to Iowa State College
- 1907 Chase led Farm Mechanics Department
- 1907 were founding members of ASAE
- Were founding members of Sigma Tau Engineering Honorary (Now Tau Beta Pi)
- 1908 Published two texts—Farm Machinery and Farm Motors. First texts in new profession of Agricultural Engineering
- 1914 J.B. Davidson received first professional degree in Agricultural Engineering from University of Nebraska
- 1914 L.W. Chase received reciprocal professional degree in Agricultural Engineering from Iowa State College
- J.B. Davidson was first President of ASAE
- L.W. Chase was 6th President of ASAE
- Both were judges from 1908-1913 for the Winnipeg Plowing contests
- Chase tested 90 tractors near Fremont NE in 1917 using three dynamometers
- Chase provided technical input to Nebraska Tractor Test Law in 1919 while in the Army in Washington D.C.

### C.K. Shedd

- Taught Farm Machinery at University of Nebraska
- 1919 First Engineer-in-Charge of new Tractor Testing program at University of Nebraska
- USDA Engineer at Kansas State, Missouri, and Iowa State
  - Best known for developing design loads for grain bins



# Alumnus Profile



*Alejandro Amézquita*

**Alejandro Amézquita** (2004, Ph.D.) recently joined the Department of Food Science at North Carolina State University (NCSU) as an Assistant Professor and Food Engineering Extension Specialist after 3 years of industry experience as a project leader for Unilever's Safety and Environmental Assurance Centre (SEAC) in Great Britain. His appointment at NCSU is 70% Extension and 30% Research. He will be working in the areas of thermal processing of muscle and liquid foods, quantitative microbiology (predictive microbiology and risk assessment), food safety engineering, and food quality engineering.

In his former position, Alejandro worked closely with microbiologists involved in the safety assessment of consumer goods. Some of his main responsibilities in SEAC included the coordination of research projects in the area of food safety engineering (with emphasis in thermal processing), supporting safe product and process design for Unilever operating companies, and evaluation and validation of microbiological safety of new products and processes (including assessment of novel intervention technologies).

Prior to his role in Unilever, Alejandro completed his Ph.D. in Biological Systems Engineering under the supervision of Dr. Curtis Weller. He obtained his M.S. degree in Food Science (with an emphasis in applied food microbiology and food safety) also at UNL, working under Dr. Mindy Brashears. The members of his graduate committees were very flexible and allowed him to tailor his coursework according to his career goals. Combining the education in Food Science with Biological Systems Engineering provided him with unique opportunities to experience the "best of both worlds" during his professional career. The excellent research facilities at UNL allowed Alejandro to successfully develop an inter-disciplinary research program that has been well received by the scientific community. As a graduate student at UNL, Alejandro was one of the first recipients of an Othmer Fellowship; he also won numerous awards at UNL and from outside organizations. Alejandro is author or co-author of more than 10 peer-reviewed scientific papers, and a number of book chapters and extension publications (both in English and Spanish).

The international character of UNL campuses and academic programs offered important opportunities for Alejandro to be actively involved in several international professional activities. He developed and delivered several training courses for the food industry in his home country, Colombia, on a wide variety of topics, including, HACCP and prerequisite programs, mathematical modeling techniques applicable to food processing operations, predictive microbiology and microbiological risk assessment techniques, and thermal processing of ready-to-eat meat products. He also was very active in engaging UNL faculty to travel to Colombia to deliver a number of technical talks.

## Career opportunities in food engineering



To be a successful food engineer today, graduates must be fully aware of the global nature of food companies. Current positions in the food industry require a good balance between specialist's skills and competencies. Knowledge of two or more languages (at least one of those being English) and the ability and willingness to travel internationally is highly desirable. Staying current in scientific and technological advances is also fundamental. Being open to work in areas outside food processing, such as bio-pharmaceutical or bio-processing, also broadens the scope of career opportunities. Specialization in state-of-the-art technical areas such as nanotechnology and development of functional foods is currently highly sought by food companies. Salaries for food scientists and food engineers are typically very competitive. According to a survey performed by the Institute of Food Technologists (IFT), the median annual salary in the United States for professionals working in the food industry was \$78,000 in late 2005. To read more from the survey, please go to: [members.ift.org/NR/ronlyres/950E5A4E-C03C-4439-AC84-E5E728CD5149/0/0206salarysurvey.pdf](http://members.ift.org/NR/ronlyres/950E5A4E-C03C-4439-AC84-E5E728CD5149/0/0206salarysurvey.pdf)

## Congratulations

Be sure you know what you're getting yourself in for if **Jan Hygnstrom** ever invites you out for a walk. This Extension Project Manager trained for walking a marathon with her sister, Maxine, beginning this past April. She was putting in 16 to 22 mile walks on the weekends leading up to the race. On Sunday, October 21, she and her sister walked the marathon in Columbus, Ohio. They finished the 26.2 mile course in seven hours, 22 minutes.

**Dr. Suat Irmak** received two awards in October. He was recognized for a Distinguished Extension New Employee Award by UNL Extension for outstanding extension programming at an NCEA/Extension Fall Conference in Grand Island, Nebraska. In Lincoln, Gamma Sigma Delta (Agricultural Honor Society) recognized him for high scholarship, outstanding achievement, and service.

Pollution Prevention Technician **Valdeen Nelsen** was recognized for her contributions to the community of Lincoln at the YWCA's Tribute to Women at a luncheon on October 26, 2007. Valdeen works with the P3 internship program.

**Dr. Richard Koelsch** received a 2007 Distinguished Service Award as a Specialist from the Nebraska Cooperative Extension Association.

### University Service

Service Awards are presented each fall as part of the activities preceeding Chancellor Perlman's State of the University address. Over 800 employees were recognized this year, including the following from our Department.

#### 35 years

Brent Sampson

#### 30 years

Jack Schinstock

#### 25 years

William Kranz

#### 20 years

Eileen Curtis

#### 15 Years

Alan Boldt

Ray Kubert

Curtis Weller

#### 10 years

Gail Ogden



# Comings and Goings



*Teresa Ryans*

**Teresa Ryans** joined the Department as the new secretary for the East Bay soil and water group. She was formerly employed with the UNMC College of Nursing-Lincoln Division. She is an avid Elvis Presley fan (her favorites are the Gospel recordings) and an enthusiastic Husker fan. Recently, Teresa challenged herself with a new project and is learning how to knit.



*Laura Hayes*

Our newest staff member, **Laura Hayes**, works in the West Bay with the food and bioproducts engineering group and also supports undergraduate academic programs, the Graduate Committee, and the Industrial Agricultural Products Center. Laura has been with the university for 17 years and previously worked in the Healing Pathways office of the Bureau of Sociological Research.



*Shana Thomas*

**Shana Thomas** joined UNL in May 2007 as a program specialist working for Dr. Viacheslav Adamchuk. She is developing a GPS/GIS and Robotics curriculum for students in middle school as part of the Nebraska 4-H program. A Lincoln resident for 8 years, her hometown is Kochi in Kerala, South India. Shana graduated from Virginia Tech, in Blacksburg, in the Department of Civil Engineering with an M.S. in GIS and CAD applications. Her hobbies include music and cooking. She enjoys spending time with her 2- and 4-year old children.



*Crystal Powers*

**Crystal Powers** (2005, B.S., BSEN) graduated from Cornell University (a very challenging and rewarding experience) in August with an M.S. in Agricultural and Biological Engineering and a minor in Systems Engineering. Her thesis was entitled *Microbial Fuel Cell Operation and Use with Anaerobic Digestion for Power Production from Dairy Manure*. Crystal and her husband enjoyed their time in the Northeast, finding time to enjoy the beauty of Upstate New York as well as to visit many of the cities in the region. She is glad to be back in the Midwest though, and will be working as an Extension Engineer with Dr. Rick Stowell for the next couple of years. Her primary responsibilities will be working with the Odor Footprint Tool for livestock. She will be making the tool publicly accessible online, comparing

setback distance requirements from county zoning ordinances in Nebraska to odor footprints, and developing educational materials and programs for the tool. Crystal is also helping with some of the courses taught in the Department.



*Angela Pannier*

We welcome one of our alums as the new biomedical engineering faculty member in our Department. Originally from Fremont, Nebraska, **Angela Pannier** received her Bachelor of Science (BSEN) from our Department in 2001, graduated with highest distinction and honors, and was a Goldwater Fellow. Angie also received her UNL Master's degree in BSEN, in 2002, for which she studied transdermal delivery of antisense oligonucleotides in Dr. Rhonda Brand's laboratory, and was named an NSF graduate fellow. She received her Ph.D. from Northwestern University in Evanston, Illinois, where she studied substrate-mediated gene delivery for tissue engineering and diagnostic applications in the Shea Laboratory of Cellular and Tissue Engineering. Angie is setting up a new lab in Chase Hall for the study of how cells can be engineered for gene delivery, specifically looking at how controlling the extracellular microenvironment and the intracellular signaling pathways can affect how cells take up DNA in their environment. She is also translating her findings to tissue engineering scaffolds. Angie moved back to Lincoln from Chicago this past summer with her husband, Tyler, and four-month old daughter, Lillian. She officially began her new position in October.



*Teresa Loseke*

**Teresa Loseke** moved to Lincoln 7 years ago from Columbus, Nebraska, and recently worked in the College of Engineering as a Business Personnel Specialist. In her new position as a Personnel Associate, she will be responsible for creating and maintaining personnel records for current and new employees, advising staff and faculty on personnel related matters (which will include UNL policies and procedures, and State and Federal employment regulations), and all aspects of personnel processing and human relations. Teresa's hobbies include attending Husker football and volleyball games, playing sand and court volleyball, and cooking. During her down time, she likes to relax at home with her husband and stepson, and walk her golden retriever.



*Dr. Chris Hay*

**Chris Hay** joined the Department as a post-doctoral research associate on July 16th. Chris is working with Dr. Suat Irmak and several collaborators to measure evapotranspiration in the Central Platte Natural Resources District. The goals of the project are to quantify actual crop evapotranspiration, develop crop coefficients, and measure non-growing period evaporative losses for different vegetation surfaces ranging from irrigated and dryland corn, to irrigated and natural grassland. The rationale is to improve the understanding of the consumptive water use of these crops to better inform water managers for more efficient utilization of water resources. He will be working with four Bowen ratio systems that will be installed near Central City to measure the surface energy balance components necessary for calculating evapotranspiration. Chris received his Ph.D. in Agricultural and Biological Systems Engineering from UNL in August 2006.



*Lijun Wang*

Research Assistant Professor **Lijun Wang** accepted an Assistant Professor position at North Carolina A&T State University, in Greensboro. He will be teaching and conducting research in the Civil, Architectural, Environmental, and Geomatics Engineering Program. He retains adjunct status with our Department.



*Leo Masek*

**Leo Masek** accepted a promotion; she is now the Personnel Generalist in the School of Natural Resources business center in Hardin Hall.



*Ardis Burkholder*

**Ardis Burkholder**, Grant Specialist, has retired. She plans to travel to spend more time with her children and grandchildren, and dance across the prairie from her home out on the plains.

**Bill Campbell** has left the Cornhusker state and is now an Assistant Professor teaching in the Department of Health, Safety, and Environmental Health Sciences at Indiana State University in Terre Haute.

**Ayse Irmak** is now an Assistant Professor in the School of Natural Resources, and the Civil Engineering Department, and made a short move over to Hardin Hall on East Campus. Ayse retains courtesy faculty status with our Department.

We appreciate all who have established endowments, or made contributions to funds that support programs in the Department of Biological Systems Engineering.

For information about establishing new endowed funds, or contributing to existing funds, contact Ann Bruntz, NU Foundation, 402-458-1176 or [abruntz@nufoundation.org](mailto:abruntz@nufoundation.org)

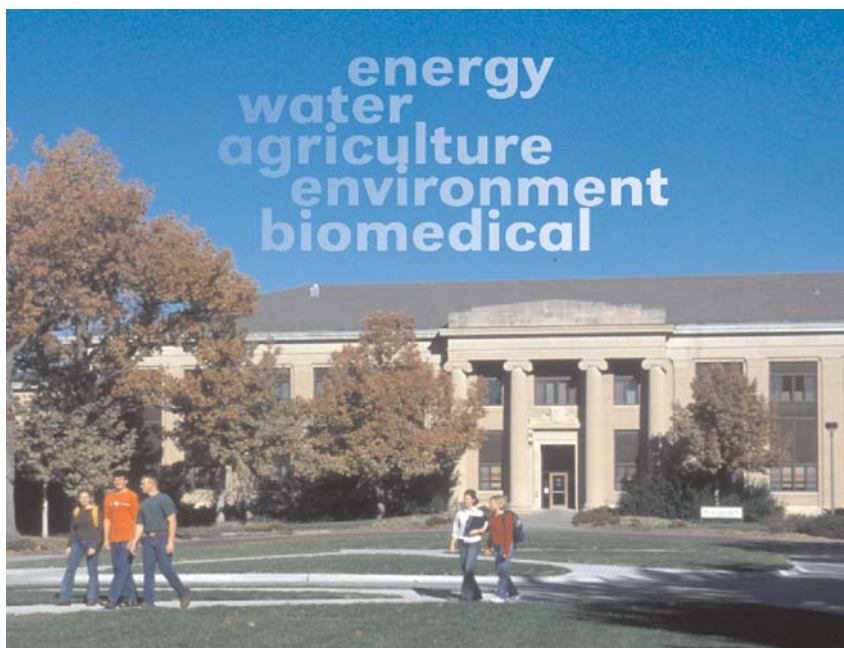


Photo: University of Nebraska-Lincoln, Institute of Agriculture and Natural Resources



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