Fall 2010

BAE Bulletin

The Department of Biosystems and Agricultural Engineering

Food Quality, Safety & Biosecurity
Sustainable Ecosystems
Renewable Bioenergy Systems

Integrating Engineering and Biology Since 1906








BAE people make the difference

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Advancing Knowledge. Transforming Lives.

From the Chair

BAE Bulletin

Since 1906, the Department of Biosystems and Agricultural Engineering has responded to the changing needs of society by integrating and applying principles of engineering and biology in a systems context. Today, biosystems engineers at MSU solve complex, rapidly-changing problems related to food quality and safety, ecosystems protection, homeland security and health protection, biomass utilization and renewable energy development.

Biosystems & Agricultural Engineering
Ajit Srivastava
Chair

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Greetings Alumni and Friends:

This past year was one of the most productive years in recent history of our department. The student enrollment in B.S. in biosystems engineering degree program on the first day of fall registration was 155 which is an all time high. Our graduates continue to be highly successful in the job market with nearly 100% employment within 3-6 months from the time of graduation. Enrollment in our graduate program continues to increase which is coupled with increase in faculty grants. Refocusing and realignment of the department priorities along with excellent faculty is the key to the many successes of the department.

We have just completed an accreditation review of our program under a new criterion – biological engineering. We have been updating the curriculum by including more biology in preparation for this review. We now require four biology courses in the program including one at 400-level. We have also developed a new required course in the program entitled microbial systems engineering at junior level which further strengthens our commitment to integrating engineering with biology to uniquely define biosystems engineering as an engineering discipline firmly grounded in the principles of biology. I would like to express many thanks to Brad Marks for providing excellent leadership during the review process.

Construction of the Anaerobic Digestion Research and Education Center (ADREC) building was completed this summer and it is now in full operation. The 6000 sq. ft. building has two well equipped wet labs and a 3000 sq. ft. pilot-scale lab. The ADREC building was made possible by a generous grant from a southeast Michigan foundation. This unique facility will play a major role in addressing waste-to-resource issues in Michigan and beyond. Construction of an anaerobic digestion/algae production demonstration unit is underway which will add to our capabilities to study farm-based integrated biorefinery concept.

We have two new tenure system faculty members join our department. They are Dr. Yan 'Susie' Liu and Dr. Fei Pan. Dr. Liu will be studying algal fermentation while Dr. Pan will study biomass feedstock supply chain logistics. These appointments significantly add to our capabilities to address the broad field of bioenergy.

While Michigan continues to face economic challenges, we in BAE are enjoying unprecedented growth in all areas and remain focused on our mission. I invite you to periodically visit our web site and let us hear from you.
GO GREEN!

Sincerely,

Ajit Srivastava
Chair

College of Agriculture and Natural Resources
College of Engineering

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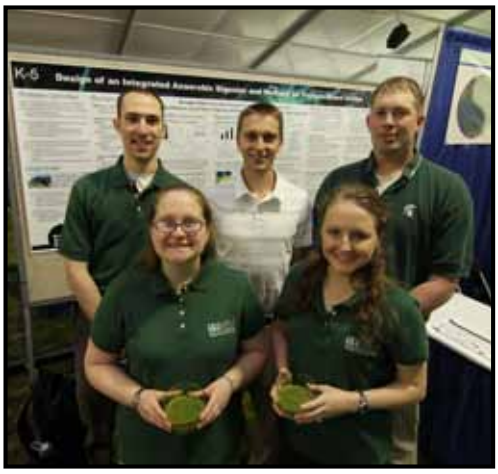


The 2010 Senior Design Teams

Faculty News

MSU Foundation Awards Strategic Partnership Grants

The Department of Biosystems and Agricultural Engineering will play a role in two of the four projects receiving 2009 Strategic Partnership Grant (SPG) funding. The SPG program looked for progressive, interdisciplinary and forward-focused research and scholarship at the leading edge of knowledge. Such research fits the MSU Foundation mission to provide seed funding for developing new knowledge, initiating centers of excellence, and generally investing in the development of MSU as one of the nation's leading research institutions.

Summaries of the projects:

Counterfeiting and Product Protection: Jeremy Wilson, associate professor of Criminal Justice.

The BAE department will help investigate product counterfeiting in food, pharmaceuticals, manufacturing and technology which has a significant impact on safety, the economy, business and the environment. The project will develop an Anti-Counterfeit and Product Protection Program that integrates research in many disciplines to develop resources that rely on data, analysis and evidence. Such resources can generate intellectual property and revenue and position MSU as the international leader in anti-counterfeit research and outreach.

Transportation Fuels from Biomass: A Novel Approach via Fast Pyrolysis and Upgrading of Bio-Oil: Dennis J. Miller, professor of Chemical Engineering and Materials Science; Chris M. Saffron, assistant professor of Biosystems Engineering and James E. Jackson, professor of Chemistry.

In this project, researchers will explore ways to upgrade the bio-oil through novel catalytic processes, including electrocatalysis using renewable electricity sources such as wind or solar power, and chemical reductive catalysis using local resources like methane from farm digesters or landfills. The research will advance understanding of pyrolysis and identify valuable byproducts.

Saffron Wins Withrow Award

Dr. Chris Saffron, assistant professor of Biosystems and Agricultural Engineering, received the MSU College of Engineering 2010 Withrow Teaching Excellence Award at the College awards luncheon this past spring. Selection for this award is based primarily on nominations from students. A committee composed of students, alumni, faculty and advisors makes the award recommendation to the department chairperson.

The award citation given to Dr. Saffron acknowledges his depth and breadth of knowledge, approachability and likeability and the passion to ensure student learning and understanding, which are ingredients of teaching excellence.

Dr. Saffron is noted among department colleagues for bringing rigor to the curriculum and clarity to subject matter, as well as raising expectations of the students to the next level.

BAE Researchers Publish Award Winning Paper for ASABE

Dr. Renfu Lu, adjunct professor and Ph. D. student Haiyan Cen were selected as one of the 2010 Information and Electrical Technology Division award-winning meeting paper presenters for their paper entitled, Optimization of the Hyperspectral Imaging-based spatially-Resolved System for Measuring the Optical Properties of Biological Materials. They were presented with the award at the 2010 ASABE Annual International Meeting held in June.

BAE Student Selected for 2009 Siemens research competition

Mimi Chen, a high school student from Country Day School in Beverly Hills, Mich, was selected as a semi-finalist in the 2009 Siemens competition. Chen, worked alongside BAE Associate Professor Evangelyn Alocilja last summer. Chen's work in Alocilja's lab: The Construction of Restrictive Enzyme set for the Detection of B. anthracis Using Bio-Barcode Assay was recognized in the national competition.

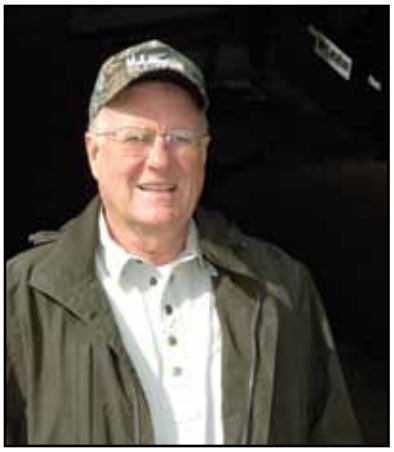
Srivastava Named OSU College of Engineering 2010 Distinguished Alumnus

Department Chair Ajit Srivastava was named the 2010 Distinguished Alumnus for The Ohio State University's College of Engineering. For more than 30 years, Ajit has applied his expertise to the understanding and application of machinery systems to food production, harvest, post-harvest and processing operations. He has developed and taught several undergraduate and graduate courses at MSU. He has served as the department chair since 1997. In 2009, he was named a fellow of the American Society of Agricultural and Biological Engineers (ASABE).

MSU Researcher's Career Reflected in Modern Dairy Operations

ANR Communications

Visit a modern-day dairy farm and it's likely you'll see groups of cows being milked with automated milking equipment, baby calves and young heifers housed in white dome-like calf hutches and open-sided barns with curtains that can be rolled up or down depending on the season of the year. The business of dairying has come a long way since the days of our grandparents and great-grandparents when milking cows by hand was the norm.



Several of the conveniences of today's dairy producers around the world take for granted can actually be traced back to the efforts of one Michigan State University (MSU) researcher and professor, Bill Bickert, professor emeritus of Biosystems and Agricultural Engineering. Bickert committed more than 45 years of his life to research and teaching that was focused on finding practices to better serve the dairy industry.

The results from Bickert's years of work designing milking and management systems and procedures are evident on nearly every dairy farm in the country. In the 1970s, Bickert led the team of graduate students who were responsible for designing the first automatic milking machine detacher. Commonly referred to as an automatic take-off, this advancement in milking technology is noted as one of the first innovations to improve both worker comfort in the milking parlor and increase worker productivity by allowing workers to monitor more animals at the same time.

Bickert's next round of work explored available housing environments for cows. New, more modern facilities were needed as the red hip-roof barns that had dominated the countryside for decades started to phase out. Bickert teamed up with his MSU animal science colleagues to investigate ways to improve animal health and comfort through building designs. Bickert, who stated many times that the old barns were designed for human comforts and not for the cows, led his team of graduate students in designing naturally ventilated barns. By eliminating the traditional wood, steel or concrete barn walls and replacing them with retractable curtains, the cows -- still housed inside the building -- had access to free-flowing air movement. This change in barn design resulted in substantial improvements in cow health and cow comfort.

In addition to changing the overall look and functionality of the barns, the MSU researchers also looked inside the buildings at the width and length of stalls and the type of bedding material used. Bickert's over-arching desire to improve cow comfort led to industry-wide adoption of differently designed stalls. Producers also started moving away from traditional bedding materials such as straw and replaced it with sand. Today, nearly every dairy farm across North America follows the guidelines first established by Bickert and his colleagues.

"Dr. Bickert's work has resulted in healthier and more comfortable cows that are reaching higher levels of production while at the same time producing higher quality milk," says Larry Nobis, a dairy farmer from St. Johns. "Dr. Bickert's work has taken a lot of the drudgery out of dairy farming and improved the environment for everyone working with cows. It all adds up to a healthy, profitable industry that is not going away."

In Bickert's last few years at MSU, he turned his attention to manure management. Though the change by numerous producers to sand bedding significantly helped improve cow comfort, incorporating sand into the manure created a whole new set of problems for farms, particularly with how it affected the equipment used to handle and remove manure.

In the mid-1990s, Bickert and a new team of graduate students began investigating the feasibility of removing the sand from the manure. Their work led to the development of a patented sand-manure separator that has since evolved to become one of a number of new on-farm technologies used to manage manure nutrients.

"Bickert worked to mainstream the concept of integrated manure systems along with common sense approaches for helping dairy producers coexist with neighbors," says one of Bickert's former graduate students Andrew Wedel. "You don't have to look far to find the impact that Bickert has had on the global dairy industry."

Technology Systems Management Major Placed on Moratorium

By Luke Reese

The Technology Systems Management (TSM) major has been put on moratorium beginning Spring 2011. A moratorium is not the termination of a major, but rather a program review with no new student admissions during the moratorium. The decision was dictated from University economics and numbers. TSM numbers, while steadily increasing, were still near the bottom for all College and Agriculture and Natural Resources (CANR) majors and thus the push from central administration. Simple numbers were used with no in depth discussions on supply, demand and industry direction. CANR had 21 majors, and TSM was 1 of 5 CANR majors slated for moratorium. Likely this discussion would never have occurred if the state's and MSU's economics weren't in such doldrums. In addition to reduction of majors, the College has discussed reducing the number of CANR academic departments from 15 to 11. Needless to say CANR is in transition.

The department still believes that the employability, demand and vitality for the TSM degree is real and in high demand. We are taking the review process seriously and in the confines of our resources and departmental strategic directives. As part of the review process, we likely will be looking to change the major to a minor with better alignment to the engineering concentrations and the bioeconomy. Most of the existing TSM core courses would remain with modifications to emphasize efficiency, bioenergy, food engineering and ecosystems all aligning with existing departmental expertise.

In line with our thinking about a minor, we are looking at how we might combine courses such as TSM 341 and 342 with AE 252 to be a power and efficiency course integrating alternative energy. For TSM 224, we are looking at how we might combine components of TSM 224, BE 333 and ECE 345 into a data acquisition and electronic sensors technology applications course. The moratorium should make the program better after the program review while gaining the efficiencies the University requires.

Remembering Clarence Hansen

Professor Emeritus, Clarence Hansen passed away this past June at the age of 96. Clarence began his tenure in the Department in 1945 when he was recruited to be a research assistant. Prior to that he was teaching high school shop classes in South Haven, Mich.

Clarence was promoted to full professor in 1970. His work at MSU included teaching, extension, and a focus on research in Power & Machinery. His work led him to travel widely, having visited 67 countries in his lifetime starting with Columbia, South America in 1952 for a year with his family as part of the Point Four Program. He made many trips to Europe, and visited five continents with sabbatical leaves in China, Japan, Taiwan, Egypt, and Chile.

During his professional and retirement years Clarence authored 141 papers and was granted 14 patents, including one each with his sons, Charles and Dennis. He was a Fellow in the American Society of Agricultural Engineers (ASAE) where he held many committee chairmanships. Honors included Michigan Section ASAE Engineer of the Year and a meritorious award from the Polish Ministry of Agriculture for mentoring Polish students. From 1966 to 1979, he mentored 24 students from many foreign countries. He acted as chairman of the organizing committee when the International Commission of Agricultural Engineering (CIGR) held its meeting at MSU in 1979. He was given a prestigious award by CIGR for his achievements in agricultural engineering and also received a meritorious award from the French Government.

Clarence retired from MSU in 1980, and in addition to his many professional accomplishments he was a member of the Executive Board for both the State YMCA and Camp-Hayo-Went Ha, and served as President of the State YMCA of Michigan. He was president of the MSU Retirees Association 1993-95 and also belonged to the MSU Beaumont Society.

MSU Anaerobic Digestion Research and Education Center

The Department's new Anaerobic Digestion Research and Education Center (ADREC) has a mission to advocate for waste to resource technologies that are efficient and protective of the environment. Of particular interest is the use of anaerobic digestion because of co-production of methane gas, concentrated fertilizer, and high quality anaerobically treated fiber (AD fiber).

The beneficial use of advanced anaerobic digestion technologies leads to value-added renewable energy/chemicals from agricultural wastes and carbon credits that offset green house gas production. We achieve ADREC's mission by conducting basic and applied research and developing and presenting outreach materials. Our research spans the continuum from mathematical modeling to full-scale optimization. Modeling economically determines if the proposed technology to convert the waste to a resource has the theoretical potential to meet site-specific objectives.

For technologies that show good theoretical potential, laboratory testing is recommended because microorganisms can be easily perturbed by environmental, physical, and chemical characteristics of the waste. By conducting simple bench-scale biogas assays and semi-continuous cultures, potential inhibition of the microbial population can be determined and the production of methane and fiber characterized. With successful bench-scale test, larger-scale simulations can be run that more closely represent the full-scale technology so that design and logistical data can be obtained.

This type of research can be conducted using pilot-scale reactors or our partner commercial farms. ADREC is also overseeing the construction of the MSU demonstration digester and will provide operational support. More traditional university style research is on developing and optimizing waste to resource technologies also occurs at ADREC.

The Center is managed by Dana Kirk, who is uniquely qualified in both applied design and research associated with digestion. Louis Faivor is the Center's technologist and expertly juggles everything from building prototypes to running experiments. Steve Safferman, Wei Liao, and Yan

"Susie" Lu are ADREC's principal investigators. Several graduate and undergraduate students gain their research education through conducting the day-to-day research for ADREC.

ADREC's new building was completed in June 2010. The state-of-the art 6000+ ft^2 facility has a conference room with a capacity for 40, offices for the manager and technologist, a wet chemistry and instrumentation laboratory, and high bay for prototype research. Included within the high bay is a large constant temperature room used to house biogas assays and small semi-continuous reactors. A lunch room, locker room, and student office provides a pleasant atmosphere. Funding for the ADREC building and the initial research program is from a major foundation that wishes to remain anonymous. Cost share for the Center manager is provided by the MSU Extension and Michigan Agricultural Experiment Center.

After a couple years in development ADREC is in now in full operation. We have received funding for projects from over 10 organizations including other universities, State government, and industry. ADREC is a collaborator with several universities on two major USDA proposals. A visit to the Center finds a vibrant, collegial atmosphere with the excitement of discovery from a diversity of cutting-edge research.

Biomass Thermal Conversion at MSU

By Christopher M. Saffron

I joined MSU in 2007 to establish a research program involving the thermal conversion of plant biomass to fuels and chemicals. Instead of using microorganisms to make alcohols or biogas, my group uses heat in an oxygen-limited environment to promote the pyrolysis of biomass to create a gas that is rich in oxygenated organic molecules and hydrogen. The thermal technologies occur along a spectrum of temperatures ranging from 200°C to about 800°C. These technologies offer simplicity in design and flexibility in application especially for low-moisture feedstocks.

At lower temperatures ranging from 200°C to 400°C, biomass undergoes torrefaction, which is a mild pyrolysis used to produce a solid that can be pelletized to a substitute for coal at existing power plants. Currently, we are assessing the potential of Michigan wood varieties to determine the efficacy of displacing coal with torrefied wood. The results of our energy analysis of torrefaction will be used to determine the optimum location of torrefaction reactors within the bioenergy supply chain. I envision that torrefaction will be paired with compaction at regional biomass processing depots to produce solid fuels that are comparable to coal in terms of combustion energy and storability. In this regard, my group is a part of the State of Michigan's Center of Energy Excellence that will be determining the optimum structure of the supply chain which may include torrefaction as a preprocessing step.

At modest temperatures between 400°C and 600°C biomass pyrolysis can be used to produce a liquid, known as bio-oil, and a solid, known as bio-char. Bio-oil can be used as heating oil or upgraded to liquid transportation fuels. Bio-char can be burned as a coal substitute or land applied as a way to sequester carbon. Pyrolysis provides a means of producing liquid intermediates that can be converted into hydrocarbons at existing petroleum refineries. Our goal with pyrolysis is to produce hydrocarbons, which are energy dense fuels that are predominantly liquids at room temperature and are thus easily stored and transported. As bio-oil is a mixture of hundreds of oxygenated organic compounds, upgrading of this material to reduce the oxygen content is required prior to combustion. This high oxygen content imposes barriers to commercializing pyrolysis technologies because of self reactivity and corrosivity. Many of the compounds in bio-oil can react together to increase the viscosity of the mixture rendering it less pumpable and transportable. Also, acidic compounds present in bio-oil cause the corrosion of carbon steel and aluminum containers and pipes. Therefore, upgrading is needed to improve the quality of bio-oil before it can serve as a drop-in replacement for crude oil at existing petroleum refineries. Currently, my group is working with Prof. Dennis Miller in Chemical Engineering and Material Science and Prof. Ned Jackson in Chemistry to develop new approaches for upgrading bio-oil.

At temperatures above 600°C, biomass is gasified to a mixture containing carbon monoxide and hydrogen.

condenser and collection vessels; char trap

Bio-oil in traps

This mixture can be directly combusted to produce heat and power or catalytically converted to alcohols or diesel fuel. We are working to develop an advanced understanding of gasification using an array of analytical equipment that is available to us at MSU. The knowledge that we gain will allow us to improve gasifier design and promote this technology for adoption by industry.

Thermal biomass conversion comprises a series of technologies that can be used to produce both liquid and solid fuels for the stationary and transportation industries. These fuels are renewable and thus result in very favorable carbon balances. My program is currently working with numerous industrial partners as well as state and federal agencies to better understand the mechanisms controlling the productivity of these technologies and to foster strategies that alleviate the risks associated with commercialization.

The New Undergraduate Bioenergy Concentration

By Christopher M. Saffron

We just finished teaching the first year of our newly established Bioenergy Concentration that has course offerings through four academic departments. Three new courses form the basis of the Bioenergy Concentration which is designed to offer our students expertise in bioenergy production systems. This concentration addresses several components of the systems needed for bioenergy production, including: biomass cultivation, harvesting, preprocessing, transportation, conversion to fuels and fuel end use.

The first course in the concentration's sequence is principally offered through the Department of Crop and Soil Sciences and is titled "Bioenergy Feedstock Production." This course was organized by Professor Kurt Thelen in Crop and Soil Sciences and Dr. Dalia Abbas in Biosystems and Agricultural Engineering. Both agricultural cropping systems and forestry systems were addressed as the State of Michigan has a diverse array of biomass feedstocks.

The second course is titled "Biomass Conversion Engineering" and is jointly offered through Biosystems Engineering and Chemical Engineering and Material Science. Dr. David Hodge and Dr. Wei Liao formulated this course to cover the engineering design of biomass conversion facilities to produce multiple products in a manner analogous to today's existing petroleum refineries. Students learned to design these 'biorefineries' to produce cellulosic ethanol, oilseed biodiesel, Fischer-Tropsch Diesel and advanced fuels from algae. The importance of producing value-added products to enhance the profitability of the biorefinery was also emphasized in this course.

A holistic understanding of bioenergy systems was the goal of our third course, titled "Sustainable Bioenergy Systems," which was taught by Dr. Chris Saffron and Dr. Dalia Abbas. The principles of life-cycle assessment were presented so that students can address the impact of bioenergy production on the environment. Concepts of systems economics were included so that the value of biomass feedstocks was accurately reflected in the overall cost and profitability of biorefineries. During the course, student groups worked on a class project that culminated in an economic and environmental assessment of a bioenergy project of their choosing. Students gained significant experience in preparing both written reports and oral presentations on their selected topics.

Overall, both the students and faculty deem the first offering of these courses to be a success. Enrollment in these courses for the 2010-2011 academic year has already exceeded our expectations. Student enthusiasm was at an unprecedented level and we are very encouraged about their prospects in the job market. We have no doubt that our students will be at the forefront of the next generation's energy production systems.

New Faculty

Dr. Yan "Susie" Liu joined the department as tenure-system assistant professor in September, 2010. Her area of expertise is fungal fermentation and algal production. She has a Ph.D. in Biosystems Engineering from Washington State University. Prior to joining the tenure system, she was a visiting assistant professor in the department. She will focus her research on the production of biofuels and high value products such bio-pharmaceuticals using fungal fermentation processes. Welcome Susie.

Dr. Fei Pan is the newest member of the bioenergy faculty in BAE. He joins the department as an assistant professor in October 2010. Fei's area of expertise is woody biomass supply chain logistics. He has a Ph.D. in Forest Engineering from University of Idaho. Prior to joining BAE, he was a post-doctoral research associate at Humboldt State University. He will be focusing on harvesting, forwarding and transportation issues related to woody biomass from natural forest as well as plantations. Welcome Fei.

Food Safety Training

By Kirk Dolan

As the government and consumers continue to put more emphasis on food safety, the need for proper food safety training increases. To help meet this growing demand, the BAE Department has implemented a series of short courses designed to connect expertise from academia, industry, and government to reach the mutual goal of producing safe, high-quality food for consumers.

The BAE Department is working in collaboration with faculty from Food Science and Human Nutrition to conduct the food safety training. Currently there are three regularly scheduled courses and four on-demand, custom-designed courses. The courses help those involved in food processing and packaging meet USDA and FDA rules and regulations. The courses run for 2 to 10 days depending on the subject matter.

These courses are:

Regularly scheduled courses:

- Better Process Control School (BPCS)
- International Food Safety Training
- International short course in Food Processing, Packaging, and Value-Addition

On-demand custom-designed courses:

- Hazard Analysis and Critical Control Point (HACCP)
- BPCS on-site for food companies
- Food Processing and Technology Course
- Train-the-Trainer Aseptic Systems Short Course

The Better Process Control School (BPCS), meets the U.S. FDA requirement for all processors of thermally treated acidified and low-acid canned foods. The course teaches the basics of food microbiology, sanitation, food chemistry, pH, heating time, heating temperatures, and equipment required to produce safe canned foods. Before 2009, MSU offered the BPCS only once in October. Due to the large increase in the number of local processors contacting the MSU Product Center, Dolan decided to start a second BPCS offered in March. “Local processors” are typically one or two people who desire to sell items such as salad dressing, salsa, chili sauce, etc. at farmer’s markets or in smaller stores.

The two other regularly scheduled courses, International Food Safety Training Course and Food Processing, and International Packaging and Value-addition have up to 50 foreign participants from over 20 countries. Participants generally hold positions in their government’s food safety divisions, academia, the food industry, and regulatory agencies. These courses are held in July and August.

In addition to the regularly scheduled courses, the department works with major food companies conducting on-site training. The Hazard Analysis and Critical Control Point (HACCP) course is offered annually to industry personnel and MSU students. The USDA and FDA require all domestic and foreign processors of meat, poultry, seafood, and juices to have written and implemented HACCP plans for their factories. These plans must specify the pre-requisite sanitation programs and critical control points (such as pH, minimum heating time, or minimum temperature) that must be followed. MSU has prepared numerous industry personnel and students entering the food industry to write and use HACCP.

Dolan and his colleagues have taught on-site courses to Post Foods, Abbott Labs, and Nestle Gerber. Over 50 companies have sent their employees for training at BPCS. The Food Processing and Technology Course is a five-day session used to train Michigan Department of Agriculture inspectors, sponsored by International Food Protection Training Institute (IFPTI) and FDA.

The MSU Train-the-Trainer Aseptic Systems Short Course brings together instructors from the university, government and industry. Led by Dr. Ozadali (Nestle Gerber and Adjunct faculty in BE), Dr. Wiese (Nestle Petcare, St. Louis), and Lyle Clem (Consultant for Hygienic Process Design) the course was taught on-site at USDA regional office in Omaha, Nebraska in June 2010. The Aseptic Systems Course was groundbreaking and historical, because it was the first organized aseptic train-the-trainer program in the USDA. It was the only aseptic course where all three groups—academia, government, and industry—had such collaboration for integrated training.

With the government putting increased emphasis on food safety and the increased level of federal funding (IFTPI has obtained $8 million in federal funding for food safety training), we expect the need for these courses to increase. The BAE department intends to increase the visibility of MSU in food safety training with FDA, USDA, food companies, and local processors.

BE-Biomedical Engineering Program

By Evangelyn C. Alocilja

The Biomedical Engineering concentration under the Biosystems Engineering (BE) program at Michigan State University prepares students to integrate various disciplines towards the early diagnosis and potential elimination of diseases. While they take classes in broader areas of biology, chemistry, and engineering, BE-Biomed students specialize in medical diagnostics. In the long-term, the BE-Biomed concentration will include classroom education, international and local internships, and study abroad to train and develop students with a global perspective on diseases and their diagnosis. The internships and study abroad programs will supplement the student's education through direct observation of medical related events.

The ultimate aim of the program is to equip graduates for their careers in medicine, pharmaceuticals, and medical devices. In these areas, we hope that BE-Biomed graduates would be able to effectively diagnose diseases (medicine), understand the function of reagents in diagnostic assays (pharmaceuticals), and contribute to the efficient design of diagnostic tools (medical devices). As professionals in these fields, they can impact society through controlling and eradicating infectious diseases, improving quality of life, and saving lives.

We offered our first BE-Biomed course in spring 2009; this course is to be offered every spring semester thereafter. In this course, students are exposed to the principles, concepts, and designs of medical diagnostic and biosensor devices, biological and chemical analytes, sample matrices, biological receptors, immobilization techniques, nano-fabrication and assembly, nanomaterial synthesis, transduction mechanisms, and signal processing. Diagnostic devices, particularly biosensors, are typically designed to enable high throughput and rapid results at the field and personal level. One good example of a user-friendly biosensor is a glucose meter that is used by people who monitor regularly their glucose levels.

The future of BE-biomedical engineering is exciting. We look forward to moving this field in unique and exciting ways to a level that is world-class and world-known, consistent with MSU's goals and missions.

BAE Distinguished Lecture Series

Professor Andy Ward, Food, Agricultural and Biological Engineering at The Ohio State University, presented a seminar last fall entitled: Channel-Forming Discharges, Dynamic Equilibrium and Why Watershed Changes Cause Channel Systems to Fail. In is discussion Ward, stressed the need to answer three key questions: Why is a stream located where it is? Why are streams crooked? and Why do streams vary in depth, width and sinuosity?

Answering these questions, he says, enables us to develop technologies and practices to protect, enhance and sustain stream ecosystems. Streams are constantly changing and trying to create dynamic equilibrium. Natural streams have main channels that carry water and sediment discharges, as predicted by the channel-forming discharge, and are connected to an active floodplain. Watershed or channel modification activities that increase flow velocity, the magnitude and frequency of high discharges, or alter the supply and/or transport of sediment often result in down-cutting and/or widening of the main channel. Connectivity to the floodplain is reduced and failure often occurs. This seminar will provide an overview of stream and watershed factors and processes that are a key to understanding and sustaining dynamic equilibrium.

Professor Ward has 28 years of international experience in watershed hydrology, stream geomorphology, reservoir sedimentation, water quality and the development and implementation of techniques to prevent or control adverse impacts of land use changes or water resources and streams.

Survey Finds BAE Undergraduates Benefit from Research Participation

By Dawn Reinhold

A growing number of undergraduates are participating and learning from research in the Biosystems and Agricultural Engineering Department.

Current and recent undergraduate researchers were asked to complete a short informal survey on their research experiences within the Biosystems and Agricultural Engineering Department. Approximately 76% of respondents were enrolled as Biosystems Engineering students, while the remaining students were from science departments, including microbiology, chemistry, and biochemistry.

Biosystems Engineering students were concentrating in all four areas of our program, including bioenergy, biomedical, ecosystem, and food engineering. Most BAE undergraduate researchers have participated in research for more than 1 year, working for a variety of professors on a diverse range of projects. Undergraduate research projects focused on anaerobic digestion, wastewater treatment, best management practices for stormwater, thermal inactivation of Salmonella, anthocyanins concentrations in cherry pomace, botanical insecticides, algal biofuels and many more. Jason Smith (BE senior) credits undergraduate research with "[gaining] a deeper understanding of [his] area of study and a practical knowledge of important issues faced by researchers and the industries we support."

Other students credit undergraduate researchers with experience, communication skills, problem solving, and success in applying for graduate schools, industrial jobs, and a National Science Foundation Fellowship. As part of their undergraduate research experiences, over 80% of students have presented to their research groups, 45% to prospective BE students, 63% at the University Undergraduate Arts and Research Forum, and 35% at a professional society meeting.

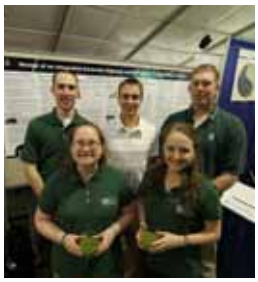
Chinese Students Participate in Summer Internship

Pictured (l-r) Dongdong Li, Lijiang Wu, Beipei Tao, Fangxia Chen, Si Nian, Guzanuer Aisikaer

Six undergraduate students from Zhejiang University (ZJU), China, participated in a 5-week summer internship program at MSU this past summer, as a part of the 3+1+x program established between the College of Agriculture & Natural Resources at MSU and College of Biosystems Engineering and Food Science at ZJU. According to the 3+1+x agreement, these students will study at their home institute ZJU for the first three years and then come here to take senior-level courses in the Department of Biosystems and Agricultural Engineering (BAE). After meeting the B.S. degree requirements by ZJU, the students will be granted a bachelor degree by ZJU and continue on their M.S. degree at BAE. Students intending to attend the 3+1+x program will also have a summer internship opportunity at MSU to gain research and social experiences by working in different labs at BAE and interacting with MSU students and faculty.

This summer, these six students worked in the research groups of Bioenergy and Food quality, Safety and Biosecurity, and they also enjoyed the tours to Mackinaw Island and Greenfield Village during the weekends.

Biosystems Engineering Students Win National Recognition



A team of MSU senior Biosystems Engineering students won honorable mention in a nationwide competition sponsored by the U.S. Environmental Protection Agency to promote sustainable solutions to pressing needs.

The students designed and evaluated an anaerobic digester system coupled to a wetland area to cost-effectively treat dairy waste and stormwater and generate biogas for energy in the bargain.

The resulting system could cut pollution from waste treatment and save on energy costs for the Kellogg Biological Station dairy farm, the students' client for the project.

Students working on the project were: Shannon Henderson, Louis Faivor, Patrick Triscari and Joseph Ahlquist, advised by Biosystems and Agricultural Engineering Assistant Professor Dawn Reinhold.

Koryto Wins Tau Beta Pi Scholarship

The Fellowship Board of Tau Beta Pi, an engineering honor society, selected Kevin Koryto to receive a GEICO Scholarship, sponsored by GEICO Insurance. This award is for Koryto's undergraduate study during the 2010-11 academic year at MSU. All Tau Beta Pi Scholarships are awarded on the competitive criteria of high scholarship, campus leadership and service, and promise of future contributions to the engineering profession.

Student Awards

Undergraduate Scholarships 2010

F.W. Bakker-Arkema Endowed Scholarship
Lara Ejups

A.W. Farrall Scholarship
Ellen Bornhorst
Kevin Koryto

Clarence & Thelma Hansen Scholarship
Bridget Bednark
Michael Schierbeek

Howard & Esther McColly Scholarship
Alexa Jones

George & Betty Merva Scholarship
Shannon Henderson

Biosystems Engineering Outstanding Undergraduate Researcher Scholarship
James MacLellan

Graduate Awards 2010

BAE Endowed Fellowship
Haiyan Cen

Merle & Catherine Esmay Scholarship
Irwin R. Donis-Gonzalez

Bill & Rita Stout Scholarship
Edith Torres-Chavolla

2010 University Undergraduate Research and Arts Forum

Two BE undergraduate students won first place awards in their respective categories at the 2010 University Undergraduate Research and Arts Forum. Jessica Emery took first place in the Health, Food and Wellness category with her project, "Thermal Inactivation of Salmonella in ground Meat Products." Hanna Miller took first place in the Engineering Group 1 Category with her project, "Comparison of Electrically Active Polyanline Magnetic Nanoparticles to Commercially Available Beads for Concentration of Bacteria from Food."

Emery and Miller were among 535 undergraduate students participating in the forum. They each received a $100 award.

This is the fifth year in a row that BE students have won first place in one or more categories at the UURAF.

Integrated Anaerobic Digester and Treatment Wetlands for Pasture Based Dairy Farms

Team members: (Pictured l-r) Louis Faivor, (St. Johns, MI), Joe Ahlquist, (Troy, MI), Patrick Triscari, Farmington Hills, MI

Sponsor/Mentor: Dawn Reinhold, MSU BAE

Academic Advisors: Wei Liao, MSU BAE

Industry Advisors: Michelle Crook, Michigan Dept. of Agriculture; Chad Ducey, e-biofuels; Dave Prouty, Heat Transfer International

The objective of this project is to utilize mathematical models to develop and optimize a preliminary engineering design that produces renewable energy while also biologically treating waste. This project focuses on the design of an anaerobic digester coupled with a treatment wetland for small dairies using the Kellogg Biological Station (KBS) as a case study.

Because KBS is a pasture based dairy farm, manure from its 100 lactating cows is only available in significant quantities during winter months, when the cows are housed inside. Results predict that sufficient manure is not available for the production of large amounts of gas for electricity or heat generation. However, by adding wetland plant material, such as duckweed grown in the treatment wetland, to the digester during the summer months, this project could be economically feasible.

Designing a comprehensive waste management system for any small farm requires a substantial capital investment. Additional and sometimes nontraditional methods will be needed to achieve sustainability.

Determining Restriction Potential & Engineering Alternatives for Carcinogenic Substances

Team Members: (Pictured l-r) Brandon Coles, (Novi, MI), Dara Phillips, (Southfield, MI) and Yvette Holly, (St. Clair Shores, MI)

Sponsor/Mentor: Christopher L. Sprague, Abbott

Academic Advisors: Evangelyn Alocilja, MSU BAE, James Pestka, MSU Food Science & Human Nutrition

Industry Advisors: Steve Steffes, Perrigo; Paul J. Eisele, Private Consultant; Rebecca Leaper, Abbott

Under the growing concern for global health safety and environmental sustainability, various regulatory agencies, such as the U.S. Environmental Protection Agency (EPA) and European Chemicals Agency (ECHA), are seeking to restrict the use of substances shown to be hazardous to humans and/or the environment. Inconsistencies in the restriction criteria exist between agencies and the lists are frequently updated as new information is found. Abbott Labs is seeking a standardized method of predicting restriction potential in order to determine whether the substances of concern used in their manufacturing of products or packaging are likely to become restricted and a procedure to evaluate alternatives.

In order to accomplish this goal, a flow chart model was developed to determine restriction probability of carcinogenic compounds of concern to Abbott. By integrating toxicological research on currently restricted substances from the International Agency for Research on Cancer (IARC) and U.S. regulatory agencies, the model assesses restriction probability on a global and qualitative scale. Carcinogens of concern to Abbott, deemed to yield the highest restriction probability, were quantitatively assessed in order to recommend sustainable alternatives.

Abbott seeks to be proactive about assessing the increase in global restriction of hazardous chemicals. Thus, the developed prediction model will serve as a foundational method for addressing such regulatory concerns and provide the means to predict chemicals that may be restricted in the future.

Nestle Aseptic Filler

Team Members: (Pictured l-r) Jonathan Biron, (Brimley, MI), Gerald Hessell, (New Haven, MI), Matthew Stinson, (Kalamazoo, MI)

Sponsor/Mentor: Ferhan Ozadali, Nestlé Nutrition R&D

Academic Advisors: Kirk Dolan, MSU Food Science & Human Nutrition & MSU BAE

Industry Advisors: Cassaundra Edwards, Kraft Foods/Oscar Mayer R & D; Scott Millsap, JBT Food Tech; Mike Potts, General Mills

The Nestle-Gerber pilot-plant requires an efficient sterile, or aseptic, process for filling a diverse array of products into varying sized and shaped packages for research and development testing. An aseptic filling environment needs to be designed, constructed, and validated for implementation in the pilot plant.

This design includes four components: chambers, sterilization system, product filler, and controls. Three connected chambers are used to isolate and sterilize packages for filling. Next, sterilization is performed using Vaporized Hydrogen Peroxide (VHP). The filler loads packages precisely with a predetermined volume. An electronic interface controls and monitors temperature, relative humidity, hydrogen peroxide concentration, air flow rates, and internal chamber pressure.

Theoretical results are simulated using computational fluid dynamics modeling software. With this model, a baseline VHP cycle time is established to optimize the sterilization process and assure sufficient surface contact. The goal is to prove a 4-log reduction of microbial pathogens. Economic analysis is used to optimize the design for long-term operations.

Pilot Bioengineering for Stabilization of the Red Cedar River

Team members: (Pictured l-r) Brad Wardynski, (Canton, MI) Natalie Bouchard, (Trenton, MI) Johanna Kinsler, (Lake Angelus, MI), Nancy Maschke, (Bad Axe, MI)

Sponsor/Mentors: Ruth Kline-Robach, Steve Miller, MSU-WATER Initiative

Academic Advisor: Dawn Reinhold, MSU BAE

Industry Advisors: Jeff Friedle, LSG Engineers & Surveyors; Valerie Novaes, Tetra Tech; Larry Stephens, Stephens Consulting Services, P.C.

The Red Cedar River, on Michigan State University's campus, presents signs of riverbank erosion. Widening of the stream channel and bank undercutting has exposed infrastructure and damaged riparian habitat along the river corridor. The MSU-WATER Initiative requested a sustainable stabilization plan that enhances biodiversity while being resistant and resilient to flood events, cost effective, and aesthetically appealing.

In order to model the stability of the system, geomorphologic, geotechnical, and hydraulic analyses were performed. Tributary discharges and dimensions were compared, and the watershed was found to be in a state of quasi-equilibrium. Site-specific hydraulic analyses were then performed using HEC-RAS to predict key design parameters of shear stress, velocity, and water surface elevation.

A vegetated geotextile retaining wall will stabilize the steep banks and conserve existing trees. A combination of live willow cuttings, vegetated buffer strips, and "terracing" with live branches will reinforce soil and reduce sediment transport. The design provides a sustainable solution by combining mechanical stabilization with biological resilience.

Further recommendations to reestablish floodplain connectivity include the expansion of riparian buffer strips and reshaping of channel geomorphology.

Senior Design Showcase

Sustainable Urban Detroit Goat Farm

Team: (Pictured l-r) Michael Wandersee, (Temperance, MI) Julio Martinez, (San Antonio, TX) , Andrew Sommerlot, (Lansing, MI)

Sponsor/Mentors: Rebecca Busk, Erin Sutton Urban Agricultural Initiatives of Detroit

Academic Advisor: Dana Kirk, MSU BAE

Industry Advisors: Steve Shine, Michigan Department of Agriculture; Saied Mostaghimi, Virginia Technical University; Paula Steiner and Juanita McCann, USDA-NRCS

With the plummeting population and increase of inexpensive unused land, urban agriculture has become a business opportunity within many cities including Detroit. Goat farming provides unique opportunities for the production of meat while providing employment and educational facilities in an urban environment. However, goat farming produces problems such as managing waste and creating a sustainable cash flow. Project objectives are to create a computer model that optimizes energy inputs with meat outputs, waste management, land availability, and employment. The project constraints require a minimum of forty goats to optimize meat production with useable land that contains both pasture and feeding space within a building.

The model includes multiple Excel routines to enable the optimization of a desired inputs. One optimization option matches the number of goats desired to housing and feeding needs, expected profit, and land area required. A second option requires the amount of land available to determine the herd size, feed requirements, and net profit. The third inputs a desired profit margin and outputs the number of goats and land requirements.

Included in the model outputs are the amount of waste produced, number of goats, and the heating and space requirements. A plan to compost the waste into a desirable product (fertilizer) is also provided. To substantially reduce the odors, gas emissions from the compost will flow through a biofilter.

Results from the model found that over forty goats are required for an urban farm to be financially sustainable. Donations or grants are required to keep the business viable. However, the model contains many assumptions that should be further explored prior to construction of an urban goat farm.

Design for Improving Air Exchange in Potato Storage

Team: (Pictured l-r) Amber Jablonski, (Macomb, MI), Jason McIntyre, (Dowagiac, MI), Andrew Johnson, (Lakeview, MI)

Sponsor/Mentors: Todd Forbush, Techmark, Inc.

Academic Advisor: Bradley Marks and Fred Bakker-Arkema MSU BAE

Industry Advisors: Kevin Evans, PepsiCo; David A. Hamilton, MI Dept. of Natural Resources and Environment; Steve Richey, Kellogg

Potatoes are cooled and stored in bulk storage for 1 to 12 months after harvesting and before being processed into potato chips. Respiration occurs during storage; the sugar in the potatoes combines with oxygen in the air to produce carbon dioxide, water, and heat.

Glucose + Oxygen ➔ Carbon Dioxide + Water + Heat

Proper air exchange removes carbon dioxide and heat while retaining the potato moisture content, which provides a higher yield when sold. Techmark, Inc., advises farmers on ventilation techniques and is therefore, interested in how variable frequency drive fans impact potato quality and electrical consumption requirements. The objective of this project is to use an air, heat, and mass transfer computer model to design an improved fan setting strategy. Computational Fluid Dynamic modeling is used to show how pressure differentials through the potato pile relate to the air flow, which corresponds to the respiration of the crop.

The project design uses potato characteristics and air properties, such as temperature and humidity, to solve heat and mass transfer equations. Different fan speeds are simulated to determine the most efficient strategy. Use of this model leads to improved air exchange settings, which result in reduced energy costs and improved crop yields.

Students Learn About Bioenergy in Sweden

By David Hodge

Energy is an enormously important area of societal significance that will only grow in importance as global energy consumption increases. As conventional energy resources become increasingly scarce, new technologies are required to meet growing energy demand, and now more than ever engineers are needed with skill sets that are able to address these current, real-world challenges.

The Bioenergy Sweden program offered by BAE in the summer of 2010 was organized and led by Drs. Ajit Srivastava and David Hodge with the help of Dr. Luke Reese, and was developed to give students a global perspective on the development of energy and especially bioenergy technologies and their deployment and use with Sweden as the case study. During this program, 7 MSU engineering students studied both technologies and policies that allow Sweden, through intensive deployment of bioenergy technologies and energy integration, to be able to obtain more than 40% of their delivered energy (the highest in the industrialized world) from biomass while decreasing petroleum consumption by more than 30% in the last 35 years. The U.S., by comparison, has increased petroleum use by more than one-third, of which the majority is now imported. This means that now agriculture/silviculture and land use patterns and management are becoming increasingly important in defining the energy picture as opposed to geology.

The specific case of Sweden was used as an example to compare the development of energy use, infrastructure, and technology with the trajectories other countries have taken. This involved grappling with issues involving the relationship between biomass resources, their potential, quality, and sustainability on the resource side in combination with technology implementation including industry's role in commercialization, government involvement in policy and market development, and in particular research and technology development. Students learned both traditionally through classroom lectures and through group projects on case studies and plant visits the technologies and processes required for the conversion and/or upgrading of biomass raw materials to fuels, heat, and power. This involved visits with the companies engaged in the various aspects of bioenergy including its production, collection, conversion, and distribution and lectures from researchers involved in developing new technologies for biomass conversion at the Royal Institute of Technology (KTH),

MSU undergraduate engineering students (L to R) Eric Sundberg (ME), Matt Pawlicki (ME), Madeline Moellering (CEE), Katie Balaze (BAE), Mike Skierski (ME), Matt Cummins (MS), and Dylan Comer (BAE) spent 3 weeks in Sweden this summer learning about bioenergy technologies.

While the trip was a very busy 3 weeks packed with activities, everyone seemed satisfied that they were able to see so much of the country and experience such a diversity of landscapes. In addition to studying bioenergy firsthand, the students helped set the world record for the world's longest toga-themed conga line in Stockholm, climb a snow-covered peak a hundred miles north of the Arctic Circle under the midnight sun, and dodge reindeer herds and a solitary moose on the drive through Swedish Lapland.

BAE Researchers Receive part of EPA Grants Focusing on Restoring Great Lakes Waterways

A group of Michigan State University researchers have been awarded more than $3 million in federal grants focusing on restoring Great Lakes waterways. U.S. Sen. Debbie Stabenow joined MSU President Lou Anna K. Simon and Cameron Davis, a senior advisor with the EPA, on campus to announce the initiative.

BAE researcher, Dr. Nejadhashemi is one of the seven PIs who received the grant. The project title is "Developing Total Maximum Daily Load Implementation Plan for Coon Creek Michigan." Maximum limits for E. coli and dissolved oxygen for these waterways were established in 2006. This project will improve water quality by developing an implementation plan to reach those limits in the waterway under alternative scenarios.

The project Co-PIs are Mr. Steve Miller from the BAE Department and Dr. Abdul Abdulkadri from Department of Agricultural, Food, and Resource Economics. Mr. Sean Woznicki is a graduate student working on the project.

Top: Senator Debbie Stabenow announcing the grants. Bottom: BAE researcher Amirpouyan Nejadhashemi

Alumni Awards

MSU College of Engineering BAE 2010 Distinguished Alumni Award Dan Poland

Dan Poland is the vice president of Manufacturing at H.J. Heinz Company. He joined Heinz in 1999 as the factory manager at Muscatine, Iowa. He was promoted to general manager of PPIC/Operations in 2002; director, Foodservice Operations in 2003; vice president, Dry Manufacturing in 2005; and vice president, Manufacturing in 2006. Dan is responsible for 25 manufacturing facilities across the US and Canada, representing $1.0 billion of costs of goods sold and 7,000 team members.

Prior to joining Heinz, Dan was employed by Nestle and Gerber in various roles, including R&D, Engineering, and Operations Management.

Dan earned a B.S. in Agricultural Engineering from Michigan State University and his MBA in Business/Finance from the University of Iowa.

Dan, his wife and two children reside in Pittsburgh.

BAE 2010 Distinguished Alumni Award Dorota Haman

Dorota Z. Haman is a professor and chair of the Department of Agricultural and Biological Engineering at the University of Florida in Gainesville, Florida. She received a B.S. degree in Mathematics from the University of Warsaw in Poland, then went on to receive her M.S. and Ph.D. degrees in Agricultural Engineering from Michigan State University. She has been at the University of Florida since 1985.

She has had statewide responsibilities as coordinator of irrigation and water conservation programs. She was also extension program leader for water conservation in Florida, and a recipient of the Governor's prize for energy conservation. Her research projects are focused on water conservation and implementation of water efficient technologies.

Her recent research focused on efficient, water conserving production systems in ornamental container nurseries and lead to a patent for water harvesting devices in plant production. She has extensive international experience that includes teaching irrigation courses and involvement in analyzing the Santa Elena Peninsula irrigation system in Ecuador and Wargal watershed near Hyderabad in India. She has been an active member of ASABE, EWRI and several other professional organizations. She is a life member of USCID, a member of the USCID Board of Directors, and a past representative to the ICID Working Group on Capacity Building, Training and Education.

BAE 2010 Outstanding Alumni Award Nick Friant

Nick joined Cargill in 2002 where he serves as the grain handling coordinator for Cargill's AgHorizons and Grain and Oilseed Supply Chain – North America business units. In January 2008, Nick's role was expanded to include leading Cargill's World Wide Grain Operations Grain Quality Center of Expertise. The key responsibilities of his position are to provide technical and regulatory assistance to Operations and Merchandising personnel on a wide range of issues related to grain quality, handling, and inventory control.

Nick attended Michigan State University where he graduated with a B.S. in 2000 and a M.S. in 2002, both in Biosystems and Agricultural Engineering. His main area of study was grain quality, handling, storage, and drying. The focus of his Master's Degree was the development of an equation to model ear corn drying.

He is a member of The American Society of Agricultural and Biological Engineers, GEAPS, the NFGA Grain Grades and Weights & Agroterrorism/Facility Security Committees, the NAEGA Grain Grades and Inspection Committee, and recently completed a three-year term on the USDA GIPSA Grain Inspection Advisory Committee (Chairperson during the third year).

Nick is married to Stephanie (MSU '98) with one son (Mason), and another child on the way. He enjoys hockey, time working in the yard, and vegetable gardening.

CANR 2010 Oustanding Alumnus Award Shelley Crawford

Shelley Crawford received her B.S. ('06) from MSU Department of Biosystems and Agricultural Engineering (BAE) with a specialization in food engineering. Since her graduation, she has quickly established herself as a rising star at the Kellogg Company, becoming a key team member for the design, installation and startup of a new Morning Foods manufacturing plant. In addition, she has been the process engineer for the successful launch of more than 20 new cereal innovations. In her short time at Kellogg, she has been nominated for a creative inclusion award and received honorable mentions for two Kellogg RQT/GE Formal Awards in teamwork and problem solving.

Ms. Crawford has also continued her involvement with MSU, serving as a speaker in biosystems engineering and food science classes and clubs, and as a volunteer helping students with their senior design projects. From 2007 to 2009, she served as the Great Lakes section chair of the Institute of Food Technologists.

Shelley has also served as a presenter for the MSU chapter of the Society for Women Engineers (SWE) and serves as the collegiate advisor for the Western Michigan University chapter of SWE.

In addition, Shelly has volunteered in her community with Habitat for Humanity and the Girl Scouts, as a mentor and coach to youth and students at Western Michigan University, and in other service initiatives.

Tom Hefferan "New Faces Of Engineering"

Tom Hefferan, MSU Alumnus, was selected as a 2010 "New Faces of Engineering" by the National Engineer's Week Foundation. Tom and four other young engineers were featured in a full-page salute to the 2010 New Faces that was published across the country in USA Today.

Tom was also named Engineer of the Year at the Lilly Plant where he is employed. He was recognized for wastewater reduction and equipment reliability improvements that he made to the CIP process in 2009.

Each year the National Engineers Week Foundation asks its member to nominate colleagues 30 years of age and younger for consideration as one of the New Faces of Engineering. ASABE's nominees were chosen from 16 individuals who were a part of the society's own campaign, "New Faces of ASABE." Both the national campaign and ASABE's program seek to honor young engineers, and in doing so call public attention to the diversity and scope of their professional accomplishments, especially as they impact the pressing issues of the day.

Alumni Gold Breakfast

Members of the Alumni Gold Club met on June 4 to celebrate 50 years or more of being a "Spartan." Those attending this year's breakfast were: Ken Bittell (special guest, MSU 1969) BAE Chair Ajit Srivastava, John Koepele, (MSU 1959), Dale Marshall (MSU 1960) and George Keller (MSU 1960).

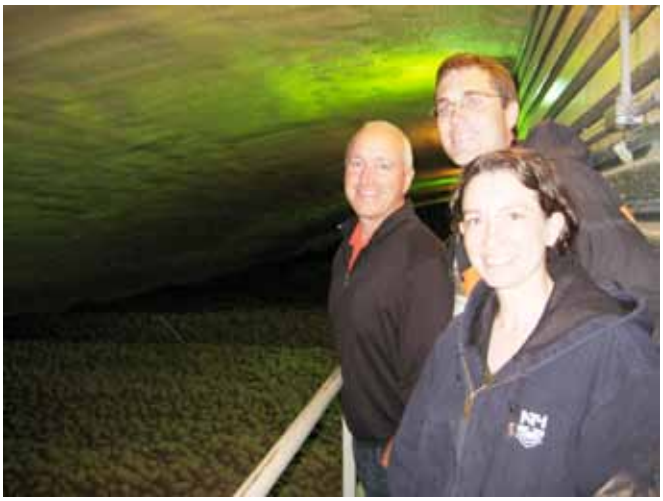
MSU Alumni Recognized with Named Professorship

Over $2 million was raised in the name of Kamyar Haghighi to create an endowment for a Named Professorship at Purdue University's College of Engineering. The Kamyar Haghighi Head of Engineering Education was established to honor Dr. Haghighi's contributions to Engineering Education. Kamyar received his M.S. in 1975 and Ph. D. in 1979 in Agricultural Engineering from MSU.

From a recent graduate...

I am working with the QA Department and my project involves hygienic design of equipment. I will be working with the sanitation shift to determine the gaps in the current cleaning process and the machines that are difficult to clean. I find that my time spent in Fluids and Solids classes have given me the ability to identify non-hygienically engineered equipment more easily. I can also apply my learning from your classes to this project to fix those gaps in the hygienic design. – Kyle Anderson

Year in Review



Potato Storage Quonset - left to right, Keith Tinsey, MI ASABE Chair Elect, Tim Krause, MI ASABE Chair, Paula Steiner, MI ASABE Past Chair.

Fall 2009 Meeting Fresh Farm Solutions

The Fall meeting was held on October 2, 2009. The meeting started with a tour of Fresh Farm Solutions in White Pigeon, Michigan. Fresh Farm Solutions is a potato processor and distributor.

The general meeting was held in their conference room after the tour. Approximately 15 members attended the meeting and orders of business included election of officers, networking, and awards.

2010 ASABE Summer Social and Networking Event

This year's ASABE Summer Social and Networking Event was held at Oldmobile Park in Lansing, MI on May 25, 2010. The Lansing Lugnuts hosted their interstate rival and Detroit Tigers affiliate, the West Michigan White Caps. Approximately 10 people including ASABE members, friends, and family attended the event. Our group went on Tuesday which is Dollar Dog Night and although there was much talk about entering the hot dog eating contest nobody actually participated. Maybe next year…

ASABE members listed in the photo from left to right, top to bottom, Paula Steiner, Josh Brood, Corin Malzahn, Ryan Bayne, and Dana Kirk. Other members not in photo include Tim Krause and Sylvia Schounauer.

Get Involved!

For more information about the Michigan Section of ASABE please contact Tim Krause, MI Section Chair at tckrause@nthconsultants.com.

Biological Engineers (ASABE)

Upcoming Events:

ESD/ASABE Urban Agriculture Summit

Thursday, October 28, 2010
Rock Financial Showplace, Novi
8:00 a.m. to 5:30 p.m.

Urban Farming is being touted as Detroit's next emerging industry. While there are many efforts to position this sector as a key player in the city's rebirth, much more needs to be done to fully understand how urban farming can effectively flourish in Detroit.

The Engineering Society of Detroit (ESD) and the American Society of Agricultural and Biological Engineers (ASABE) invite you to a full-day summit to discuss zoning and land use issues; farming concepts; agricultural farming systems including mechanization versus hands-on labor; environmental concerns and financing opportunities including how to start an urban farm.

Cost to attend: $95 for ESD and ASABE members; $125 for non-members or join ESD for $184 and attend for free.

A limited number of tickets for students is available. Visit the ESD webpage to register and for sponsorship and exhibit opportunities (http://ww2.esd.org/EVENTS/2010/2010-10-UrbanFarm.htm).

An ASABE dinner and MI Section Business Meeting will be held in the same location following the summit.

Awards and Recognition - Milestone Anniversaries

Sylvia Schonauer	25 years
Mary Maley	25 years
Tim Harrigan	25 years
David Kendrick	35 years
Dale Marshall	50 years
Bill Johnston	50 years
Jack Schram	62 years
Floyd Reuter	62 years
Cernyw Kline	62 years
George D. Kreuzkamp	63 years
Clarence Hansen	62 years
Jimmy L. Butt	64 years
Leland E. Morgan	66 years

Congratulations to all of our Section members that are celebrating anniversaries this year!

Finding Yourself in a Sea of Green

MSU Development

"At times I feel the hugeness of the university and its way of life closes down on me and I wonder who I am and where I am going."

A student contributed that pensive line to the 1969 MSU Yearbook. It could have been from the journal of Stephen DeBoer (B.S. '71, M.S. '73, Agricultural Engineering) who as a sophomore that year, like many sophomores in any year, was floundering. As the first in his family to attend college; paying for school through a combination of scholarships and work; and indeed, unsure of who he was or where he was going, he considered "packing it up and leaving."

Then, as often happens, one person took an interest in him. Professor Fred Bakker-Arkema in Agricultural Engineering suggested that Stephen was well suited for a student position in the department. A whole new world opened up. Suddenly, instead of one person in a sea of thousands, Stephen was connected with fellow students and the faculty in a small department. The computer simulations, Dr. Bakker-Arkema involved him in, turned out to be his calling.

"I started working on things that were breakthrough technology," Stephen recalled. "I found my niche and my studies became much more relevant. But without that group in Ag. Engineering, I never would have finished school and went on to the career I've had."

Recently, Stephen, together with his wife Pamela, decided it was the right time to give back to the department that had changed the course of his life, creating the DeBoer Family Scholarship/Fellowship Fund and at the same time joining the Jonathon L. Snyder Donor Society. This endowment will allow the department to identify and offer the same opportunities that existed for Stephen when he was an MSU student.

"I never envisioned myself where I am now," Stephen said. "But MSU opened a lot of doors for me. I feel very blessed in that and I am blessed to have the opportunity to give back."

After completing both his B.S. and M.S., and starting a doctorate at MSU, Stephen left for an assignment at the W.K. Kellogg Company. He never came back to complete the doctorate, but he never had cause for regret on the matter. He enjoyed a fulfilling career at Kellogg, first in food technology, later engineering and then as the vice president of Research and Development. "I loved my work so much," he said. "Anytime I started to get a little bit bored, something new came up."

He had been the very first agricultural engineer ever hired by the company. But, by the time he retired in 2004, there were 60 such specialists, many of them fellow Spartans whom Stephen himself had hired. He ended his long tenure at Kellogg as the vice president of Operations. He credits his successful career back to what he learned at MSU.

For more information on making a gift to the College of Agriculture and Natural Sciences, contact Assistant Director of Development Jeremy Wittrock at (517) 353-4749.

Surbrook Honored

Biosystems and Agricultural Engineering Professor Truman Surbrook was recently honored by the Institute of Agricultural Technology with an Honorary Certificate. Truman is 40-year teaching veteran in the department specializing electrical systems and alternative energy. He has been instrumental in developing the Electrical Technology Certificate Program at MSU.

Passings...

John Dixon, died April 6. He was living in Idaho. John received his Ph.D. degree from MSU in 1979.

Sam Parsons, died on March 24. Sam received his Ph.D. degree from MSU in 1979.

Robert Kleis, died December 17, 2009. Kleis received his B.S., M.S. and Ph.D. at MSU in 1951 and 1957. He went on to serve as head of the Agricultural Engineering Department at the University of Massachusetts and the University of Nebraska.

Gift and Order Form

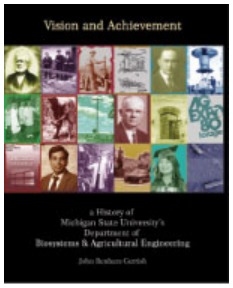
A gift to BAE is an investment in future generations, in the environment, in food safety, and in the planet.

In support of the MSU Department of Biosystems and Agricultural Engineering, I am enclosing $_____.
I designate this gift to be used for:

	Biosystems and Agricultural Engineering Discretionary Fund A104		Deborah and Timothy Spehar Endowed Scholarship Fund A10428
	Agricultural Engineering Laboratory Enhancement Endowment Fund A1047		Electrical Technology for Agriculture Fund A10402
	Agricultural Engineering Endowed Fellowship Fund A1043		F.W. Bakker-Arkema Endowed Scholarship Fund in Biosystems Engineering A10416
	Alfred and Mary Murray Endowed Scholarship Fund A10430		Galen K. Brown Endowment Fund A10424
	Arthur W. Farrall Endowed Scholarship Fund A10404		George E. and Betty L. Merva Endowed Scholarship Fund A10412
	Bill and Rita Stout Expendable Scholarship Fund A10422		Howard F. and Esther L. McColly Endowed Scholarship Fund A10411
	Biosystems Engineering Fund A10413		Katherine and Merle L. Esmay Endowed Fellowship Fund A10423
	Biosystems and Agricultural Engineering Centennial Endowment Fund A10426		Robert Gustafson Endowed Scholarship Fund A10427
	Clarence and Thelma Hansen Endowed Scholarship Fund A10401		Walter M. and Lillie M. Carleton Endowed Scholarship Fund A10429

Last Name _____ First Name _____ MI _____
Address _____ City _____ State _____ Zip _____
E-mail _____ Phone _____
o Alumni – Degree/Year _____ o Friend o Parent o Faculty/Staff o Business/Corporation

Make checks payable to: Michigan State University
Mail gift check to: Michigan State University Development Office
300 Spartan Way
East Lansing, MI 48824-1005



"Vision and Achievement" by John Gerrish
A History of MSU's Department of Biosystems and Agricultural Engineering
$125 donation

"Spring" Watercolor 13" x 20"
$250 donation

I would like to order the following:

	Donation	# of copies	Total
History Book	$125		
"Spring" 13" x 20" watercolor of Farrall Hall	$250		
"Morning Shadows" 11" x 14" watercolor of Farrall Hall	$100		

"Morning Shadows" Watercolor 11" x 14"
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