## News from the Department Chair – Troy Runge

Welcome to Biological Systems Engineering Fall 2019 Newsletter from Madison, WI. As of this writing, we just completed our traditional fall celebration where the students, staff and faculty come together in a feast to say thanks for all our blessings and enjoy a large meal prior to the finals push. With over 150 people attending it was similar to a traditional Thanksgiving meal, with lots of good food, lot of good cheer, and even a "kids table" –though these are college "kids." This event, funded by the faculty and staff, is a small way to let the students know that we care for their well-being and thank them for being part of the BSE family.
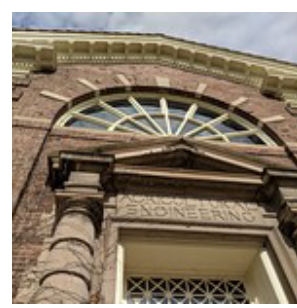
This BSE tradition of a Thanksgiving meal was shared this year with many fresh faces. We brought in more than 60 new freshmen and transfers into the department, which has become the new normal for our growing department. Many of the students are recruited by our alumni, with many of stories a family member or a neighbor recommending BSE as a great place to start a career. Thank-you and please "keep them coming." We also have several new faculty and staff that started in August. Dr. Paul Stoy working in the natural resources area has joined our faculty in August, coming from his faculty position in Montana State. Dr. Matt Digman working in machinery systems has also joined our faculty, coming from his faculty position in UW River Falls. Additionally, Amanda Harguth has joined our academic staff working on the Agrability project improving the lives with farmers with physical disabilities.

With the new faces comes lots of new energy and ideas. We are developing several new classes and have even started a robotics team to compete at the ASABE international meeting. We have continued to improving our teaching spaces completing several upgrades to our lab and shop, now having several places for students to participate in active learning for design or lab classes. Thank you to all that have made donations to our BSE fund to help drive these important improvements to date to improve our capabilities. We still have many more student needs, so if able please consider us when making charitable donations (info on the back page).

With six members in the Digital Agriculture Research Lab, our lab endeavors utilize Artificial Intelligence (AI) for sustainable agriculture. We currently run three research projects in parallel. One is focusing on high-throughput plant phenotyping using UAV-based hyperspectral imaging. Specifically, we are developing machine learning models for crop yield and quality predictions at the field scale using time series high resolution hyperspectral images acquired by the UAV platform. Another project is targeting on forecasting the crop yield at large scale by using the satellite remote sensing imagery. The third one is about water quality mapping and forecasting using remote sensing and machine learning. For these projects, the research data have been collected and pre-processed. We are now focusing on developing the machine learning, especially deep learning models for these research missions. In the future, we will incorporate the domain knowledge into the data-driven machine learning model to further enhance the model performance. We are also interested in applying the big data and AI techniques to solve other agricultural problems, such as dairy housing design.

BSE Student Update

ASABE Student Chapter

Fall is an exciting and busy time for all UW students, and this held true for the UW-Madison Student Chapter of ASABE. From international meetings to lawnmower clinics, here is a summary of ASABE's activity from this semester:

- Chapter meetings have been quite eventful. Members presented on their internships from this summer and discussed what they learned and shared skills on how to succeed at career fairs. Additionally, Robert Thiboldeaux delivered a presentation on environmental concerns associated with Concentrated Animal Feed Operations.
- Members attended the Fall Wisconsin ASABE Section Meeting in conjunction with the World Dairy Expo.
- Students from the chapter presented to gain funding to start a Robotics team that will be eligible to compete at the ASABE International Meeting.
- Our members participated in a industry tour of ABS Global, a livestock genetics company in Deforest, WI.
- Our October social event was a trip to Wisconsin Scary Land, a haunted house in Waunakee WI.
- On October 24-26th, the chapter held its annual lawn mower clinic fundraiser, where local residents brought in their lawnmowers, snowblowers, and roto-tillers to be winterized. All money raised will be used for members to travel to different conferences and events.
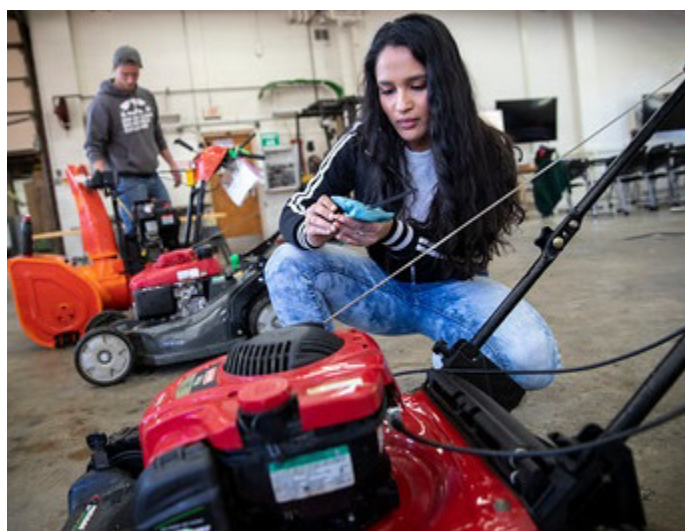

Photo by Michael P. King/UW-Madison CALS

Feel free to like UW-Madison's ASABE chapter on Facebook to stay up to date with all events!

Quarter Scale Tractor Team

The UW Madison ¼ Scale Tractor Team is a student design organization that is tasked with designing, manufacturing, testing, and competing in a ¼ scale tractor for classical pulling as well as maneuverability, durability, ergonomics, and several other events. The team recently held a regional exhibition pull with University of Wisconsin- River Falls, Iowa State University, and the University of Nebraska- Lincoln. In this event the three schools brought just under a dozen tractors in which we held a series of pulls. In addition, the team has held a design review inviting faculty, alumn, as well as several grembers from industry to give input on this year's design. For this year, our design will be similar to last year's model, running a hydraulic drive train with a few tweaks to our front ends and operator station to give it ideal control and a user-friendly interface.

BSE in the News

Photo by Michael P. King/UW-Madison CALS

Reaping the Benefits of Advanced Drone Technology

Adaptation is crucial in an ever-changing world, but adaptation requires ingenuity. BSE's Brian Luck is using advanced technology to keep moving forward. Click here to read more.

Photo by Michael P. King/UW-Madison CALS

Extension Specialist Cheryl Skjolaas on the State of Farm Equipment Safety

Extension Specialist Cheryl Skjolaas speaks on state of farm safety equipment, and how technological advancements can create improvements. Click here for more.

Photo by Michael P. King/UW-Madison CALS

Research Focus: Zhou Zhang and the Digital Agriculture Research Lab

With six members in the Digital Agriculture Research Lab, our lab endeavors utilize Artificial Intelligence (AI) for sustainable agriculture. We currently run three research projects in parallel. One is focusing on high-throughput plant phenotyping using UAV-based hyperspectral imaging. Specifically, we are developing machine learning models for crop yield and quality predictions at the field scale using time series high resolution hyperspectral images acquired by the UAV platform. Another project is targeting on forecasting the crop yield at large scale by using the satellite remote sensing imagery. The third one is about water quality mapping and forecasting using remote sensing and machine learning. For these projects, the research data have been collected and pre-processed. We are now focusing on developing the machine learning, especially deep learning models for these research missions. In the future, we will incorporate the domain knowledge into the data-driven machine learning model to further enhance the model performance. We are also interested in applying the big data and AI techniques to solve other agricultural problems, such as dairy housing design.


Photo by Jennifer Lu, La Crosse Tribune

How the Green New Deal will Impact Wisconsin

The Green New Deal has been dominating headlines and been a hot discussion topic in the world of politics, but what does it mean for Wisconsin farmers? BSE's Rebecca Larson and Horacio Aguirre-Villegas discuss the changes that the Green New Deal would bring to Wisconsin's farming industry. Click here to read about how the Green New Deal will affect Wisconsin farming.

BSE People

New Faculty and Staff
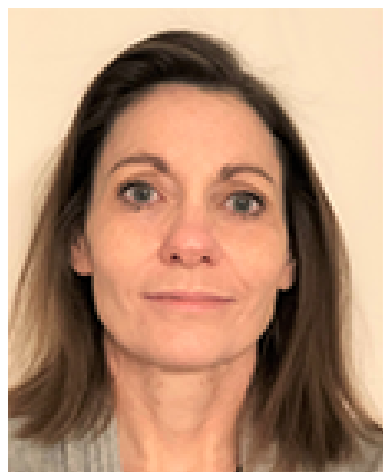
The Department of Biological Systems Engineering is pleased to welcome two new members to our staff: Amanda Harguth to AgrAbility and Julie Garvin to our student services. Additionally, we would like to welcome Paul Stoy and Matthew Digman to our faculty. Harguth's work in AgrAbility will deal with outreach for the mission of AgrAbility, which is to provide assistance to farmers and their families living with a farm injury, disability, or limitation. Julie will serve as a vital resource for our Department's graduate students, where she will serve as the main graduate student coordinator. Paul's research will focus on on measuring carbon, water, and energy fluxes from typical crop rotation patterns, while Matt's research will focus on enabling technologies for autonomy and the impact of autonomy on agricultural machine forms.

Recent Retirements
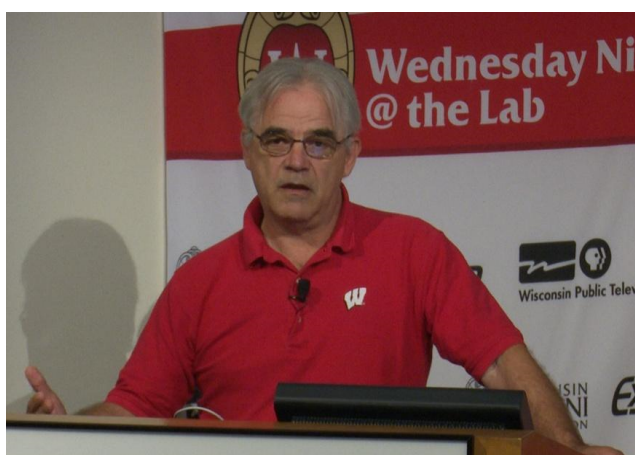
Along with our new incoming members, we would also like to congratulate three members of the Department on their recent retirements: Richard Straub, David Kammel and Paul Thompson. Richard served the department for 40 years, holding the title as both Department Chair and CALS Senior Associate Dean. David had a 36 year tenure with the Department, where he helped to educate county extension agents, rural builders, veterinarians, agricultural professionals, and agricultural producers. Paul, during his 18 years with BSE, performed research that focused on supporting life cycle analysis of greenhouse gas generation from Wisconsin dairy production. These gentlemen have supported the BSE mission throughout their many years of service, and we are extremely grateful for all their contributions to the Department.

BSE Awards

Sundaram Gunasekaran honored with IAEF Lifetime Achievement Award

BSE's Sundaram Gunasekaran has been honored with a Lifetime Achievement Award from the International Association for Engineering and Food (IAEF). Click here to read more.

Rob Anex to Serve on Federal Biomass Advisory Committee

Rob Anex has always had an interest for biofuels, and their effects on markets and industries. Now, he will extend this expertise to the U.S. Departments of Energy and Agriculture as a newly appointed member of the Biomass Research and Development Technical Advisory Committee. Click here to read more.

Thank You To All Donors!

We would like to thank all the donors who have supported the department from October 2018-September 2019. Your support is what keeps the department running, and we are extremely grateful for your donations.

To make a donation to BSE, click here