

# ABEN GOOD THINGS

April 1 to August 15, 2018

## A RECENT SUCCESS

*Dr. Ken Hellevang received the Professional Engineering Institute's Professional Engineer of the Year Award for 2018.*

## PUBLICATIONS

★ S. Sunoj, S.N. Subhashree, S. Dharani, C. Igathinathane., J.G. Franco, R.E. Mallinger, J.R. Prasifka, D. Archer. 2018. Sunflower floral dimension measurements using digital image processing. *Comput. Electron. Agric.* 151:403-415.

<https://doi.org/10.1016/j.compag.2018.06.026>

★ Shirzadifar S., Alimohammad, Sreekala Bajwa, Seyed Ahmad Mireei, Kirk Howatt, and John Nowatzki. 2018. "Weed Species Discrimination Based on SIMCA Analysis of Plant Canopy Spectral Data." *Biosystems Engineering* 171 (July): 143–54.

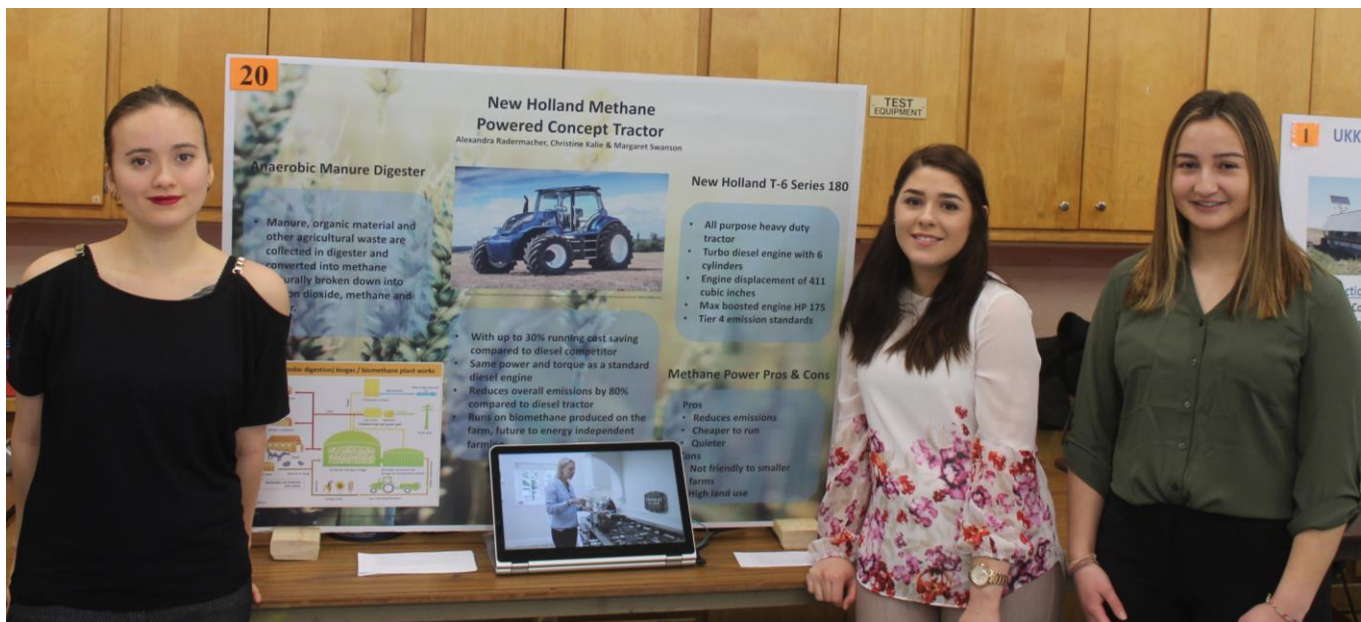
<https://doi.org/10.1016/j.biosystemseng.2018.04.019>.

★ Xuefeng Chu, **Zhulu Lin**, Mohsen Tahmasebi Nasab, Lan Zeng, Kendall Grimm, Mohammad Hadi Bazrkar, Ning Wang, Xingwei Liu, Xiaodong Zhang, Haochi Zheng. 2018 Macro-scale grid-based and subbasin-based hydrologic modeling: joint simulation and cross-calibration. *Journal of Hydroinformatics* DOI:10.2166/hydro.2018.026

## Student Presentations

### Ag Tech Expo February 2018

Grand Champion winners are Margaret Swanson, Christine Kalie, and Alexandra Rademacher. "New Holland Methane Powered Concept Tractor"



## Presentations

### Friends & Neighbors day

- **Dr. Igathinathane Cannayen** and his research group (Sunoj Shajahan and Subhashree N. Srinivasagan) participated in the 2018 Friends & Neighbors day on July 19, 2018 and staffed a booth on the theme “Digital Imaging to Monitor Crop Growth” which displayed some of the on-going research at USDA-NGPRL, Mandan on image processing applications in agriculture. About 25 members stopped at the booth and discussed the projects.



- Sunoj Shajahan presented a scientific poster titled “**Dimensions Measurement of Sunflower Floral Components by Image Processing**” and received good response from the people.
- Subhashree N. Srinivasagan presented a scientific poster titled “**Agricultural Image Processing Applications of Proximal and Aerial imagery**” and the topics were useful for the public.
- Dr. Igathinathane Cannayen and Sunoj Shajahan presented “**Image processing applications in agriculture**” in the Field tour as a part of **2018 Friends & Neighbors Day** activity. About 30 members participated and discussed the field problems that can be identified using images.



**ASABE International Meeting, Detroit, MI, July 29 and Aug. 1, 2018:**

**Dr. Igathinathane Cannayen:**

1. Moderated the Session 204 - BIOMASS FEEDSTOCK SUPPLY LOGISTICS AND MODELING – Sponsored by ES-220, ASE-12 with co-moderator Dr. Jayashankar Tumuluru, INL, Idaho.
2. Co-authored. Needs and Benefits of ASAE/ASABE Standards, Engineering Practices, and Technical Data Applicable to Biomass and Related Industrial Feedstocks. James Dooley, Forest Concepts, LLC, Auburn, WA United States (Presenter: James Dooley) (James Dooley, Igathinathane Cannayen, Kevin Comer, Oladiran Fasina, Kevin Kenney, Sudhagar Mani, Shahabaddine Sokhansanj).

**Sunoj Shajahan – Ph.D. student:**

1. Phenocam color image calibration using higher order terms - Sunoj, S., Igathinathane, C., Saliendra, N., Hendrickson, J.
2. Sunflower head, disc, and petal dimensions measurement using image processing - Sunoj, S., Subhashree, S.N., Dharani, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., Prasifka, J.R., Archer, D.
3. A simple 3D image reconstruction using ImageJ - Sunoj, S., Igathinathane, C., Hendrickson, J., Archer, D.
4. Shape based weed discrimination in low-altitude unmanned aerial system images – Dharani, S., Sunoj, S., Igathinathane, C., Flores, P.

**Subhashree N. Srinivasagan – Ph.D. student:**

1. Digital image processing for classification and quantification of flowers for pollinators interaction - Subhashree S.N., Sunoj, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., Prasifka, J.R., Archer, D
2. A review on sensor-based crop stress assessment - Subhashree, S.N., Sunoj, S., Igathinathane, C., Hendrickson, J., Halvorson, J., Archer, D.

**Unmanned Aerial Vehicle Applications**, April 17th, 2018 NDSU Alumni Center, Reimers Room, NDSU, Fargo, ND  
Presented by: The **RED RIVER VALLEY SECTION**,  
**American Society of Agricultural and Biological Engineers**

- **John Nowatzki**, NDSU Extension Service, described the variety of ways UAVs are being used in agriculture including a brief overview of the research being done at NDSU

**Dronefocus** <https://dronefocuscon.com/focused-lunches/>

*Dronefocus Ag Panel 2018 led by Orlando Saez, John Nowatzki, Todd Gully, and Joel Wipperfurth*





## RESEARCH

### IN THE NEWS: UAS SPRAYER AT CASSELTON AGRONOMY SEED FARM

Agweek reports on John Nowatzki's research to reduce chemicals and time using the first UAV sprayer. See the video at <http://www.agweek.com/news/4475234-agweektv-first-drone-sprayer-debuts>



## FUNDED GRANTS

Kenneth Hellevang (PI). Energy Education Website. \$8,998 from the ND Department of Commerce. 10/01/2018 – 03/20/2019

## SEMINAR

**Ag & Biosystems Engineering Seminar Series**  
Friday, September 7, 2018  
2:30 p.m. – Room # ABEN 224

**Uzbekistan: History, Culture, People, Science,  
Education and Development**

**Dr. Sulaymon Eshkabilov**  
ABEN Visiting Scientist & Former Associate Professor,  
Tashkent Automobile Road Institute, Uzbekistan



Dr. Sulaymon Eshkabilov is a visiting scientist to Agricultural and Biosystems Engineering Department, NDSU since August 1, 2018 and currently teaching the course – 213 – System Modeling and Simulation (with MATLAB/Simulink). He held an Associate Professor position at Tashkent Automobile Road Institute for 2006-2018 and Part-time Professor position at Tashkent-Turin Polytechnic University for 2015 - 2018. He obtained Mechanical Engineer Diploma from Tashkent Automobile Road Institute (Uzbekistan), MSc in Mechanical Engineering from Rochester Institute of Technology (USA) and PhD in control and system analysis engineering from Cybernetics Research Institute of Academy Sciences (Uzbekistan). His research interests include mechanical vibrations, biomechanical applications of vibrations, comfort ride studies of vehicles, mechatronics, system modeling and simulations. Dr. Eshkabilov has had some collaboration and exchange experiences in engineering curriculum development and research projects with a few European universities, viz. KTH – Royal Institute of Technology (Sweden), Johannes Kepler University (Austria), Politecnico di Torino (Italy), Catholic University of Leuven (Belgium), University of Birmingham (UK), University of Leeds (UK), and University of Madrid Carlos III (Spain). He has been an external academic expert in the European Commission (EC) to evaluate various academic projects funded by the EC for over 10 years since 2008. He has been a reviewer of several peer reviewed journals - Springer Verlag Lecture Notes and Elsevier.

*Dissertation Seminar for NDSU Agricultural & Biosystems Engineering Ph.D. program:*

### **QUALITY EVALUATION OF HULLED AND COATED CONFECTIONARY EXTRA-LARGE SUNFLOWER KERNELS FOR PRECISION PLANTING** by Harjot Kaur Sidhu, July 25, 2018

#### **ABSTRACT**

Domestic and export demand for extra-large (XL) in-shell confectionary sunflower seeds is growing; however, a significant proportion of the hybrid seed for planting goes to the snack food market because the extra-large seed is not acceptable to farmers. The extra-large hybrid seed has poor emergence in the field and is not compatible with precision planters.

Therefore, the option of coating the hulled sunflower kernels for improved germination and plantability is investigated in this dissertation.

## FACULTY NEWS

### VISITING SCIENTIST

Welcome to Dr. Eshkabilov from Uzbekistan to ABEN. Dr. Eshkabilov is an associate professor and head of the unit of Dynamics and Controls Lab at Tashkent Automobile and Road Institute in Uzbekistan. He will be spending the next one

year with us as a visiting scholar. Dr. Tom Bon has been working with Dr. Eshkabilov for many years, and will be hosting him during his stay. During his visit, he will be contributing to teaching in his expert areas of Matlab and mechatronic systems, and will be working with the precision ag group on research. He will also be collaborating with Mechanical Engineering Department. This is the second time Dr. Eshkabilov is visiting ABEN and NDSU. We are hoping to establish broader collaboration with him during this visit. He is here with his family (wife and 7<sup>th</sup> grader son). Dr. Eshkabilov is working in Room 206B. Please introduce yourself to him, and make him feel welcome to our department and university.

## PROMOTIONS

### ASSOCIATE PROFESSOR



---

***Zhulu Lin** was promoted to associate professor with tenure, effective August 16, 2018. Lin performs research on understanding and managing complex, large-scale agricultural and hydrological systems for sustainable uses of soil and water resources. He teaches undergraduate and graduate level courses in agricultural and biosystems engineering.*

---

### PROFESSOR



---

***Scott Pryor** was promoted to professor effective July 1, 2018. Pryor is tenured in ABEN. His research focus is on developing technologies for processing cellulosic feedstock such as perennial grasses and agricultural residues. He taught a variety of courses ranging from introductory undergraduate level courses to a graduate level course in bioprocess engineering. Pryor currently serves as associate dean for undergraduate programs in the College of Engineering.*

---

## AWARDS

### Professor named Professional Engineer of the Year

The American Society of Agricultural and Biological Engineers has recognized Ken Hellevang, NDSU professor of agricultural and biosystems engineering, with the Professional Engineering Institute's Professional Engineer of the Year Award for 2018.

Hellevang, also an NDSU Extension agricultural engineer, received the award during the society's annual international meeting in Detroit. The professional society, which has 8,000 members from more than 100 countries, recognizes one licensed engineer annually.

The society honored Hellevang for his application of engineering principles to crop post-harvest engineering, energy efficiency, building moisture and mold problems and restoration of flooded buildings.

"I am honored that professional engineers in ASABE consider my work worthy of being recognized," he says. "My goal has been to use my expertise to educate and provide technical assistance, and I have been fortunate to have people supporting me who enabled me to excel."



Hellevang uses numerous methods, including publications, presentations, news releases, news media interviews, individual consultations and the internet to provide education and technical assistance.

In addition, he has conducted research on grain drying and storage, including moisture content changes in stored grain during the summer, drying and storing dry edible beans, air temperature increases due to grain drying and aeration fans, and aeration duct design.



#### **ABEN PhD student receives Superior Paper Award**

NDSU graduate student Sunoj Shajahan, a doctoral candidate in ABEN, received the American Society of Agricultural and Biosystems Engineers' Superior Paper Award. He was recognized with a certificate during the society's annual international meeting held July 29-Aug. 1 in Detroit, MI.

Sunoj, S, Sivarajan, S. Maharlooei, M., Bajwa, S.G., Harmon, J.P., Nowatzki, J., Cannayen, I. 2017. Identification and Counting of Soybean Aphids from Digital Images Using Shape Classification. Transactions of the ASABE 60(5):1467-1477. DOI: 10.13031/trans.12105

In the paper, an image processing-based method was developed for assessing aphid numbers, while differentiating from the exoskeletons and leafspots from the digital image of soybean leaves for rapid quantification of pest infestation.

Of the 300 articles published in the society's three peer-reviewed journals during the previous year, about 5 percent are selected for the annual superior paper award. The papers are judged on timeliness, value, originality and benefits to society.

Coauthors are Saravanan Sivarajan, postdoctoral fellow and associate professor at Sri Shakthi Institute of Engineering and Technology, India; Mohammadmehdi Maharlooei, assistant professor at Shahid Bahonar University, Iran; Sreekala G. Bajwa, NDSU professor and chair of agricultural and biosystems engineering; Jason P. Harmon, NDSU associate professor and program leader of entomology; John Nowatzki, NDSU Extension specialist; and Igathinathane Cannayen, NDSU associate professor of agricultural and biosystems engineering.



Dr. Cannayen is Shajahan's doctoral major adviser. Shalahan's doctoral dissertation is about software tools development for image color calibration, volume estimation and sunflower dimension measurements. Shajahan, is from Coimbatore, India. Before joining NDSU, Shajahan earned his master's degree in agricultural processing and food engineering from Tamil Nadu Agricultural University, Coimbatore, India.

## Contact Us

### **Agricultural and Biosystems Engineering**

NDSU Dept. 7620, PO Box 6050  
701 231 7261

Email [ndsu.aben@ndsu.edu](mailto:ndsu.aben@ndsu.edu)

Website

<https://www.ndsu.edu/aben>