

NDSU AGRICULTURAL AND BIOSYSTEMS ENGINEERING

Research - Extension - Teaching

WHO WE ARE

The Department of Agricultural and Biosystems Engineering (ABEN) is a part of the College of Agriculture, Food Systems, and Natural Resources, North Dakota Agricultural Experiment Station, and NDSU Extension Service. The engineering academic program is in the College of Engineering. The department provides research, extension and education in machinery systems, precision agriculture, irrigation and drainage, water resource management, food and biological materials processing, agricultural waste engineering, grain drying, flood preparation and recovery, and energy. The department has about 130 undergraduate students, 17 faculty, 11 staff members, and about 25 graduate students. The department is located in the Agricultural and Biosystems Engineering building, with additional offices in Morrill Hall, teaching in the Machinery Learning Center and Bio Process Engineering Lab, and additional research labs in Hultz Hall, Waldron Hall, Van Es, and Research 2.

DEPARTMENTAL HIGHLIGHTS

- Precision Agriculture major & minor plus incorporation into engineering & Ag Systems Management curriculum. USDA/ARS research project: hired 2 faculty and 2 specialists.
- Center for Digital Agriculture: Approved by the State Board of Higher Education; John Nowatzki is the Center Director, Drs. Rex Sun and Paulo Flores: Associate Directors, Research and educational needs of the region to increase efficiency and sustainability of production agriculture through digital technologies
- Faculty Awards:
 - Ryan Carda: ASABE as undergraduate student of the year.
 - Zhao Zhang; ASABE Rain Bird Engineering Concept of the Year Award
 - Sreekala Bajwa: ASABE James and Karen Gilley Academic Leadership Award.
 - Ken: ASABE Sukup Global Food Security Award
 - Borhan: CAFSNR research specialist
 - Steele: CoE teaching excellence



CHALLENGES & OPPORTUNITIES

- Need to expand the use of agricultural crops by developing new products and value added opportunities.
- Lack of research on drying and storing grain.
- Research and education in precision technology for chemical application such as testing new nozzles, chemicals, and additives, studying drift, and temperature inversion is needed.
- Temperature inversion work was done primarily by retired faculty.
- The need for intelligent systems (sensors, artificial intelligence, robotics and automation) in agriculture is increasing. NDSU has a gap in research and education in sensors, instrumentation, automation and robotics.
- Data management and analysis leading to actionable intelligent decisions.
- Need for office support staff – Admin. Asst, Student Coordinator, accountant, grants assistant reduced to two staff.
- Opportunity for donated Precision Ag Machinery if we can obtain storage space.
- Extension faculty retirements
- Unmet needs in chemical application, safety, and agricultural structures.
- Reduced office staff impacting faculty effectiveness and creating staff overload

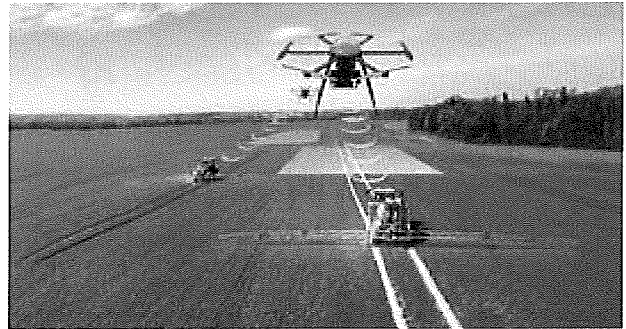
RESEARCH NEEDS: *Value Added & Digital Precision Agriculture*



Value Added: There is a need to develop new uses of agricultural commodities to enhance farm and related industries. Need additional research FTE funding to support faculty positions and technicians. (1.2 FTE, 1.0 Research Specialist)

Crop Post Harvest Engineering: There are numerous voids in research on grain drying and storage. Much of the research was done 50 years ago on crop varieties not grown in our region and under different climatic conditions. Need for a research technician. (1.0 Research Specialist)

NDSU *Bio-Energy and Product Innovation Center*

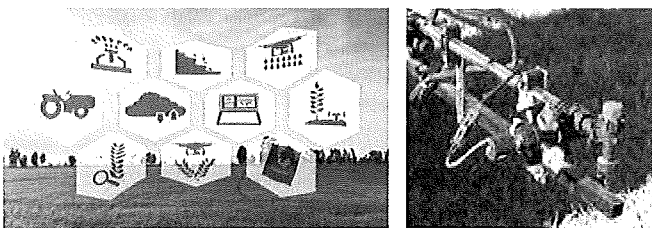


Precision chemical application: Evaluating spray systems with new nozzles, new chemicals, and chemical additives under different environmental conditions for spray uniformity, droplet distribution, drift, etc. There is also a strong research need to study nozzles, accuracy of spot spraying, chemical drift, volatilization, effectiveness, chemical injury, and drift control technologies under different environmental conditions (wind, temperature, humidity, temperature inversion).

Intelligent Systems: There is an increasing need for automation and robotics in agriculture to adjust thresher operation based on crop condition, to adjust planting depth with precision based on soil moisture content, and to leave right amount of residue on the surface during tillage

Digital Agriculture: Data management and analysis lead to actionable intelligence. We are drowning in data but starving for information. (1.0 FTE, 1 Research Specialist)

EXTENSION NEEDS:



Chemical application and Digital Agriculture: Training producers and chemical applicators on best management practices and the latest technologies available for chemical application. Manage data and convert them to actionable intelligence. (1.0 FTE)

Agricultural Structures: Structural design, layout, siting, and environmental aspects of farmstead buildings. (1.0 FTE)

SUPPORT STAFF NEEDS:

NORTH DAKOTA STATE UNIVERSITY NDSU

Staff
Agricultural and Biosystems Engineering

Staffing: Additional support staff funding. (2.0 FTE)