

What we do & Why it matters

Agricultural and Biological Engineering | abe.illinois.edu

The Department of Agricultural and Biological Engineering integrates engineering, technology, and life sciences to solve problems associated with the enhancement of living systems in global agriculture, food, energy, water, and the environment. Our faculty and students demonstrate excellence in addressing the land-grant mission through cutting-edge research and consistently high national rankings of our undergraduate and graduate programs.

ALAN HANSEN (interim department head)

Dr. Hansen's research creates innovative solutions to improve the operation of off-road machine systems. He leads a U.S. team that has established innovation and field hubs in Bangladesh, Cambodia, Ethiopia, and Burkina Faso. He develops appropriate-scale technologies to help smallholder farmers, especially women, be more productive while benefiting the local environment and economic well-being of rural communities.

ROBERT AHERIN (professor & ag safety program leader)

Dr. Aherin is reducing the number of agricultural work-related injuries and deaths by advancing understanding of agricultural injury causation and effective injury and illness risk reduction measures. He leads AgrAbility Unlimited, utilizing technologies and identifying resources to assist farm people with physical limitations maintain their livelihood at the highest level possible, regardless of age, disease, or accident-related disability.

NESLIHAN AKDENIZ (clinical assistant professor)

Dr. Akdeniz studies livestock mortality and waste management/utilization. She develops ways to improve air quality and environmental conditions in livestock buildings. Her extension program focuses on sustainable livestock production.

KAUSTUBH BHALERAO (associate professor)

Dr. Bhalerao develops new sensor, instrumentation, and computational technologies to improve decision-making in crop and animal agricultural production. He created a robotic system for quantifying soybean cyst nematode pathogens, a sensor to improve swine insemination outcomes, and a detector to screen for adulterated milk samples.

RABIN BHATTARAI (assistant professor)

Dr. Bhattarai discovers innovative ways to clean polluted waters. He uses laboratory and field experiments, along with computer simulation models, to study how various factors impact water quality.

GIRISH CHOWDHARY (assistant professor)

Dr. Chowdhary is advancing how to design, build, and automate collaborative aerial and ground robotic systems. He advances machine learning and decision-making algorithms to enable drones and ground robots to collaboratively manage agricultural tasks. His work improves the robustness of robots utilized in defense, home-land security, and hostile environment exploration.

MARIA CHU (assistant professor)

Dr. Chu investigates how climate and land-use changes affect water quantity and quality in order to achieve a sustainable agro-ecosystem where productivity, environmental soundness, and social relevancy are optimized. She models the impacts of changes in environmental stressors on ecosystem services, and provides economic and social endpoints to these impacts.

RICHARD COOKE (professor)

Dr. Cooke is increasing the efficiency of drainage-related best management practices, and developing protocols for their design. He also develops techniques to simplify the extraction of elevation data from a pulsed laser system (LiDAR) images, and creates rainfall harvesting systems to extend cropping into the dry season in Sierra Leone.

PAUL DAVIDSON (assistant professor)

Dr. Davidson improves and maintains surface water systems by reducing the transport of nutrients, pathogens, and pesticides from agricultural systems to waterways. He works with farmers and other stakeholders to develop solutions that protect the quality of our water resources while maintaining efficient farming operations.

WHAT WE DO & WHY IT MATTERS, CONT'D

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RICHARD S. GATES (professor)

Dr. Gates conducts research on engineering issues of controlled environment plant and animal production, including greenhouse gas emissions and energy efficiency. He directs the Certified Livestock Managers Training program, required of all livestock operations in Illinois.

ANGELA GREEN (associate professor)

Dr. Green advances our understanding of animal husbandry issues in order to address production and sustainability challenges. Using a systematic “speaking animal” approach to explore the interactions of animals with their environment, she designs housing systems and management strategies to simultaneously promote animal welfare and more efficient resource utilization.

TONY GRIFT (associate professor)

Dr. Grift develops robotics and sensing technologies that aid agriculture with efficiently reaching its production potential while minimizing its environmental impact. The grand challenge is to set humanity on a trajectory where it can feed itself sustainably, indefinitely, and from renewable sources alone.

JOE HARPER (professor)

Dr. Harper works with industry representatives to develop and implement educational and career placement programs. He leads the Technical Systems Management program and provides undergraduate and graduate teaching and advising.

KENT RAUSCH (associate professor)

Modern grain processes produce a high-valued primary product with an assortment of low-valued coproducts. Dr. Rausch improves nutrient separation in processing streams so the resulting coproducts are better suited to the end user and more valuable to the producer. Improved separation increases efficiency, reduces the environmental footprint, and increases sustainability of grain processing.

LUIS RODRIGUEZ (associate professor)

Dr. Rodriguez specializes in biological system modeling, simulation, and analysis. He works to ensure that complex food and agricultural systems can operate efficiently, with minimal wastage, while managing costs for the benefit of both society and the environment.

VIJAY SINGH (professor, director of Integrated Bioprocessing Research Laboratory)

Dr. Singh focuses on science and engineering required to produce sustainable food, biofuels, and bioproducts. He develops novel, cost-effective bioprocessing technologies that improve recovery of chemical and phytochemical constituents from biological material and their conversion to higher value industrial products.

LEI TIAN (associate professor)

Dr. Tian develops real-world precision and site-specific tools for industry and government agencies to use in agriculture and natural resources management. His research ranges from on-farm production uses such as weed control to large-scale agribusiness uses such as regional yield estimations.

XINLEI WANG (professor)

Dr. Wang develops creative engineering solutions to problems dealing with the environment and energy in biosystems that involve humans, plants, and animals. He investigates renewable energy such as solar, wind, and geothermal energy and technologies that improve energy efficiency in building environment controls, agricultural production, and processes. He also studies how to control livestock production emissions for air quality improvement.

YUANHUI ZHANG (professor, Innoventor Professor in Engineering)

Dr. Zhang advances hydrothermal processes of converting wet biomass into biocrude oil and biochemicals. The processes recover nutrients, treat the wastewater, and capture carbon dioxide. The biocrude is then upgraded into transportation fuel. He develops advanced technology for fluid flow studies that can quantify profiles of velocity, acceleration, pressure, and particulate transport fate.