Jean D. Niwenshuti, MS

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Education:

PhD   **Doctor of Philosophy – Natural Resources, present**   **University of Nebraska**
Major in Water resources   Lincoln, Nebraska
Focus on Hydrologic and Watershed modeling and
Automated irrigation systems

MS   **Master of Science – Biological Systems Engineering, 2023**   **University of Nebraska**
Major in Mechanized Systems Management   Lincoln, Nerbaska
Focus on Computer vision and edge computing in Agriculture

BS   **Bachelor of Science – Integrated Sciences, 2021**   **University of Nebraska**
Major in Integrated Sciences   Lincoln, Nebraska
Minors in Agronomy, Mechanized System Management,
Leadership and Entrepreneurship

Research Interests:

Computer Vision
Adopting computer vision solutions as precision management tools to monitor production systems

Precision System Management
Implementation of Internet of Things (IoT) and Edge computing technology to collect and analyze real-time data to ensure energy efficiency and enhance productivity

Computational Modeling
Efficient use of software models for hydrology and irrigation to recommend sustainable water management plans

Featured Skills:

- Hydrology models: GIS (ArcGIS and QGIS), HEC-HMS, HEC-RAS, and SWAT
- Computer Vison: MATLAB, Google Earth Engine, and ENVI
- Crop models: AQUA-CROP and HybridMaize
- Statistical Analysis: R programming and MS Excel
- Video Edit: Microsoft Clipchamp and Yuja
- Technical Skills: Hydrology modeling, Image processing, Project management, and Technical/Scientific reporting.
- Languages: English (Fluent), French (Fluent), and Kinyarwanda (native)

Professional Experience:

Principal Investigator – Nebraska Water Center, 2025-Present
Chittaranjan Ray, PhD, P.E. | Director of Nebraska Water Center
> Title: Impact of wetlands on improving water quality in Pecan Creek and Deadman's Run
> Investigators: **Jean Niwenshuti** (PI), Aaron Mittelstet, PhD (co-PI), Derek Heeren, PhD, P.E. (co-PI)
> - Designed and led research projects from conception to implementation.
> - Secured and managed research funding and budgets.
> - Supervised and mentored undergraduate students.
> - Ensured compliance with ethical and funding requirements for all institutional partners.
> - Coordinated data collection, analysis, and interpretation.
> - Collaborated with academic and industry partners.

Instructor – Department of Biological Systems Engineering (BSE), 2023-2025
Mark Stone, PhD, P.E. | Head of the Department of Biological Systems Engineering (BSE)
> Position within the Department of Biological Systems Engineering (BSE) under the College of Agricultural Sciences and Natural Resources (CASNR). Perform teaching and service duties, which include:
> - Primary Instructor of record for teaching, gateway-level, Power and Machinery Principles (AGST 232) course during fall semesters (15+ students per semester)
> - Restructured the course to meet the current technological advancement in machinery and data management
>   - Efforts included inviting state-of-the-art machinery manufacturers to share advancements in precision agriculture
>   - In-class projects that were based on current farming practices and challenges
>   - Focused on current technological solutions and their impact on the future of farming
> - Led and conducted labs for students on different components of machinery such as gears, u-joints, hydraulics, and machine sizing
> - Collaborated with other faculty and staff members to have guest lectures, tours, and career fair opportunities to improve the students' chances of success.

Teaching Assistant Experiences:

Irrigation Systems Management (AGST 452), 2024-Present
Derek Heeren, PhD, P.E. | Department of Biological Systems Engineering
- Develop online learning materials using pre-recorded materials
- Video editing using Clipchamp to produce short concise videos
- Visuals and audio enhancement of the raw footage
- Transcription in other languages such as Fresh and Kiswahili

Soil Conservation (AGST 354), 2023-Present
Aaron Mittelstet, PhD | Department of Biological Systems Engineering
- Assisted with data collection in labs for landscape surveying and stream flow discharge
- Facilitated safe transportation of students from study cites and field trips
- Administered mid-term and final exams

Sensors and Controls Systems for Agri-Industries (AGST 416), 2022
Santosh Pitla, PhD, P.E. | Department of Biological Systems Engineering
- Assisted students in developing board circuits and writing codes on micro-controllers (Arduino)
- Lectured some topics such as electrical circuits that were part of their course material
- Helped students with their final projects conceptualization and developing the logic of their algorithms

Soil Nutrients Relationship Class (AGRO 366), 2021
Meghan Sindelar, PhD | Department of Agronomy and Horticulture
- Facilitated students to develop nutrient management plans for different farm operations in the state of Nebraska
- Assisted students working with different soil types and environments to efficiently allocate resources towards sustainable production.
- Helped with grading and monitoring lab activities for the class.

Experimenting Entrepreneurship Class (EAEP 275), 2019
Brennan Costello | Engler Agribusiness Entrepreneurship Program
- Facilitated students to start entrepreneurial businesses with $50 as class projects.
- Helped students to turn ideas into prosperous business opportunities.
- Monitored students' businesses (class projects) to make sure they were successful.

Research Assistant Experiences:

Hydrology and Water Resources, School of Natural Resources, 2023-Present
Supervisory Committee: Aaron Mittelstet, PhD; Derek Heeren, PhD, P.E.; Mark Stone, PhD, P.E. and Jill Motschenbacher, PhD

- Hydrology modeling projects:
  - Quantify the impact of In-Situ rainwater harvesting system (RHW) on the watersheds using SWAT.
  - Evaluate the impact of wetlands on stormwater management and surface water quality of Peacan creek in Lincoln, Nebraska using HEC-HMS
- Participating in Lincoln Public School (LPS) summer school to educate elementary and middle school students about the importance of storm water management on water quality and quantity.
- Preliminary analysis of water quality in Pecan creek before installation of stormwater retention ponds and wetlands.
- Responsible for data collection, data analysis, experimental design, and presentation of results

Precision Agriculture, Department Biological Systems Engineering, 2021-2023
Supervisory Committee: Yijie Xiong, PhD; Tami Brown-Bradl, PhD; Galen Erickson, PhD

- Computer vision projects:
  - Developed MATLAB image processing programs to process and quantify residual feed in a concrete feed bunk for beef feedlots using depth cameras
  - Classification of feedlot ingredients using texture analysis and machine learning techniques
- Calibrated and validated the accuracy of Microsoft Azure Kinect to estimate residual feed in the bunk
- Trained and validated a ResNet50 deep learning model to predict ingredient types based on their texture
- Worked with animals to ensure quality data collection and safety
- Responsible for data collection, data analysis, experimental design, and presentation of results
- Prepared reports, conference manuscripts, and presentations for local and international conferences.

Alternative Crop Program, Panhandle Research and Extension Center (PREC), 2019
Supervisor: Dipak Santra, PhD; Saurav Das, PhD

- Worked with alternative crops like fenugreek, canola, camelina, millet, and mint for Western Nebraska crop management.
- Worked with field scouting apps that record and organize experimental field data easily and fast.
- Operated different equipment like a seed clipper, seed counting machine (Sinoped), and seed test weight/density measuring equipment.
- Prepared seeds, planted seeds, managed experimental fields, cleaned seeds after harvest, measured the seed density and size, and analyzed data for a global pea germplasm project.

Other Professional Experiences:

Guest Lectures:
  2025:
  - Soil Conservation (AGST 354): "**Deadman's Run Restoration Project**"
    Presented the importance of hydrologic modeling before landscape modification.
  - Sensors and Controls Systems for Agri-Industries (AGST 416): "**Client Project: ID Irrigator**"
    Presented the process from ideation to building a prototype using BSE-PI facility and collaborating with the Industry.
  2024:
  - Rwanda Institute of Conservation Agriculture (RICA): "**Plant Water Use/Irrigation Scheduling**"
    Presented to the Mechanized and Irrigation class on optimizing water use by plants and several irrigation scheduling methods to achieve maximum yields.
  2022
  - CUSP Career Fair Expo: "**Current Global Agriculture Systems and Youth's Contribution in Leadership Initiatives**"
    Presented the importance of collaboration between academic institutions and private sector. Special guests included the Minister of Agriculture from Rwanda Dr. Geraldine Mukeshimana, along with the Minister of Defense from Rwanda, Maj. General Albert Murasira, and other distinguished guests
  - Featured on the FarmBits Podcast Episode 058: "**Paving the future of livestock production**"
    Discussed the contribution of precision management technology in the future of agriculture.

Volunteer:
  Southeast Reginal Science Fair
  - Poster judge for science fair projects
  - Engage with middle and high school students on science projects and research

  Campus Red-Cross, University of Nebraska-Lincoln
  - Help organize blood drive events on campus.

  New Student Enrollment, University of Nebraska-Lincoln
  - Greeted new students and their parents and helped them settled on/around campus.
  - Conducted small group campus tours to students and parents.
  - Contributed to orientation week by helping students to find classes and organizations.

  FATE consulting ltd, Kigali Rwanda
  - Collected data as an enumerator (or census data collector) for Save the Children International Rwanda (a children's rights project).
  - Analyzed quantitative and qualitative data to increase awareness of children rights from parents and children themselves.
  - Received training on using different survey methods and software to analyze survey data.

Achievements and Certificates:

Introduction to Data Engineering (certificate)
  International Business Machine Corporation (IBM), Armonk, N.Y 2023
ETL and Data pipelines (certificate)
  International Business Machine Corporation (IBM), Armonk, N.Y 2023
Image processing and deep learning toolbox (certificate)
  MathWorks certification, MATLAB 2022
Agricultural Healthy and Safety (certificate)
  University of Nebraska, Lincoln, Nebraska 2018
Agricultural Skills Development (certificate)
  Nebraska College of Technical Agriculture (NCTA), Curtis, Nebraska 2018

Honors and Awards:

2023, 2024, 2025 Othmer Fellowship Award
2021 Undergraduate Student Research Award, University of Nebraska-Lincoln
2017 CASNR Undergraduate Scholarship Program (CUSP) Scholarship, University of Nebraska-Lincoln
2017 and 2018 Dean's list
2015 College of Agriculture and Veterinary Medicine (CAVM) Undergraduate Scholarship, University of Rwanda
2013 and 2014 Champion of Debate Mate Competitions

Scholarly Work:

Department of Biological Systems Engineering Theses (2023) – *published*
  Niwenshuti, J. 2023. Characterizing feedlot feed using depth cameras and imaging technology (Master's Thesis). Biological Systems Engineering.
American Society of Agricultural and Biological Engineers Abstract – *accepted*
  J. Niwenshuti, T. Brown-Brandl, G. Erickson, E. Psota, Y. Xiong. Imaging method to quantify residual feed in fence-line feedlot bunk using depth cameras[abstract]. In: American Society of Agricultural and Biological Engineers Annual International Meeting; 2022 July 17-20; Houston, Texas.
2022 Annual University of Nebraska-Lincoln Beef Committee Meeting presentation
  J. Niwenshuti, T. Brown-Brandl, G. Erickson, E. Psota, Y. Xiong. Quantifying residual feed in fence-line feedlots using depth camera imaging technique [oral presentation].
Nebraska Cattlemen Association - Cattlemen's College
  J. Niwenshuti, T. Brown-Brandl, G. Erickson, E. Psota, Y. Xiong. Imaging method to quantify residual feed in fence-line feedlot bunk using depth cameras[poster]. In: 2021 Nebraska Cattlemen's College extension event; 2022 November 30th; Kearney, Nebraska
2023 Nebraska beef cattle report – *Submitted*
  J. Niwenshuti, T. Brown-Brandl, G. Erickson, E. Psota, Y. Xiong. Quantifying residual feed in fence-line feedlots using depth camera imaging technique[report].