Biquan Zhao

ADDRESS

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GOOGLE SCHOLAR PAGE

https://scholar.google.com/citations?hl=en&user=nUAAkiIAAAAJ&view_op=list_works&sortby=title

EDUCATION

09/2019 – 12/2023, **Ph.D.**, Major in Natural Resource Sciences,
University of Nebraska-Lincoln, Lincoln, USA
Dissertation: *Monitoring and Assessing forage production of Grazed Grasslands in Nebraska: Toward Adaptive Grazing*

09/2016 – 06/2019, **M.S.**, Major in Information Engineering of Natural Resources & Environment,
Huazhong Agricultural University, Wuhan, China
Thesis: *Mechanical seeding performance evaluation for rapeseed and its seedling count estimation from unmanned aerial vehicles (UAV) remote sensing images.*

09/2012 - 06/2016, **B.S.,** Major in Natural Resources & Community Planning,
Guangdong University of Finance & Economic, Guangzhou, China

RESEARCH AND TRAINING EXPERIENCE

01/2024 – present, **Postdoc research associate,** Animal Sciences & Biological Systems Engineering
University of Nebraska-Lincoln, Lincoln, USA

- Precision rangeland management

09/2019 – 12/2023, **Research Assistant**, Natural Resource Sciences & Biological Systems Engineering,
University of Nebraska-Lincoln, Lincoln, USA

- Rangeland and grazing management with remote sensing and GPS.
    - Using satellite remote sensing and on-ground plant biomass data to evaluate long-term weather variability on rangeland productivity and grazing activity.
    - Analysis of cattle GPS collar data to evaluate factors influencing cattle grazing behaviors and distribution over space and time.
    - Investigation of unmanned aerial vehicles (UAV) for ranch-/pasture-level monitoring and estimation of forage at finer scales.
- Crop monitoring, management, and high-throughput phenotyping with UAV remote sensing.
    - Monitoring wheat, corn, soybean fields during growing season and collecting multispectral/hyperspectral images by using UAV.
    - Evaluation of positioning accuracy and potential of RTK-based UAV images for row crop pinpointing and locating for precision agriculture.

12/2021, **Certificated knowledge on Production Agriculture in Nebraska: Crops**,
Issued by College of Agricultural Sciences and Natural Resources, University of Nebraska-Lincoln.
https://unl.badgr.com/public/assertions/MgsyEA2MSWW6J15CBLGpGw

12/2021, **Certificated knowledge on Production Agriculture in Nebraska: Livestock**,
Issued by College of Agricultural Sciences and Natural Resources, University of Nebraska-Lincoln,
https://unl.badgr.com/public/assertions/jlI7FcZUQcC8flOAwWtWpg

10/2018 – 04/2019, **Visiting student**, Biological Systems Engineering,
University of Nebraska-Lincoln, Lincoln, USA

- A project on wheat lodging detection and mapping by using drone technology.

TEACHING EXPERIENCE

Teaching Assistant: Fall semester, 2023

AGEN/AGRO/AGST 431 Site-Specific Crop Management

Department of Biological Systems Engineering, University of Nebraska-Lincoln

- Teach and demonstrate the software (ArcMap, Yield Editor) and instruments (handheld GPS) in spatial data analysis for crop management needed in each week's exercise.
- Answer students' questions regarding lab exercises and homework during the official time.
- Review lab section materials before each week's exercise.
- Grading the students' quizzes and homework

Other experience for teaching:

Assisted with course materials and lab designs, Spring 2022

MSYM 492/892 Precision Agriculture

- Develop Lab materials on data analysis related to rangeland biomass availability and cattle grazing.
- Provide instructions on using Python as the primary data processing and analyzing tool for spatial data (i.e., satellite/drone images, cattle GPS collar data).
- Visualization and interpretation for rangeland management.

RESEARCH INTERESTS

- Application of GIS/RS/GPS and other technologies in agriculture and natural resource management.
- Remotely sensed imagery processing: drone and satellite.
- Smart agriculture in plant/crop management, and precision rangeland management of adaptive grazing management.
- Modeling and interpretation of agricultural big data.

PUBLICATIONS

1. **Zhao, B.,** McDermott, R. L., Erickson, G. E., Xiong, Y., Technical Note: Assessing GPS Sensor Accuracy Using Real-Time Kinematic Device for Livestock Tracking. Journal of Animal Science. (Accepted on 16-Aug-2024).

2. **Zhao, B.,** Stephenson, M., Awada, T., Volesky, J., Wardlow, B., Zhou, Y., Shi, Y. (2024). 15-Yr Biomass Production in Semiarid Nebraska Sandhills Grasslands: Part 2—Plant Functional Group Analysis. *Rangeland Ecology & Management*. (Under Review)

3. **Zhao, B.,** Stephenson, M., Awada, T., Volesky, J., Wardlow, B., Zhou, Y., Shi, Y. (2024). 15-Yr Biomass Production in Semiarid Nebraska Sandhills Grasslands: Part 1—Plant Functional Group Analysis. *Rangeland Ecology & Management*, 93, 49-61.

4. Heil, H. A., **Zhao, B.**, Troyer, B. C., Sjostrand, R. L., Xiong, J., Watson, A. K., Erickson. G. E., Okalebo, J., Shi Y., Xiong, Y. (2023). Characterizing Yearling Beef Steers Grazing on Smooth Bromegrass Pasture Using Global Positioning Technology. *Journal of Animal Science*, 101, 11-12.

5. **Zhao, B.,** Khound, R., Ghimire, D., Zhou, Y., Maharjan, B., Santra, D. K., & Shi, Y. (2022). Heading percentage estimation in proso millet (Panicum miliaceum L.) using aerial imagery and deep learning. *The Plant Phenome Journal*, 5(1), e20049.

6. Jiang, Z., Tu, H., Bai, B., Yang, C., **Zhao, B.**, Guo, Z., ... & Zhang, J. (2021). Combining UAV-RGB high-throughput field phenotyping and genome-wide association study to reveal genetic variation of rice germplasms in dynamic response to drought stress. *New Phytologist*, *232*(1), 440-455.

7. **Zhao, B.,** Li, J., Baenziger, P. S., Belamkar, V., Ge, Y., Zhang, J., & Shi, Y. (2020). Automatic wheat lodging detection and mapping in aerial imagery to support high-throughput phenotyping and in-season crop management. Agronomy, 10 (11), 1762.

8. Zhang, J., **Zhao B.**, Yang C., Shi Y., Liao Q., Zhou G., Wang C. et al. (2020). Rapeseed stand count estimation at leaf development stages with UAV imagery and convolutional neural networks. *Frontiers in Plant Science* 11: 617.

9. **Zhao, B.**, Zhang, J., Yang, C., Zhou, G., Ding, Y., Shi, Y., ... & Liao, Q. (2018). Rapeseed seedling stand counting and seeding performance evaluation at two early growth stages based on unmanned aerial vehicle imagery. *Frontiers in Plant Science*, 1362.

10. Zhang J., Meng J., **Zhao B.**, Zhang D., & Xie J. (2018). Research on the chlorophyll content (SPAD) distribution based on the consumer-grade modified nearinfrared camera. *Spectroscopy and spectral analysis* 38, no. 3: 737-744. (in Chinese)

11. Zhang, J., Yang, C., **Zhao, B.**, Song, H., Clint Hoffmann, W., Shi, Y., ... & Zhang, G. (2017). Crop classification and LAI estimation using original and resolution-reduced images from two consumer-grade cameras. *Remote Sensing*, *9*(10), 1054.

12. **Zhao B.**, Ding Y., Cai X., Xie J., Liao Q., & Zhang J. (2017). Seedlings number identification of rape planter based on low altitude unmanned aerial vehicles remote sensing technology. *Transactions of the Chinese Society of Agricultural Engineering* 33, no. 19: 115-123. (in Chinese)

CONFERENCES PARTICIPANT AND PRESENTATIONS

- ***Conference proceedings:***

1. Wang, L., Li, J., Zhao, L., **Zhao, B.**, Bai, G., Ge, Y., & Shi, Y. (2021, April). Investigate the potential of UAS-based thermal infrared imagery for maize leaf area index estimation. In *Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping VI* (Vol. 11747, p. 1174703). International Society for Optics and Photonics.
2. **Zhao, B**., Li, J., Wang, L., & Shi, Y. (2020, April). Positioning accuracy assessment of a commercial RTK UAS. In *Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping V* (Vol. 11414, p. 1141409). International Society for Optics and Photonics.

- ***Conference presentations:***

1. **Zhao, B.,** Hiller, J., Awada, T., Xiong, Y., Watson, A., Stephenson, M., Wang, R., Erickson, G., Jin, V., Schmer, M., Wardlow B., Shi, Y. (2024). Forage biomass estimation for smooth bromegrass using drone-based remote sensing to evaluate effects of treatments with nitrogen fertilization and cattle nutrient supplement. Management and Imaging (session 2 of 2), In 2024 SRM Annual Meeting. Jan. 28 to Feb. 01, Sparks, Nevada.
2. **Zhao, B.,** Hiller, J., Awada, T., & Shi, Y. (2023). Pasture forage biomass estimation with management treatments using UAV and machine learning models. In 118 UAS Applications in Precision Agriculture, Natural Resources, and Vector Control. The American Society of Agricultural and Biological Engineers (ASABE), 2023 Annual meeting, 9 - 12 July, 2021, Omaha, NE.
2. **Zhao, B.,** Stephenson, M., Awada, T., Volesky, J., Wardlow, B., Zhou, Y., & Shi, Y. (2023). Linking on-ground plant functional group biomass production to remote sensing in the semi-arid grasslands of the Nebraska Sandhills. In 2023 SRM Annual Meeting. Feb. 12 to Feb. 16, Boise, Idaho.
3. **Zhao, B.,** Stephenson, M. B., Volesky, J. D., Xiong, Y., Awada, T., Wardlow, B., & Shi, Y. (2023). Selection preference of grazing cattle over time and paddocks in Nebraska Sandhills in 2016 and 2017 seasons. In 2023 SRM Annual Meeting. Feb. 12 to Feb. 16, 2023, Boise, Idaho. (Poster presentation)

4. Izere, P., **Zhao, B.,** Ge, Y., & Shi, Y. (2022). Estimation of plant height using UAS with RTK GNSS technology. In Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping VII. International Society for Optics and Photonics (SPIE), Defense + Commercial Sensing 2022 - Digitial Forum, 2022. Scheduled for 3 - 7 April in Orlando, Florida, United States.

5. **Zhao, B.**, Khound, R., Santra, D., & Shi, Y. (2021). Applying Computer Vision to Detect Heads of Proso Millet from UAV Images. In UAS Applications and Precision Agricultural Utilization in Agriculture II. The American Society of Agricultural and Biological Engineers (ASABE), 2021 Annual International virtual meeting, 12 - 16 July, 2021.

6. **Zhao, B.**, Li, J., Wang, L., & Shi, Y. (2020). Assessing positioning accuracy of a commercial UAS with RTK-GPS in crop sensing. In Machinery Systems - UAVs in Precision Agriculture. The American Society of Agricultural and Biological Engineers (ASABE), 2020 Annual International virtual meeting, 12 - 15 July, 2020.

7**. Zhao, B.**, Li, J., Wang, L., & Shi, Y. (2020). Positioning accuracy assessment of a commercial RTK UAS. In Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping. International Society for Optics and Photonics (SPIE), Defense + Commercial Sensing 2020 - Digitial Forum, 2020. Scheduled for 26 - 30 April in Anaheim, California, USA, shifted to a new, Digital Forum online.

MEMBERSHIP IN SCIENTIFIC SOCIETY

- 2019 – present: American Society of Agricultural and Biological Engineers
- 2021 – present: The Society for Range Management

AWARDS

- David H. & Annie E. Larrick Memorial Travel Fund, from the Agricultural Research Division, UNL, in February 2023.
- Graduate Student Travel Award, from the Office of Graduate Studies, UNL, in December 2022.

SERVICES

07/2020 – 2023, Student Activity Committee (SAC) of the Association of Overseas Chinese Agricultural, Biological, and Food Engineers (AOCABFE).