

## **Xin (Rex) Sun, Ph.D.**

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Research Group Website: <https://sites.google.com/view/ndsusunslab>

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### **EMPLOYMENT**

- 2018.09- Assistant Professor of Precision Agriculture (40% Teaching; 60% Research) - Department of Agricultural and Biosystems Engineering, North Dakota State University, Fargo, ND, U.S.
- 2018.09- Director - NDSU Meat Quality Laboratory Recharge Center, North Dakota State University, Fargo, ND, U.S.
- 2018.09- Associate Director - Center for Digital Agriculture and Big Data, North Dakota State University, Fargo, ND, U.S.
- 2018.09- Adjunct Faculty- Department of Animal Sciences, North Dakota State University, Fargo, ND, U.S.
- 2015-2018 Research Scientist - Department of Animal Sciences, North Dakota State University, Fargo, ND, U.S.
- 2015.01-11 Visiting Scholar/ Postdoctoral Researcher - Department of Animal Sciences, North Dakota State University, Fargo, ND, U.S.
- 2013-2015 Lecturer (50% Teaching; 50% Research) - Department of Engineering, Nanjing Agricultural University, Nanjing, Jiangsu, China.

### **EDUCATION**

- 2003-2007 **B.S.** Electronic Information Science and Technology, Yantai University, China
- 2007-2013 **Ph.D.** Agriculture Engineering, Nanjing Agricultural University, China

### **TEACHING**

#### **North Dakota State University, Agricultural and Biosystems Engineering (ABEN) Department**

- PAG 115 Introduction to Precision Agriculture 2019 Fall, 2020 Fall
- PAG 215 Mapping of Precision Ag Data 2019 Spring, 2020 Spring, 2021 Spring
- PAG 315 Electronic Systems in Precision Agriculture 2020 Fall
- PAG 496 Field Experience/Practicum 2019 Fall, 2020 Fall
- PAG 496 Field Experience (Ag Tech Expo) 2019 Spring, 2020 Spring

#### **North Dakota State University, College of Engineering**

- ENGR 191 Engineering Grad Challenges Seminar 2019 Spring, 2020 Spring

XIN SUN

### **North Dakota State University, Animal Sciences Department**

- ANSC 393 Undergraduate Research: Meat Science                      2017 Fall, 2018 Spring, 2019 Spring, 2019 Fall, 2020 Spring
- ANSC 379 Study Tour Abroad    2017 Fall, 2018 Spring

### **Nanjing Agricultural University, College of Engineering; Agricultural Engineering Department**

- Geography Information Systems (GIS)                                      2014 Spring; Fall
- Intelligent Transportation Systems (ITS)                                      2014 Spring; Fall
- Lab: Applied Transportation Software (ArcGIS)                                      2014 Spring; Fall

### **PROFESSIONAL SERVICE**

1. NSF 2021 **Reviewer**
2. USDA-NIFA 2021 **Reviewer**
3. Frontiers in Sensors – **Editor Review Board**
4. Journal of Food, Agriculture and Environment (JFAE) – **Editor Review Board**
5. Scientific Reports – Nature **Reviewer**
6. Transactions of the ASABE – **Reviewer**
7. Computers and Electronics in Agriculture – **Reviewer**
8. Meat Science – **Outstanding Reviewer**
9. International Journal of Agricultural and Biological Engineering – **Reviewer**
10. Meat and Muscle Biology – **Reviewer**
11. Applied Engineering in Agriculture – **Reviewer**
12. Food Chemistry – **Reviewer**
13. Journal of Animal Science - **Reviewer**
14. Canadian Journal of Animal Science - **Reviewer**
15. Analytica Chimica Acta - **Reviewer**
16. Food Analytical Methods - **Reviewer**
17. Food Reviews International – **Reviewer**
18. Journal of the Science of Food and Agriculture – **Reviewer**
19. Innovative Food Science & Technologies (IFSET) – **Reviewer**
20. International Journal of Food Engineering (IJFE) – **Reviewer**
21. Trends in Food Science & Technology – **Reviewer**
22. Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy – **Reviewer**
23. International Journal of Computer Systems Science and Engineering – **Reviewer**
24. Journal of Fisheries & Livestock Production – **Reviewer**

**PUBLICATIONS:**

	Journal Article	Abstract	Book Chapter	Conference Proceeding	Technical Papers	Industry Report	Press Features	Professional Engineer Publication	Total
By June 30 <sup>th</sup> , 2021	<b>31</b>	<b>35</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>22</b>	<b>1</b>	<b>98</b>

**Select Journal Articles** (\* indicate the correspondence author)

- Chen, X. M., Ogdahl W., Hanna, L. L. H., Dahlen, C. R., Riley, D. G., Wagner, S., Berg, E. P., & **Sun, X\***. (2021). Evaluation of Beef Cattle Temperament by Eye Temperature Using Infrared Thermography Technology. *Computers and Electronics in Agriculture*. **Accepted**.
- Shi, Y., Wang, X., Mohammad, B., Young, J., Newman, D., Berg, E., & **Sun, X\***. (2021). Review article - A review on meat quality evaluation methods based on non-destructive computer vision and artificial intelligence technologies. *Food Science of Animal Resources*. doi: <https://doi.org/10.5851/kosfa.2021.e25>.
- GC, S., Saidul Md, B., Zhang, Y., Reed, D., Ahsan, M., Berg, E. P., & **Sun, X\***. (2021). Using Deep Learning Neural Network in Artificial Intelligence Technology to Classify Beef Cuts. *Frontiers in Sensors*, 2, 5. doi: <https://doi.org/10.3389/fsens.2021.654357>.
- Ahmed, M. R., Reed, D. D. Jr., Young, J. M., Eshkabilov, S., Berg, E. P., & **Sun, X\***. (2021). Beef Quality Grade Classification Based on Intramuscular Fat Content Using Hyperspectral Imaging Technology. *Applied Sciences*. 11(10):4588. doi: <https://doi.org/10.3390/app11104588>. (Cover Story)
- Delavarpour, N., Koparan, C., Nowatzki, J., Bajwa, S., & **Sun, X\***. (2021). Review article - A Technical Study on UAV Characteristics for Precision Agriculture Applications and Associated Practical Challenges. *Remote Sensing*, 13, 1204. doi: <https://doi.org/10.3390/rs13061204>.
- Eshkabilov, S., Chiwon, W. L., **Sun, X.**, Ademola, H., & Simsek, H. (2021). Hyperspectral imaging techniques to examine nutrient status of hydroponically grown lettuce cultivars. *Computers and Electronics in Agriculture*, 181, 105968. doi: <https://doi.org/10.1016/j.compag.2020.105968>.
- Liu, J. H., Newman, D. J., Young, J. M., & **Sun, X\***. (2020). Prediction of Whole Pork Loin and Individual Chops' Intramuscular Fat Using Computer Vision System Technology. *Meat and Muscle Biology*, 4(1). doi: <https://doi.org/10.22175/mmb.11127>.
- Chen, X., Ogdahl, W., Borhan, M. S., & **Sun, X\***. (2020). Evaluation of Beef Cattle Temperament Using Video Technology. *Transactions of the ASABE*, 63(6), 1905-1911. doi: <https://doi.org/10.13031/trans.14044>.
- Sun, X.\***, Young, J., Liu, J. H., Chen, Q., & Newman, D. (2018). Predicting Pork Color Scores Using Computer Vision and Support Vector Machine Technology. *Meat and Muscle Biology*, 2(1), 296-302. doi: <https://doi.org/10.22175/mmb2018.06.0015>.
- Sun, X.\***, Young, J., Liu, J. H., & Newman, D. (2018). Prediction of pork loin quality using online computer vision system and artificial intelligence model. *Meat Science*, 140, 72-77. doi: <https://doi.org/10.1016/j.meatsci.2018.03.005>.

11. **Sun, X.**, Newman, D., Liu, J. H., Young, J., & Bachmeier, L. (2016). Predicting pork two tone color grade using image color features and support vector machine. *Meat Science*, (112), 154-155. doi: <https://doi.org/10.1016/j.meatsci.2015.08.119>.
12. **Sun, X.**, Newman, D., Young, J. M., & Berg E. P. (2016). Prediction of Pork Fatty Acid Content Using Image Texture Features. *Advance Journal of Food Science and Technology*, 12(11): 644-647. doi: <http://dx.doi.org/10.19026/ajfst.12.3323>.
13. **Sun, X.**, Chen G. Y., Young J. M., Liu J. H., Bachmeier L., Chen K. J., Zhang Y. & Newman, D. (2016). Prediction of Pork Color Grade using Image Two-tone Color Ratio Features and Support Vector Machine. *Advance Journal of Food Science and Technology*, 11(9): 593-598. doi: <http://dx.doi.org/10.19026/ajfst.11.2733>.
14. **Sun, X.**, Young, J. M, Liu, J. H., Bachmeier L., Somers R. M., Chen K. J., & Newman, D. (2016). Prediction of pork color attributes using computer vision system. *Meat Science*, 113, 62-64. doi: <https://doi.org/10.1016/j.meatsci.2015.11.009>.
15. **Sun, X.**, Chen, K. J., Berg, E. P., Newman, D. J., Schwartz, C. A., Keller, W. L., & Maddock Carlin, K. R. (2014). Prediction of troponin-T degradation using color image texture features in 10d aged beef longissimus steaks. *Meat science*, 96(2), 837-842. doi: <https://doi.org/10.1016/j.meatsci.2013.09.012>.
16. **Sun, X.**, Chen K. J., Maddock- Carlin K. R., Anderson V. L., Lepper A. N., Schwartz C.A., Keller W. L., Ilse B. R., Magolski J. D. & Berg E. P. (2012). Predicting beef tenderness using color and multispectral image texture features. *Meat Science*, (4): 382-393. doi: <https://doi.org/10.1016/j.meatsci.2012.04.030>.
17. **Sun, X.**, Chen K. J., Berg E. P. & Magolski J. D. Predicting Fresh Beef Color Grade Using Machine Vision Imaging and Support Vector Machine (SVM) Analysis. (2011). *Journal of Animal and Veterinary Advances*, (10): 1504-1511. doi: <http://dx.doi.org/10.3923/javaa.2011.1504.1511>.

### **Book Chapter**

1. **Sun, X.**, Berg, E. P. CH07 - Factors affecting the colour and texture of pig meat. Achieving sustainable production of pig meat. (2017). Burleigh Dodds Science Publishing.
2. Zhang, Y., **Sun, X.**, Bajwa, S., G., Sivarajan, S., Nowatzki, J., Khan, M. Chapter 8: Plant Disease Monitoring with Vibrational Spectroscopy. *Vibrational Spectroscopy for Plant Varieties and Cultivar Characterization*. (2018). Elsevier.

**RESEARCH FUNDING**

	NAU, China	NDSU, USA	Total	Sun's Share
By March 31 <sup>st</sup> , 2021	<b>\$177,619</b>	<b>\$10,385,815</b>	<b>\$ 10,563,434</b>	<b>\$1,319,726</b>

**Select Projects**

Year	Role	Project Source	Project Title	Amount	Sun's Share
2021	<b>PI</b>	State Board of Agricultural Research & Education	Assessment of consumer purchasing and education of beef quality attributes using mobile applications (Android and iPhone operating system: IOS) - Year 2	\$15,823	\$15,823
2019	<b>PI</b>	National Pork Board	Computer vision system development for online pork loin quality evaluation	\$70,000	\$70,000
2019	<b>Co-PI</b>	USDA-ARS	Advanced UAS/UAV application systems, data management systems, and bioinformatics tools that integrate GxExM data into precision agricultural crop management for regional relevant crops	\$4.36M	\$595,861
2018	<b>PI</b>	NDAES Precision Ag Grant Program	Field validation of weed species and herbicide resistance identification with a multi-sensor thermal-3D modeling approach with UAS	\$60,831	\$60,831
2018	<b>PI</b>	State Board of Agricultural Research & Education	Predict early stages of respiratory disease in beef cattle using near-infrared spectroscopy (NIRS)	\$17,400	\$17,400
2018	<b>PI</b>	State Board of Agricultural Research & Education	Assessment of consumer purchasing and education of beef quality attributes using mobile applications (Android and iPhone operating system: IOS)	\$15,000	\$15,000
2018	<b>PI</b>	North Dakota Pork Council	Pork quality evaluation using advanced imaging technology	\$4,000	\$4,000
2018	<b>PI</b>	NDAES Precision Ag Grant Program	Study the relationship between beef cattle temperament and beef quality using near-infrared, video, and thermal imaging technologies	\$69,859	\$69,859
2018	<b>PI</b>	National Pork Board	NPB quality materials update	\$79,500	\$79,500
2017	<b>PI</b>	The US Pork Center of Excellence's Pork Information Gateway	Promoting the Importance of Pork Quality through High-Resolution Video	\$2,500	\$2,500
2017	<b>PI</b>	North Dakota Beef Commission	Evaluation of imaging processing technology to predict outstanding beef flavor	\$36,270	\$36,270
2015	<b>PI</b>	National Pork Board	Prediction of pork quality using online computer vision system	\$80,145	\$80,145
2014	<b>PI</b>	JiangSu Province Natural Science Foundation	Study of relationship between beef microstructure characteristics and beef tenderness	\$30,442	\$30,442
2013	<b>PI</b>	Nanjing Agricultural University- Young Teachers Start Fund	Detecting Agricultural Food Quality Using Online Machine Vision Technology	\$7,610	\$7,610

## **RELATED WEB LINKS**

Google Scholar:

- <https://scholar.google.com/citations?user=w0UZiqUAAAAJ&hl=en>

News/Media Report:

1. <https://www.farms.com/ag-industry-news/ai-the-future-of-farming-846.aspx>
2. <https://www.ndsu.edu/news/view/detail/58923/>
3. <https://www.farm-equipment.com/articles/18253-todays-recap-xin-rex-sun-assistant-professor-precision-agriculture-north-dakota-state-university>
4. <https://insideunmannedsystems.com/trends-slow-but-sure/>
5. <https://insideunmannedsystems.com/ndsu-puts-focus-on-livestock-as-part-of-precision-ag/>
6. [https://issuu.com/fmspotlight/docs/future-farmer-jan-master-2\\_cad0d26adec8ac](https://issuu.com/fmspotlight/docs/future-farmer-jan-master-2_cad0d26adec8ac)
7. <http://ndsuspectrum.com/changes-in-agriculture/>
8. <https://www.agweek.com/business/agriculture/4701639-precision-ag-opportunities-abound-farm-and-industry#.XjCgzVFuJU0.twitter>
9. [https://www.ndsu.edu/vpag/newsletter/beef\\_cattle\\_temperament\\_is\\_linked\\_to\\_health\\_meat\\_quality/](https://www.ndsu.edu/vpag/newsletter/beef_cattle_temperament_is_linked_to_health_meat_quality/)
10. [https://issuu.com/fmspotlight/docs/future-farmer-jan-master-2\\_cad0d26adec8ac](https://issuu.com/fmspotlight/docs/future-farmer-jan-master-2_cad0d26adec8ac)
11. <https://www.grandforksherald.com/business/agriculture/1356196-Precision-ag-research-looks-to-drones-to-fight-weeds-diagnose-livestock>
12. <https://www.farmflavor.com/north-dakota/north-dakota-agribusiness/high-tech-farming-tools-help-north-dakota-producers-feed-their-communities/>
13. <https://ndfu.org/20761-2/>
14. <https://www.ag.ndsu.edu/academics/new-precision-ag-major-offered-at-ndsu>
15. [https://www.farmforum.net/farm\\_forum/precision-ag-research-looks-to-drones-to-fight-weeds-diagnose/article\\_1f6f1290-f1dd-5919-a2a1-3cd9ece12af4.html](https://www.farmforum.net/farm_forum/precision-ag-research-looks-to-drones-to-fight-weeds-diagnose/article_1f6f1290-f1dd-5919-a2a1-3cd9ece12af4.html)
16. <https://www.agweek.com/business/agriculture/4620349-brave-new-world-drones-ag-data>
17. <https://www.agweek.com/business/agriculture/4620440-agweektv-ndsu-looks-high-tech-weed-control>
18. [https://issuu.com/ndfu/docs/uf\\_-\\_march19\\_web](https://issuu.com/ndfu/docs/uf_-_march19_web)
19. <https://www.am1100theflag.com/news/3702-ndsu-introduces-new-ag-program-precision-agriculture>
20. [https://www.farmforum.net/farm\\_forum/new-precision-ag-major-offered-at-ndsu/article\\_c4b91fe6-2299-557c-8086-de98501c41d4.html](https://www.farmforum.net/farm_forum/new-precision-ag-major-offered-at-ndsu/article_c4b91fe6-2299-557c-8086-de98501c41d4.html)
21. <http://ndsuspectrum.com/new-animal-science-technology/>

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22. <https://www.ndsu.edu/news/view/detail/32885/>
23. <http://www.meatingplace.com/Industry/News/Details/78566>
24. <http://www.inforum.com/news/4239890-ndsu-researchers-eyeball-new-ways-grow-better-beef>
25. <http://www.agweek.com/agweektv/4240478-agweek-tv-full-show-mcmartin-bankruptcy-beef-research-poultry-changes>
26. <https://www.ndsu.edu/news/view/detail/21112/>
27. [http://www.ndsu.edu/news/studentnews/archive/foodsystems\\_china/](http://www.ndsu.edu/news/studentnews/archive/foodsystems_china/)
28. <http://news.njau.edu.cn/?m=article&id=42860> (Chinese)
29. <http://news.pk.njau.edu.cn/info/1003/2549.htm> (Chinese)
30. <http://www.pk.njau.edu.cn/info/1007/1472.htm> (Chinese)
31. [http://www.pukou.gov.cn/pkyw/zjdj/201306/content\\_0604\\_194476.htm](http://www.pukou.gov.cn/pkyw/zjdj/201306/content_0604_194476.htm) (Chinese)
32. <http://dkxy.nwsuaf.edu.cn/show.php?articleid=8107> (Chinese)
33. [http://cast1.cau.edu.cn/art/2013/5/17/art\\_70\\_177013.html](http://cast1.cau.edu.cn/art/2013/5/17/art_70_177013.html) (Chinese)
34. <http://www.flickr.com/photos/usdachina/sets/72157633750354667/>