

# Subhashree Navaneetha Srinivasagan (Subha)

Postdoctoral Associate

Nutrient Management Spear Program

Department of Animal Science, 325 Morrison Hall, Cornell University

[LinkedIn](#) | [Twitter](#) | [Google Scholar](#) | [ResearchGate](#) | [Email](#)

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## EDUCATION

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**Ph.D. | Agricultural and Biosystems Engineering** January 2018 – March 2022  
North Dakota State University (NDSU), USA

Dissertation title: Modeling and web tool development for ranch and pasture forage economics and growth prediction using open source software

**Certificate degree | Software Engineering** August 2019 – May 2020  
NDSU, USA

**Masters | Agricultural and Biosystems Engineering** August 2015 – December 2017  
NDSU, USA

Thesis title: Infield biomass bales aggregation logistics and equipment track impacted area evaluation

**Bachelors | Energy and Environmental Engineering** July 2009 – May 2013  
Tamil Nadu Agricultural University, India

Study title: Energy evaluation of Cumbu Napier variant (CO<sub>6</sub>) forage grass variety

## PROFESSIONAL EXPERIENCE

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**Postdoctoral Associate** April 2022 – Present  
*Department of Animal Science, Cornell University, Ithaca, NY, USA*

Efficient nutrient management for corn yield production for New York farmers

- Conducting on-farm research for developing efficient nutrient management practices
- Using remote sensing technology (drones) and machine learning approaches for crop yield prediction
- Creating user-friendly tools for farmers and farm consultants to aid in making management decisions

**Graduate research assistant** January 2018 – March 2022  
*Agricultural and Biosystems Engineering, NDSU*

Energy consumption simulation and modeling for forage collection operation

- Simulated scenarios for forage collection operation using various field parameters.
- Compared energy consumption forage collection operation using tractor and automatic bale loader.
- Developed nonlinear models using field inputs to estimate logistics distance, operation time, and fuel consumption for forage collection operation.
- Developed iOS based web app for estimating forage energy consumption. ([Link](#))

Forage economics calculator web tool

- Developed user-friendly web based tool to perform forage economic analysis for bale operation in collaboration with USDA-ARS, Mandan ([Link](#)).
- Collected requirements for the web tool functionality from ranchers, farmers, and extension specialist.
- Built features such as machinery purchase decision, what-if, no-cost scenario analysis, and downloadable report.
- Conducted real field case studies – accuracy and performance of the calculator was reported satisfactory.

Forage yield prediction using remote sensing and climate data (on-going)

- Developing prediction models using climate data and vegetation indices estimated from satellite imagery (Landsat ETM, Sentinel, and CubeSat – Google Earth Engine, PlanetScope Inc. and USGS; Satellite image processing – R, QGIS and Python).
- Conducted analysis using multiple linear and machine learning models (Random forest, support vector machine, & k-nearest neighbor).
- Developed web app using ShinyR to predict pasture forage based on the remotely sensed imagery and climate data.

## Graduate research assistant

August 2016 – December 2017

*Agricultural and Biosystems Engineering, NDSU*

Infield logistics simulation and modeling for stacking and impacted area

- Simulated real field bale scenario to estimate the optimized location to stack the bales.
- Developed simulation mimicking harvest, baling, and forage (bale) collection operation with realistic vehicle turning case.
- Developed 19 different turning case scenarios based on the bale location using geometric principles.
- Build non-linear prediction models to track the tyre foot print of the machinery (soil impacted area) using field inputs.

Machine learning in precision agriculture

- User-coded k-nearest neighbor (kNN) and linear discriminant analysis (LDA) to classify weed species and soybean aphids.
- Classified cover crop flower species using support vector machine and developed webtool to classify and quantify cover crop flowers. ([Link](#))

Computer-vision algorithm development

- Studied the browning in apples using time-lapse images - color and textural features were analyzed.
- Digitally measured sunflower floral dimensions using pixel-march method and developed a user-coded plugin.

## TEACHING EXPERIENCE

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### Teaching assistant

August 2015 – May 2016

Instructor: Dr. Ganesh Bora

Course: Principles and Application of Precision Agriculture (ASM 454),  
Agricultural and Biosystems Engineering, NDSU

### Teaching assistant

January 2016 – May 2016

Instructor: Dr. Xinhua Jia

Course: Natural Resource Management Systems (ASM 264),  
Agricultural and Biosystems Engineering, NDSU

## RELEVANT TECHNICAL SKILLS

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- **Programming languages:** R, JavaScript, Java, Python, Swift, HTML, CSS, L<sup>A</sup>T<sub>E</sub>X
- **Machine learning:** Caret (R software), Scikit-learn (Python)
- **Image processing:** ImageJ (Java), MATLAB
- **Web development:** JavaScript, HTML, CSS
- **Mobile application:** Xcode, Android Studio
- **Statistical analysis:** R Studio, SAS, Minitab
- **GIS/Remote sensing:** ArcGIS, QGIS, ENVI
- **UAV/Precision agriculture software:** Pix4D, Farm Works<sup>TM</sup>, DroneDeploy.
- **Others:** Adobe Photoshop, Inkscape

## AWARDS AND HONORS

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1. Graduate Research Paper Award 2020-2021 (first place) in the Ph.D. category, AABFEIO, American Society of Agricultural and Biological Engineering (ASABE).
2. Frank Bain Scholarship, NDSU, 2019.
3. Travel Grant, Production Agriculture Symposium, University of Minnesota, St. Paul, 2019.
4. Best poster award, Graduate Student Council, NDSU, 2017.
5. Graduate Research Paper Award 2016-2017 (third place) in the Masters category, AABFEIO, American Society of Agricultural and Biological Engineering (ASABE).
6. Graduate Student Council Travel Award, NDSU, 2016.

## GRANT WRITING

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1. Project titled “Putting Farmers in the Driver Seat for On-Farm Research; Scalable Precision Agriculture Technology for Adaptive Management” submitted to Cornell Atkinson Center for Sustainability’s postdoctoral fellowship (2022 – 2024) – Awarded.
2. Assisted in grant writing for the project titled “Using Machine Learning and Remote Sensing to Predict Forage Production during Drought” for a total budget of \$99,120. Submitted to USDA-ARS AI Innovation Fund (2022–2023) – Not funded.

## PEER-REVIEWED PUBLICATIONS (JOURNAL/BOOK CHAPTER)

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### Published

1. **Subhashree, S. N.**, Igathinathane, C., Liebig, M., Halvorson, J., Archer, D., Hendrickson, J., and Kronberg, S. 2021. Biomass bales infield aggregation logistics energy for tractors and automatic bale pickers – A simulation study. *Biomass and Bioenergy*, 144: 105915. ([Link](#))
2. **Subhashree, S. N.**, and Igathinathane, C. 2019. Tracks impacted field area simulation using kinematics and geometry for different equipment and operation scenarios. *Biosystems Engineering*, 187: 185–200. ([Link](#))
3. Pandiselvam, R., Manikantan, M. R., **Subhashree, S. N.**, Mathew, A. C., Balasubramanian, D., Shameena Beegum, P. P., ... and Hebbar, K. B. 2019. Correlation and principal component analysis of physical properties of tender coconut (*Cocos nucifera* L.) in relation to the development of trimming machine. *Journal of Food Process Engineering*, 42(6): e13217. ([Link](#))
4. Sunoj, S., **Subhashree S. N.**, Dharani, S., Igathinathane, C., Franco, J., Mallinger, R. E. Prasifka, J. R., and Archer, D. 2018. Sunflower floral dimension measurements using digital image processing. *Computers and Electronics in Agriculture*, 151: 403–415. ([Link](#))
5. **Subhashree, S. N.**, Sunoj, S., Xue, J., and Bora, G. C. 2017. Quantification of browning in apples using colour and textural features by image analysis. *Food Quality and Safety*, 1(3): 221–226. ([Link](#))
6. **Subhashree, S. N.**, Igathinathane, C., Bora, G. C., Ripplinger, D., and Backer, L. 2017. Optimized location of biomass bales stack for efficient logistics. *Biomass and Bioenergy*, 96: 130–141. ([Link](#))

### Book chapter

1. **Subhashree, S.N.**, Sunoj, S., Hassanijalilian, O., and Igathinathane, C. 2020. Decoding common machine learning methods: Agricultural application case studies using open source software. *Applied Intelligent Decision Making in Machine Learning*. Taylor & Francis Group. pp 21–52. ([Link](#))

### Submitted/In preparation

1. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D., Liebig, M., Halvorson, J., Kronberg, S., Toledo, D., Sedevic, K., 2021. Forage Economics Calculator – A Web Tool. *Computers and Electronics in Agriculture* (Submitted – under review).
2. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D., Liebig, M., Toledo, D., Sedevic, K., Kronberg, S., Halvorson, J., 2021. Forage growth prediction tools and models – a review. *Rangelands*.
3. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D., Liebig, M., Halvorson, J., Kronberg, S., Toledo, D., Sedevic, K., 2021. Forage yield prediction using remotely sensed vegetation index and climate data through machine learning. *Rangelands*.

## CONFERENCE PROCEEDINGS AND EXTENSION PUBLICATIONS

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1. **Subhashree, S. N.** and Igathinathane, C. Forage Economics Calculator – a Web Tool. USDA-ARS Integrator, February 202, pp 11–12.
2. **Subhashree, S. N.** and Igathinathane, C. Fuel Consumption Comparison in Logistics of Aggregation of Biomass Bales – Tractor vs. Automatic Bale Pickers. USDA-ARS Integrator, August 2020, pp 7–8.
3. Harsh, P., **Subhashree, S. N.**, Sunoj, S., and Igathinathane, C. Data Security and Privacy in Precision Agriculture - Is Open Source Software a Possible Solution?. USDA-ARS Integrator, August 2020, pp 12–13.

4. Igathinathane, C., Sunoj, S., and **Subhashree, S.N.** Agricultural engineering research excellence in image processing using open source software. National Conference on Strategic for Developing World-Class Agricultural Universities. Paper no: WCAU/FLP/5, March 2019, pp 76–89.
5. **Subhashree, S.N.**, Sunoj, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., Archer, D., Digital image processing for classification and quantification of cover crop flowers. USDA-ARS Integrator, February 2019, pp 14–15.
6. Sunoj, S., **Subhashree, S.N.**, Dharani, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., Prasifka, J.R., and Archer, D. 2018. Sunflower head, disc, and petal dimensions measurement using image processing. ASABE Paper No. 1801328. St. Joseph, MI: ASABE.
7. Sunoj, S., **Subhashree, S.N.**, Dharani, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., Prasifka, J.R., and Archer, D. Sunflower dimensions — Are two manual measurements sufficient?. USDA-ARS Integrator, February 2018, p 12.
8. **Subhashree, S. N.** and Igathinathane, C. Biomass bale aggregation using automatic bale pickers. USDA-ARS Integrator, February 2018, pp 15–16.
9. **Subhashree, S. N.** and Igathinathane, C. Infield optimized location of biomass bales stack for efficient collection logistic. USDA-ARS Integrator, July 2017, pp 8–9.
10. **Subhashree, S. N.**, Igathinathane, C. 2017. Equipment Track Impacted Field Areas during Harvesting, Baling, and Infield Bale Logistics. ASABE Paper No. 1700599. St. Joseph, MI: ASABE.
11. **Subhashree, S. N.**, Igathinathane, C. 2017. Biomass Bale Infield Logistics Scenario using Automatic Bale Picker. ASABE Paper No. 1700598. St. Joseph, MI: ASABE.

## CONFERENCE PRESENTATIONS

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1. **Subhashree, S. N.** and Igathinathane, C. 2021. Forage Economics Calculator: A User-friendly Web Tool for Ranchers and Farmers. 2021 NDSU Extension-REC Fall Conference 2021, Radisson Hotel, Bismarck, October 12 – 14, 2021 (Oral presentation).
2. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D., Liebig, M., Halvorson, J., Kronberg, S., Toledo, D., Sedevic, K. 2021. Forage yield prediction using remotely sensed vegetation index and climate data through machine learning. Long-Term Agroecosystem Research 2021 Annual Science Meeting, August 30 – September 1, 2021 (Poster presentation).
3. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D., Liebig, M., Halvorson, J., Kronberg, S., Toledo, D. 2021. Forage economics calculator: A decision support tool for analyzing economic performance of forage operations. Long-Term Agroecosystem Research 2021 Annual Science Meeting, August 30 – September 1, 2021 (Poster presentation).
4. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D., Liebig, M., Halvorson, J., Kronberg, S., Toledo, D. 2021. Ranch forage prediction web tool . Paper number: 2100885. ASABE 2021 Annual International Meeting (Virtual and On Demand), July 12 – 16, 2021 (Oral presentation).
5. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D., Liebig, M., Halvorson, J., Kronberg, S., Toledo, D. 2021. Forage Economics Calculator – A Web Tool. Paper number: 2100883. ASABE 2021 Annual International Meeting (Virtual and On Demand), July 12 – 16, 2021 (Oral presentation).
6. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D., Liebig, M., Halvorson, J., Kronberg, S., Toledo, D. 2020. Forage economics analysis using a developed web tool. Gamma Sigma Delta – NDSU Chapter 3rd Annual Symposium (Virtual), North Dakota State University, Fargo, ND, April 22, 2021 (Oral presentation).
7. **Subhashree, S. N.**, Igathinathane, C., J., Archer, D, Hendrickson, Liebig, M., Halvorson, J., Kronberg, S., Toledo, D. 2020. Webtool demonstration - Forage Economics Calculator. North Dakota Stockmen's Association Annual Board of Directors Meeting. December 2, 2020 (Oral presentation).
8. **Subhashree, S. N.**, Igathinathane, C., J., Archer, D, Hendrickson, Liebig, M., Halvorson, J., Kronberg, S., Toledo, D. 2020. Forage Economics Calculator. USDA Under Secretary Mr. Greg Ibach's visit, Northern Great Plains Research Laboratory (NGPRL), USDA-ARS, Mandan October 9, 2020 (Oral presentation).
9. **Subhashree, S. N.**, Igathinathane, C., Liebig, M., Halvorson, J., Archer, D, Hendrickson, J., Kronberg, S. 2020. Energy consumption of tractors and automatic bale pickers for biomass bales infield aggregation.

ASABE Paper No. 2000449, ASABE Annual International Meeting (Virtual), July 13–15, 2020 (Oral presentation).

10. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D. 2020. A review on drought-based decision tools applicable to forage production and management. ASABE Paper No. 2000560, ASABE Annual International Meeting (Virtual), July 13–15, 2020 (Oral presentation).
11. **Subhashree, S. N.**, Igathinathane, C., Hendrickson, J., Archer, D. 2019. A review on agricultural drought analysis modeling. ASABE Paper No. 1901271, ASABE Annual International Meeting, July 7–10, 2019, Boston, Massachusetts, USA (Oral presentation).
12. **Subhashree, S. N.**, Sunoj, S., Igathinathane, C., Franco, J.G., Mallinger, R., Archer, D. 2019. Web tool for classification and quantification of flowers for pollinators interaction using R. ASABE Paper No. 1901275, ASABE Annual International Meeting, July 7–10, 2019, Boston, Massachusetts, USA (Oral presentation).
13. **Subhashree, S. N.**, Sunoj, S., Igathinathane, C., Franco, J.G. 2019. Development of user-coded plugin and web application for classification and quantification of flowers for pollinator interaction. GSC 3rd Annual Research Symposium, North Dakota State University, Fargo, ND, April 3, 2019 (Poster presentation).
14. **Subhashree, S. N.**, Sunoj, S., Igathinathane, C., Franco, J.G. 2019. Digital image processing for classification and quantification of flowers for pollinators interaction. UMN Production Ag Symposium, University of Minnesota, St. Paul, Minnesota, USA (Oral presentation).
15. Sunoj, S., **Subhashree, S. N.**, Dharani, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., Prasifka, J.R., and Archer, D. 2018. Sunflower head, disc, and petal dimensions measurement using image processing. ASABE Paper No. 1801328, ASABE Annual International Meeting, July 29–August 1, 2018, Detroit, Michigan, USA (Oral presentation).
16. **Subhashree S. N.**, Sunoj, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., Prasifka, J.R., and Archer, D. 2018. Digital image processing for classification and quantification of flowers for pollinators interaction. ASABE Paper No. 1800764, ASABE Annual International Meeting, July 29–August 1, 2018, Detroit, Michigan, USA (Oral presentation).
17. **Subhashree, S. N.**, Sunoj, S., Igathinathane, C., Hendrickson, J., Halvorson, J., and Archer, D. 2018. A review on sensor-based crop stress assessment. ASABE Paper No. 1800763, ASABE Annual International Meeting, July 29–August 1, 2018, Detroit, Michigan, USA (Oral presentation).
18. Sunoj, S., Dharani, S., **Subhashree, S. N.**, and Igathinathane, C. 2018. Agricultural image processing applications of proximal and aerial imagery. 2018 Friends and Neighbors Day, NGPRL USDA-ARS, Bismarck, ND, July 19, 2018 (Poster presentation).
19. Sunoj, S., **Subhashree, S. N.**, Dharani, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., Prasifka, J.R., and Archer, D. 2018. Dimensions measurement of sunflower floral components by image processing. 2018 Friends and Neighbors Day, NGPRL USDA-ARS, Bismarck, ND, July 19, 2018 (Poster presentation).
20. **Subhashree S. N.** and Igathinathane, C. 2018. Equipment Track Impacted Field Areas Evaluation during Harvesting, Baling, and Infield Bale Logistics. GSC Annual Research Symposium, NDSU, Fargo, April 6, 2018 (Oral presentation).
21. **Subhashree S. N.** and Igathinathane, C. 2018. Infield biomass bale logistics scenarios using Automatic Bale Picker. GSC Annual Research Symposium, NDSU, Fargo, April 6, 2018 (Poster presentation).
22. Sunoj, S., **Subhashree, S. N.**, Dharani, S., and Igathinathane, C. 2018. A machine vision approach to measure sunflower floral dimensions. GSC Annual Research Symposium, NDSU, Fargo, April 6, 2018 (Poster presentation).
23. Sunoj, S. , **Subhashree, S. N.**, Dharani, S., Igathinathane, C. 2018. Sunflower head, disc, and floral dimensions measurement using image processing. Graduate Student Showcase, NDSU, Fargo, February 22, 2018 (Poster presentation).
24. **Subhashree, S. N.** and Igathinathane, C. 2017. Infield Equipment Impacted Area during Harvesting, Baling, and Bale Aggregation. SNRS Research Symposium, NDSU, Fargo, December 4, 2017 (Poster presentation).
25. Sunoj, S., **Subhashree, S. N.**, Dharani, S., Igathinathane, C., Franco, J.G., Mallinger, R.E., and Archer, D. 2017. An image processing approach to measure sunflower and seed head dimensions. SNRS Research

Symposium, NDSU, Fargo, December 4, 2017 (Poster presentation).

26. **Subhashree, S. N.** and Igathinathane, C. 2017. Track Impacted Field Areas during Harvesting, Baling, and Infield Bale Logistics Simulation. 2017 Friends and Neighbors Day, NGPRL USDA-ARS, Bismarck, ND, July 27, 2017 (Poster presentation).
27. **Subhashree, S. N.** and Igathinathane, C. 2017. Equipment Track Impacted Field Areas during Harvesting, Baling, and Infield Bale Logistics. ASABE Paper No. 1700599, ASABE Annual International Meeting, July 16-19, 2017, Spokane, Washington, USA. (Oral presentation).
28. **Subhashree, S. N.** and Igathinathane, C. 2017. Biomass Bale infield logistics scenario using Automatic Bale Picker. ASABE Paper No. 1700598, ASABE Annual International Meeting, July 16-19, 2017, Spokane, Washington, USA. (Oral presentation).
29. **Subhashree, S. N.**, and Igathinathane, C. 2017. Simulation on Track Impacted Field Areas during Harvesting, Baling, and Infield Bale Logistics. Farming and Ranching for the Bottom Line Conference, Area4 SCD, BSC, NDSU-Extension, and NGPRL USDA-ARS, Bismarck, February 28, 2017 (Poster presentation).
30. **Subhashree, S. N.**, and Igathinathane, C. 2017. Simulation on Track Impacted Field Areas during Harvesting, Baling, and Infield Bale Logistics. GSC Annual Research Symposium, NDSU Fargo, ND, February 24, 2017 (Best Poster Award).
31. **Subhashree, S. N.**, and Igathinathane, C. 2016. Equipment Track Impacted Field Areas during Infield Bale Logistics using Automatic Bale Picker, Solving real world problems. An interdisciplinary celebration of research, NDSU Fargo, ND, November 18, 2016 (Poster Presentation).
32. **Subhashree, S.N.**, Igathinathane,C.2016. Equipment Track Impacted Field Areas during Infield Bale Logistics using Automatic Bale Picker. Agricultural Biosciences International Agricultural Conference (ABIC 2016), FargoDome, North Dakota on September 20, 2016 (Poster presentation).
33. Sunoj, S., **Subhashree, S. N.**, and Igathinathane, C. 2016. Digital image processing in agriculture, Techxploration 2016, NDSU Fargo, ND, September 16, 2016 (Poster Presentation).
34. **Subhashree, S. N.**, Igathinathane Cannayen, Ganesh C Bora.2016. Biomass Bale Stack Location for Efficient Infield Logistics. ASABE Paper No. 162461747, 2016 ASABE Annual International Meeting, July 17 - 23, 2016, Orlando, Florida, USA (Oral presentation).
35. **Subhashree, S. N.**, Igathinathane Cannayen, Ganesh C Bora.2016. Effect of rainfall on the water uptake by biomass bales. 2016 ASABE Annual International Meeting, July 17 - 23, 2016, Orlando, Florida, USA (Oral presentation).
36. **Subhashree, S. N.**, Igathinathane,C.,Bora, G.C., Ripplinger, D., and Backer, L.2016. Optimized location of biomass bales stack for efficient logistics. 2016 Friends and Neighbors Day, NGPRL USDA-ARS, Bismarck, ND, July 28, 2016 (Poster presentation).
37. **Subhashree, S. N.**, Igathinathane,C.,Bora, G.C. 2016. Effect of rainfall on the water uptake by biomass bales. 2016 Friends and Neighbors Day, NGPRL USDA-ARS, Bismarck, ND, July 28, 2016 (Poster presentation).
38. **Subhashree, S. N.**, Igathinathane,C.,Bora, G.C., Ripplinger, D., and Backer, L.2016. Optimized location of biomass bales stack for efficient logistics. 2016 Bio Industry Summit, NDSU Fargo, ND, May 12, 2016 (Poster presentation).

## **EXTENSION/OUTREACH PRESENTATIONS**

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1. Manned a technical booth in the theme "Digital imaging for crop growth monitoring", Friends and Neighbors day 2019, Northern Great Plains Research Laboratory, USDA-ARS, Mandan, July 18, 2019 (Attended  $\approx$  40 members).
2. Manned a technical booth in the theme "Digital imaging for crop growth monitoring", Friends and Neighbors day 2018, Northern Great Plains Research Laboratory, USDA-ARS, Mandan, July 19, 2018 (Attended  $\approx$  40 members).
3. Conducted a field tour and presented on "Remote sensing and image analysis applications on agriculture" in Area IV research farms, Friends and Neighbors day 2018, July 19, 2018 (Attended  $\approx$  25 members).

4. Manned a technical booth in the theme “Digital imaging for crop growth monitoring”, Friends and Neighbors day 2017, Northern Great Plains Research Laboratory, USDA-ARS, Mandan, July 27, 2017 (Attended  $\approx$  30 members).
5. Participated in TechXploration Fair 2016 and presented on “Digital image processing in agriculture”, NDSU Great Plains Ballroom, September 15, 2016. (Attended  $\approx$  50 members).

### **PROFESSIONAL DEVELOPMENT ACTIVITIES**

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1. Attended a workshop on “Writing a Teaching Philosophy”, NDSU Graduate School, April 15, 2021.
2. Attended a workshop on “Writing in active voice”, NDSU Graduate School, April 9, 2021.
3. Attended a workshop on “Cover Letters and CVs”, NDSU Graduate School, September 21, 2020. enumerate
4. Attended a workshop on “Demystifying Your Dissertation: Communicating to a General Audience”, NDSU Graduate School, October 31, 2018.
5. Attended a workshop on “UAS applications on agriculture”, Drone Focus 2018, May 31, 2018.
6. Attended a workshop on “How to correct common grammar and punctuation mistakes”, NDSU Center for writers on November 2, 2016.
7. Attended a workshop on “Writing the results section”, NDSU Center for writers on October 13, 2016.
8. Attended a workshop on “Writing a first draft”, NDSU Center for writers on September 28, 2016.
9. Attended a workshop on “Introduction a literature review”, NDSU Center for writers on September 6, 2016.

### **PROFESSIONAL MEMBERSHIPS**

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1. American Society of Agronomy, Soil Science Society of America, since 2022 (Membership #: 811880).
2. American Society of Agricultural and Biological Engineering, since 2015 (Membership #: M1050765).
3. International Society of Precision Agriculture, since 2021 (Membership #: ISPA-02148).
4. Society of Women Engineers (SWE), since 2020.
5. Alpha Epsilon Honor Society – Agricultural, Food, and Biological Engineering, since 2016.

### **JOURNAL REVIEWER ACTIVITIES**

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1. Journal of Food Process Engineering, Wiley.
2. Journal of Texture Studies, Wiley.
3. Frontiers in Artificial Intelligence
4. Frontiers in Nutrition