Sunoj Shajahan

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EDUCATION

Ph.D. Agricultural and Biosystems Engineering   2015 – 2019
North Dakota State University (NDSU), Fargo, ND, USA

M.Tech., Agricultural Processing and Food Engineering   2012 – 2014
Tamil Nadu Agricultural University (TNAU), Coimbatore, India

B.Tech., Food Process Engineering   2008 – 2012
Tamil Nadu Agricultural University (TNAU), Coimbatore, India

PROFESSIONAL EXPERIENCE

Postdoctoral associate   Oct. 2019 – Present
Department of Animal Science, Cornell University, Ithaca, NY, USA
Role: • Processing and managing huge volumes of yield monitor database • Developing automated image analysis algorithms for remotely sensed UAS and satellite imagery • Developing corn yield prediction models using machine learning and deep learning approaches • Mentoring undergraduate and graduate students • Assisting in grant writing • Presenting findings for scientific and extension audiences.

Graduate research assistant   Aug. 2015 – Oct. 2019
Department of Agricultural & Biosystems Engineering, NDSU, Fargo, ND, USA
Role: • Developed image processing and artificial intelligence algorithms in precision agriculture applications • Presented findings in technical meetings • Published peer-reviewed journal articles • Assisted in grant writing.

Teaching instructor   Jan. 2015 – May 2015
Ramakrishna Mission Vivekananda Educational & Research Institute, Coimbatore, India
Role: • Handled theory classes for a course titled "Principles of food science and processing" for BS Agriculture students (class strength = 60) • Assisted and partly handled practical classes for the course.

Graduate research fellow   July 2012 – May 2014
Department of Food & Agricultural Process Engineering, TNAU, Coimbatore, India
Role: • Conducted research on non-destructive quality analysis using NIR spectroscopy • Presented and published research results • Assisted in conducting practical classes for crop process engineering and principles of food process engineering.

Product development trainee   Jan. 2014 – Feb. 2014
Britannia Industries Private Limited, Chennai, India
Role: • Conducted a short-term project on cream consistency of sandwich cookies • Trained in product development and recipe trials.

Quality assurance and product development trainee   Nov. 2011 – Feb. 2012
Perfetti Van Melle Private Limited, Chennai, India
Role: • Trained in candy packaging quality testing • Evaluated performance of candy sorting equipment.

RELEVANT TECHNICAL SKILLS

- **Programming languages**: Java, JavaScript, Python, R, Dart, HTML, CSS.
- **UAV/Precision agriculture software:** AgLeader SMS, WebODM, Pix4D Mapper, DroneDeploy.
- **GIS/Remote sensing**: QGIS, Google Earth Engine, R, ArcGIS, ENVI.
- **Machine learning**: Scikit-learn (Python), caret (R).
- **Deep learning**: PyTorch (Python), TensorFlow (Python), Keras (R).
- **Mobile application**: Android Studio (Java), Flutter (Dart).
- **Robotics**: RaspberryPi (Pi 3B+), Arduino (Uno).
- **Document preparation**: LaTeX, Microsoft Office.

AWARDS AND HONORS

1. NDSU GSC 3rd Annual Research Symposium, People Choice Award, 2019.
2. University of Minnesota, Production Ag Symposium, Travel Award, 2019.
3. ASABE Superior Paper Award, 2018.
4. ASABE AABFEIO Graduate Student Research Award, Ph.D. first place, 2017.
5. ASABE AABFEIO Graduate Student Research Award, Ph.D. first place, 2016.
6. ASABE ITSC Technical Community Paper Award, 2016.
7. NDSU College of Engineering, Travel Award, 2016.
8. Graduate Research Assistantship, Aug. 2015 – Oct. 2019.
9. Tamil Nadu Agricultural University, Merit Scholarship, 2012–2014.
10. Tamil Nadu State Council for Science & Technology – Best undergraduate project, 2012.

SYNERGISTIC ACTIVITIES

1. Served as a judge for "SASES National Student Research Symposium Contest" Crop production and management at ASA-CSSA-SSSA Annual International Meeting from Nov. 7 – 10, 2021.
2. Served as a judge for "AABFEIO Graduate Student Research Competition" at ASABE Annual International Meeting from July 11 – 15, 2021.
3. Served as a judge for "ASABE Women in Engineering Award" at ASABE Annual Meeting 2021.
4. USDA-NIFA grant reviewer panelist member – 2020 to 2022.
5. Session moderator for PRS-703 "Artificial Intelligence and Measurement for Biological Materials Processing" in the ASABE Annual International Meeting from July 13 – 15, 2020.

MENTORING EXPERIENCE

1. Ibtida Fardin Ahmed — June 2022 – present (Undergraduate student)
2. Nicholas Paschall — June 2022 – present (Undergraduate student)
3. Julianna Lee — June 2022 – present (Undergraduate student)
4. Shirley Zhang — June 2022 – present (Undergraduate student)
5. Benjamin Polson — Apr. 2022 – present (Undergraduate student)
6. Benjamin Yeh — Jan. 2021 – present (Undergraduate student)
7. Isha Vaish — Jan. 2021 – May 2022 (Undergraduate student)
8. Celia Lee Walden — Jan. 2021 – May 2022 (Co-mentored with Dr. Ketterings for Honor's thesis)
9. Yiran Li — Jan. 2021 – Sep. 2021 (Undergraduate student)

10. James Czub — Spring 2021 (High school student, co-mentored with Dr. Ketterings)
11. Benjamin Lehman — Fall 2020 – Spring 2021 (Co-mentored with Dr. Ketterings for Honor's thesis)
12. Research Mentor in Digital Ag Hackathon, March 2021 at Cornell University
13. Jonathan M. Berlingeri — Spring 2020 – Spring 2021 (Research Aide)
14. Jason Byung Cho — Spring 2020 – Spring 2021 (Master's student, co-mentored with Dr. Ketterings)
15. Jodi Putman — Fall 2020 – Spring 2021 (Master's student, co-mentored with Dr. Ketterings)

GRANT WRITING

1. Assisted in grant writing for the project titled "Satellite-based development of yield maps and yield stability-based management zones" for a total budget of $33,630. Submitted to Northern New York Agricultural Development Program (2022 – 2023) — Funded.

2. Assisted in grant writing for the project titled "DSFAS-AI: Toward Operational AI-based Assessment of 3D Crop Structure and Yield Using UAS Fisheye Structural Sensing" for a total budget of $500,000. Submitted to USDA NIFA (2022 – 2025) — Not funded.

3. Assisted in grant writing for the project titled "Scalable corn yield management using in situ sampling, airborne remote sensing, and satellite-based monitoring" for a total budget of $1,189,489. Submitted to National Science Foundation – Cyber-Physical Systems (CPS) (2021 – 2024) — Not funded.

4. Assisted in grant writing for the project titled "Giving all farmers access to yield estimates through satellite and automated drone imagery" for a total budget of $148,999. Submitted to Northeast SARE (2021 – 2023) — Not funded.

5. Project titled "UAV based corn population stand and weeds distribution with mapping" for a total budget of $48,606. Submitted to North Dakota Corn Council (2020 – 2021) — Funded.

6. Project titled "Plant phenotyping in dry beans (*Phaseolus vulgaris* L.) using Unmanned Aerial Systems (UAS)" for a total budget of $69,196. Submitted to North Dakota Agricultural Experiment Station Precision Ag Grants Program (2016 – 2018). — Not funded.

PEER-REVIEWED PUBLICATIONS (JOURNAL/BOOK CHAPTER)

Published/Accepted — (Google scholar profile)

1. **Sunoj, S.**, Cho, J., Guinness, J., van Aardt, J., Czymmek, K., and Ketterings, Q.M. 2021 Corn grain yield prediction and mapping from unmanned aerial system (UAS) multispectral imagery. *Remote Sensing*, 13: 3948.

2. Berlingeri, J.M., Lawrence, J.R., **Sunoj, S.**, Czymmek, K.J., and Ketterings, Q.M. 2021. Nitrogen and phosphorus balances vary at the whole-farm, field, and within-field scales. *Frontiers in Sustainability, section Sustainable Supply Chain Management*, 2: 747883 .

3. **Sunoj, S.**, Hammed, A., Igathinathane, C., Eshkhabilov, S., and Simsek, H. 2021. Identification, quantification, and growth profiling of eight different microalgae species using image anlaysis. *Algal Research.*, 60: 102487.

4. **Sunoj, S.**, McRoberts, K.C., Benson, M., and Ketterings, Q.M. 2021. Digital image analysis estimates of biomass, carbon, and nitrogen uptake of winter cereal cover crops. *Computers and Electronics in Agriculture*, 184: 106093.

5. Cho, J., Guinness, J., Kharel, T.P., **Sunoj, S.**, Kharel, D., Oware, E., Aardt, J.V., and Ketterings, Q.M. 2021. Spatial estimation methods for mapping corn yield monitor data. *Precision Agriculture*, 1–20.

6. **Sunoj, S.**, Kharel, D., Kharel, T.P.., Cho, J., Czymmek, K., and Ketterings, Q.M. 2021. Impact of headland area on whole field and farm corn silage and grain yield. *Agronomy Journal*, 113: 147–158.

7. Ajayi-Banji, A.A., **Sunoj, S.**, Igathinathane, C., and Rahman, S. 2021. Kinetic studies of alkaline-pretreated corn stover co-digested with upset dairy manure under solid-state. *Renewable Energy*. 161, 2198–2207.

8. Ajayi-Banji, A.A., Rahman, S., **Sunoj, S.**, and Igathinathane, C. 2020. Impact of corn stover particle size and C/N ratio on reactor performance in solid-state anaerobic co-digestion with dairy manure. *Journal of the Air & Waste Management Association*, 70(4): 436–454.

9. Pandiselvam, R., Manikantan, S., **Sunoj, S.**, Sreejith, S., and Beegum, S., 2019. Modeling of coconut milk residue incorporated rice-corn extrudates properties using multiple linear regression and artificial neural network. *Journal of Food Process Engineering*, 42(2): e12981.

10. **Sunoj, S.**, Igathinathane, C., N. Saliendra, J. Hendrickson, and Archer, D. 2018. Color calibration of digital images for agricultural and other applications. *ISPRS Journal of Photogrammetry and Remote Sensing*, 146: 221–234.

11. **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.

12. **Sunoj, S.**, Igathinathane, C., and Jenicka, S. 2018. Cashews whole and splits classification using a novel machine vision approach. *Postharvest Biology and Technology*, 138: 19–30.

13. **Sunoj, S.**, Sivarajan, S., Maharlooei, M., Bajwa, S.G., Harmon, J.P., Nowatzki, J.F., and Igathinathane, C. 2017. Identification and counting of soybean aphids from digital images using shape classification. *Transactions of the ASABE*, 60(5): 1467–1477.

14. 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.

15. Shidenur, H.T., Mathew, S.M., Sankalpa, K.B., Pandiselvam, R., and **Sunoj, S**. 2017. Engineering Properties of Jackfruit (*Artocarpus heterophyllus* L.). *Agricultural Engineering Today*, 41(1): 56–60.

16. Pandiselvam, R., **Sunoj, S.**, Manikantan, M.R., Kothakota, A., and Hebbar, K.B. 2016. Application and kinetics of ozone in food preservation. *Ozone: Science & Engineering*, 39(2): 115–126.

17. **Sunoj, S.**, Igathinathane, C., and Visvanathan, R. 2016. Nondestructive determination of cocoa bean quality using FT-NIR spectroscopy. *Computers and Electronics in Agriculture*, 124: 234–242.

18. Pandiselvam, R., **Sunoj, S.**, and Uma, D. 2016. Development of multivariate regression model for quantification of proximate content in *Vigna radiata* using Fourier transform–NIR spectroscopy. *Scientific Journal Agricultural Engineering*, 41(2): 61–70.

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.

CONFERENCE PROCEEDINGS AND EXTENSION PUBLICATIONS

1. **Sunoj, S.**, Cherney, J., Longchamps, L., and Ketterings, Q.M. 2022. Remote sensing to estimate yield of field crops. *The Manager.* March 2022. (Link)

2. **Sunoj, S.**, Cho, J., Guinness, J., van Aardt, J., Czymmek, K.J., and Ketterings, Q.M. 2022. Corn Grain Yield Estimation with Drones – Timing is Key!. *What's Cropping Up?* February 2022. (Link)

3. **Sunoj, S.**, Ketterings, Q.M., Lawrence, J., and Godwin, G. 2021. Too late to sidedress nitrogen? Summary of 4 years of data. *What's Cropping Up?* July 2021. (Link)

4. **Sunoj, S.**, Kharel, D., Kharel, T.P., Cho, J., Czymmek, K., and Ketterings, Q.M. 2020. Headlands often reduce overall field yield. Are they worth fixing?. *What's Cropping Up?* October 2020. (Link)

5. **Sunoj, S.**, Igathinathane, C., Saliendra, N., Hendrickson, J., Archer, D., and Liebig, M. Soybean phenology measurement and analysis from PhenoCam images. Research Results, February 2020.

6. 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.

7. **Sunoj, S.**, Igathinathane, C., Flores, J.P., Archer, D., and Hendrickson, J. Sunflower plant-stand count, spatial distribution, and vigor analysis from UAV images using ImageJ. Integrator, February 2019, pp 12–13.

8. 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. Integrator, February 2019, pp 14–15.

9. **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.

10. **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?. Integrator, February 2018, p 12.

11. **Sunoj, S.**, Igathinathane, C., Hendrickson, J., and Archer, D. Color image calibration — Vital step in color agricultural image processing. Integrator, July 2017, pp 10–11.

12. **Sunoj, S.**, Igathinathane, C., and Jenicka, S. 2017. Identification of whole and split cashew nuts using machine vision. ASABE Paper No. 1701246. St. Joseph, MI: ASABE.

13. **Sunoj, S.**, Igathinathane, C., and Hendrickson, J. 2017. Phenocam color image calibration using image analysis. ASABE Paper No. 1701245. St. Joseph, MI: ASABE.

14. **Sunoj, S.**, Sivarajan, S., Maharlooei, M., Bajwa, S.G., Harmon, J.P., Nowatzki, J.F., and Igathinathane, C. 2016. Identification and counting of soybean aphids from digital images using particle separation and shape classification. ASABE Paper No. 162462927. St. Joseph, MI:ASABE.

15. **Sunoj, S.**, Igathinathane, C., and Hendrickson, J. 2016. Monitoring plant phenology using phenocam: A review. ASABE Paper No. 162461829. St. Joseph, MI:ASABE.

16. **Sunoj, S.**, Igathinathane, C., and Visvanathan, R. 2016. Quantification of fermentation levels in cocoa beans using FT-NIR spectroscopy. ASABE Paper No. 162461813. St. Joseph, MI:ASABE.

CONFERENCE PRESENTATIONS

1. **Sunoj, S.**, Yeh, B., and Ketterings, Q.M. 2022. Deep Learning Approaches to Corn Grain and Silage Yield Estimation from High-Resolution UAS Imagery. Systems and Technologies for Remote Sensing Applications Through UnmannedAerial Systems (STRATUS), SUNY ESF, Syracuse, NY., May 23 – 25, 2022 (Oral presentation). (Page 35; Link)

2. **Sunoj, S.**, Li, Y., Vaish, I., and Ketterings, Q.M. 2021. Yield estimation of corn grain and silage fields from high-resolution satellite imagery. Abstract No. 135553, ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT., Nov. 7 – 10, 2021 (Oral presentation). (Link)

3. **Sunoj, S.**, Yeh, B., Godwin, G., and Ketterings, Q.M. 2021. Corn Grain and Silage Yield Prediction from UAS Imagery. Abstract No. 135611, ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT., Nov. 7 – 10, 2021 (Oral presentation). (Link)

4. Berlingeri, J. M., Lawrence, J., **Sunoj, S.**, Czymmek, K.J., and Ketterings, Q.M. 2021. Nitrogen and Phosphorus Balances Vary at the Whole-Farm, Field and within-Field Scales. Abstract No. 133329, ASA, CSSA, SSSA International Annual Meeting, Salt Lake City, UT., Nov. 7 – 10, 2021 (Oral presentation). (Link)

5. **Sunoj, S.**, Cho, J., Guinness, J., Aardt, J.V., Oware, E., Godwin, G., Czymmek, K., and Ketterings, Q.M. 2021. Corn grain yield estimation and mapping from high-resolution UAS imagery. Systems and Technologies for Remote Sensing Applications Through Unmanned Aerial Systems (STRATUS), May 27, 2021 (Oral presentation).

6. Eshkabilov, S., **Sunoj, S.**, Hammed, A., Igathinathane, C., and Simsek, H. 2021. Studies of microalgae cultures for quantification, growth profiling, and species differentiation using image analysis techniques. 3rd International Virtual Water and Waste Management Conference, Feb. 24 – 26, 2021 (Oral presentation).

7. **Sunoj, S.**, Cho, J., Guinness, J., Aardt, J.V., Oware, E., Czymmek, K., Ketterings, Q.M. 2020. Corn grain yield mapping from high resolution UAS imagery. Abstract No. 126350, 2020 ASA-CSSA-SSSA International Annual Meeting (Virtual), Nov. 9 – 13, 2020 (Oral presentation).

8. **Sunoj, S.**, Kharel, D., Kharel, T.P., Cho, J., Czymmek, K., Ketterings, Q.M. 2020. Impact of headland area on whole field and farm corn silage and grain yield. Abstract No. 126163, 2020 ASA-CSSA-SSSA International Annual Meeting (Virtual), Nov. 9 – 13, 2020 (Oral presentation).

9. **Sunoj, S.**, McRoberts, K.C., Benson, M., Ketterings, Q.M.. 2020. Digital image analysis estimates of biomass and nitrogen uptake of winter cereal cover crops in the northeast US. Abstract No. 126373, 2020 ASA-CSSA-SSSA International Annual Meeting (Virtual), Nov. 9 – 13, 2020 (Oral presentation).

10. Cho, J., Maresma, A., Kharel, T.P., Godwin, G., **Sunoj, S.**, Kharel, D., Oware, E., Aardt, J.V., Guinness, J., Ketterings, Q.M. 2020. Spatial estimation methods for mapping corn yield monitor data. Abstract No. 126151, 2020 ASA-CSSA-SSSA International Annual Meeting (Virtual), Nov. 9 – 13, 2020 (Oral presentation).

11. Berlingeri, J.M., Lawrence, J., **Sunoj, S.**, Czymmek, K., Ketterings, Q.M. 2020. Influence of hybrid selection, field, and within-field yield variability on cropland nitrogen balances in New York corn silage cropping systems. Abstract No. 126351, 2020 ASA-CSSA-SSSA International Annual Meeting (Virtual), Nov. 9 – 13, 2020 (Poster presentation).

12. **Sunoj, S.**, Igathinathane, C., Flores, J.P., Schatz, B., Archer, D., Hendrickson, J., Halvorson, J., Toledo, D. 2020. Plant stand spatial distribution analysis for whole field using unmanned aerial system (UAS) imagery. ASABE Paper No. 2000222, ASABE Annual International Meeting (Virtual), July 13 – 15, 2020 (Oral presentation).

13. **Sunoj, S.**, Igathinathane, C. 2020. Simplified no-code approach for phenological analysis from PhenoCam images using kymograph. ASABE Paper No. 2000574, ASABE Annual International Meeting (Virtual), July 13 – 15, 2020 (Oral presentation).

14. **Sunoj, S.**, Igathinathane, C., Flores, J.P. 2019. Automatic plot extraction in field crop trials using digital image processing from UAV images. ASABE Paper No. 1901263, ASABE Annual International Meeting, July 7 – 10, 2019, Boston, Massachusetts, USA (Poster presentation).

15. **Sunoj, S.**, Igathinathane, C., Flores, J.P., Sidhu, H., Monono, E., Wiesenborn, D., Archer, D. 2019. Plant stand count and spatial distribution mapping from UAV images. ASABE Paper No. 1901259, ASABE Annual International Meeting, July 7 – 10, 2019, Boston, Massachusetts, USA (Poster presentation).

16. **Sunoj, S.**, Igathinathane, C., Hendrickson, J. 2019. Vegetation indices comparison with green chromatic coordinates from PhenoCam images. ASABE Paper No. 1901261, ASABE Annual International Meeting, July 7 – 10, 2019, Boston, Massachusetts, USA (Oral presentation).

17. 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).

18. **Sunoj, S.**, Igathinathane, C., Flores, J.P. 2019. UAV-based plant-stand count, plant vigor, and spatial distribution mapping using open source ImageJ. GSC 3rd Annual Research Symposium, North Dakota State University, Fargo, ND, April 3, 2019 (Poster presentation - People Choice Award).

19. Subhashree, S.N., **Sunoj, S.**, Igathinathane, C., Franco, J.G. 2019. Development of user-coded plugin and web applications 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).

20. **Sunoj, S.**, Igathinathane, C., Flores, J.P., Archer, D., Hendrickson, J. 2019. Sunflower stand count and spatial distribution analysis using images from small-UAV. UMN Production Ag Symposium, University of Minnesota, St. Paul, Minnesota, USA (Oral presentation).

21. 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).

22. **Sunoj, S.**, Igathinathane, C., Flores, J.P., Sidhu, H. 2019. Early season row identification, plant-stand count, and spatial distribution analysis from UAV images. 2019 Precision Agricultural Summit, Jan. 21& 22, 2019, Jamestown, North Dakota, USA (Poster presentation).

23. **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).

24. **Sunoj, S.**, Igathinathane, C., Hendrickson, J., and Archer, D. 2018. A simple 3D image reconstruction using ImageJ. ASABE Paper No. 1801305, ASABE Annual International Meeting, July 29–August 1, 2018, Detroit, Michigan, USA (Oral presentation).

25. **Sunoj, S.**, Igathinathane, C., Saliendra, N., and Hendrickson, J. 2018. Phenocam color image calibration using higher order terms. ASABE Paper No. 1801318, ASABE Annual International Meeting, July 29–August 1, 2018, Detroit, Michigan, USA (Oral presentation).

26. 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).

27. 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).

28. Dharani, S., **Sunoj, S.**, Igathinathane, C., and Flores, P. 2018. Shape based weed discrimination in low-altitude unmanned aerial system images. ASABE Paper No. 1801570, ASABE Annual International Meeting, July 29–August 1, 2018, Detroit, Michigan, USA (Oral presentation).

29. **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).

30. **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).

31. **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).

32. **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).

33. **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).

34. **Sunoj,S.**, Igathinathane, C., Saliendra, N., Hendrickson, J., and Archer, D. 2017.Color calibration of digital images using imageJ for phenocam application. 2017 Friends and Neighbors Day, NGPRL USDA-ARS, Bismarck, ND, July 27, 2017 (Poster presentation).

35. **Sunoj, S.**, Igathinathane, C., and Visvanathan, R. 2017. Mathematical modeling of thin-layer drying characteristics of black pepper. ASABE Paper No. 1701247, ASABE Annual International Meeting, July 16–19, 2017, Spokane, Washington, USA (Poster presentation).

36. **Sunoj, S.**, Igathinathane, C., and Jenicka, S. 2017. Identification of split and whole cashew nuts based on machine vision. ASABE Paper No. 1701246, ASABE Annual International Meeting, July 16–19, 2017, Spokane, Washington, USA (Oral presentation).

37. **Sunoj, S.**, Igathinathane, C., and Hendrickson, J. 2017. Phenocam color image calibration using image analysis. ASABE Paper No. 1701245, ASABE Annual International Meeting, July 16-19, 2017, Spokane, Washington, USA. (Oral presentation).

38. **Sunoj, S.**, Igathinathane, C., and Hendrickson, J. 2017. Phenocam color calibration using image processing. 2017 Winter Annual Workshop, "Farming and Ranching for the Bottom Line", Area4 SCD, BSC, NDSU-Extension, and NGPRL USDA-ARS, Bismarck, February 28, 2017 (Poster presentation).

39. **Sunoj, S.**, Igathinathane, C., and Hendrickson, J. 2016. Color calibration of phenocam images using ANN algorithm. Solving real world problems: An interdisciplinary celebration of research, NDSU Fargo, ND, November 18, 2016 (Poster presentation).

40. **Sunoj, S.**, Igathinathane, C.,and Hendrickson, J. 2016. Phenocam color calibration using artificial neural network. Agricultural Biosciences International Conference, Fargodome, Fargo, ND, September 19, 2016 (Poster presentation).

41. **Sunoj, S.**, Subhashree, S.N., and Igathinathane, C. 2016. Digital image processing in agriculture, TechXploration, NDSU Fargo, ND, September 15, 2016 (Poster presentation).

42. **Sunoj, S.**, Igathinathane, C.,and Hendrickson, J. 2016. Application of phenocam for crop health and biomass estimation. 2016 Friends and Neighbors Day, NGPRL USDA-ARS, Bismarck, ND, July 28, 2016 (Poster presentation).

43. **Sunoj, S.**, Sivarajan, S., Maharlooei, M., Bajwa, S.G., Harmon, J.P., Nowatzki, J.F., and Igathinathane, C. 2016. Identification and Counting of Soybean Aphids from Digital Images using Particle Separation and Shape Classification. ASABE Paper No. 162462927, 2016 ASABE Annual International Meeting, July 17–23, 2016, Orlando, Florida, USA (Poster presentation).

44. **Sunoj, S.**, Igathinathane, C., and Hendrickson, J. 2016. Monitoring plant phenology using phenocam: A review. ASABE Paper No. 162461829, 2016 ASABE Annual International Meeting, July 17–23, 2016, Orlando, Florida, USA (Oral presentation).

45. **Sunoj, S.**, Igathinathane, C., and Visvanathan, R. 2016. Quantification of fermentation levels in cocoa beans using FT-NIR spectroscopy. ASABE Paper No. 162461813, 2016 ASABE Annual International Meeting, July 17–23, 2016, Orlando, Florida, USA (Poster presentation).

46. **Sunoj, S.**, Igathinathane, C.,and Hendrickson, J. 2016. Application of phenocam for crop health and biomass estimation – A review. 2016 Bio Industry Summit, NDSU Fargo, ND, May 12, 2016 (Poster presentation).

EXTENSION/OUTREACH PRESENTATIONS

1. Presented to extension educators in New York on the topic "Making use of technology to evaluate what works and what doesn't in precision agriculture" on 2021 Northeast Certified Crop Advisors and Agribusiness Training – virtual, organized by Cornell Cooperative Extension on December 1, 2021 (Around 125 members attended).

2. Presented to farmers, consultants, and policy makers in the theme "Turning yield data into action; How much yield do we give up on headlands?" on Corn Congress 2021 - virtual, organized by Cornell Cooperative Extension on January 6, 2021 (Around 180 members attended).

3. Manned a technical booth in the theme "Digital imaging for crop growth monitoring" on Friends and Neighbors day 2019 held in the Northern Great Plains Research Laboratory, USDA-ARS, Mandan on July 18, 2019 (Around 40 members attended).

4. Conducted a field tour and presented on "Remote sensing and image analysis applications on agriculture" in Area IV research farms in connection with Friends and Neighbors day 2018, held on July 19, 2018 (Around 25 members attended).

5. Manned a technical booth in the theme "Digital imaging for crop growth monitoring" on Friends and Neighbors day 2017 held in the Northern Great Plains Research Laboratory, USDA-ARS, Mandan on July 27, 2017 (Around 30 members attended).

6. Participated in TechXploration Fair 2016 and presented on "Digital image processing in agriculture" held in NDSU Great Plains Ballroom on September 15, 2016. (Around 40 members attended).

INVITED PRESENTATIONS/TALKS

1. Presented on "Imaging and Spectroscopic Analysis — Role on abiotic stress detection." for an International Conference on "Recent Trends in Molecular Physiology of Horticultural Crops under Abiotic Stress" (virtual) held in Vellore Institute of Technology, School of Agricultural Innovations and Advanced Learning (VAIAL), Vellore, Tamil Nadu, India on December 3, 2021 (Around 83 members attended).

2. Presented on "Image processing techniques and applications in agriculture." for undergraduate students in Hindustan college of technology, Coimbatore, Tamil Nadu, India on July 28, 2021 (Around 68 members attended).

3. Presented on "Sensing techniques for non-destructive food quality evaluation" for undergraduate and graduate students in Safi Institute of Advanced Studies, University of Calicut, Kerala, India on May 18, 2021 (Around 120 members attended).

4. Presented on "Higher studies and career opportunities abroad in agriculture" for undergraduate and graduate students in Vellore Institute of Technology, Tamil Nadu, India on Feb., 19, 2021 (Around 70 members attended).

PROFESSIONAL DEVELOPMENT ACTIVITIES

1. Attended a 9-week workshop on "Postdoc Leadership Program" organized by The Office of Postdoctoral Studies at Cornell University from October 28, 2021 to March 3, 2022.

2. Attended a 4-week workshop on "Teaching & Learning in the Diverse Classroom" organized by Center for Teaching Innovation (CTI) at Cornell University from June 1–30, 2021.

3. Attended a 5-week research mentor training on "Building mentoring skills for an academic career" organized by Center for the Integration of Research, Teaching, and Learning (CIRTL) at Cornell University between January 29 and April 7, 2020.

4. Attended a workshop on "How to correct common grammar and punctuation mistakes" arranged by NDSU Center for writers on November 2, 2016.

5. Attended a workshop on "Writing the results section" arranged by NDSU Center for writers on October 13, 2016.

PROFESSIONAL MEMBERSHIPS

1. American Society of Agronomy, Soil Science Society of America, since 2019 (Membership #: 741548).
2. International Society of Precision Agriculture, since 2019 (Membership #: ISPA-01942).
3. American Society of Agricultural and Biological Engineering, 2015–Present (Membership #: M1050764).
4. Indian Society of Agricultural Engineers, Lifetime member since 2016 (Membership #: LM-11444).
5. Alpha Epsilon Honor Society – Agricultural, Food, and Biological Engineering.

JOURNAL REVIEWER ACTIVITIES

Reviewed journal publications in the following journals:

1. Transactions of the ASABE, ASABE.
2. Applied Engineering in Agriculture, ASABE.
3. Computers and Electronics in Agriculture, Elsevier.
4. Journal of Infrared Physics, Elsevier.
5. Agronomy Journal, Wiley.

6. Journal of Food Process Engineering, Wiley.

7. Journal of Food Processing and Preservation, Wiley.

8. Journal of Applied Entomology, Wiley.

9. Journal of Texture Studies, Wiley.

10. Remote Sensing, MDPI.

11. Agronomy, MDPI.

12. Agriculture, MDPI.

13. Precision Agriculture, Springer.

14. Journal of Food Science and Technology, Springer.

15. Food Analytical Methods, Springer.

16. Ozone: Science and Engineering, Taylor & Francis.

17. Plant Methods, BioMed.

RELATED WEBLINKS

Google Scholar

- Google scholar profile – Metrics as of October 10, 2022:
  Citations = 420; h-index = 9; i10-index = 9.

ResearchGate

- ResearchGate profile – Metrics as of October 10, 2022:
  Citations = 348; h-index = 9; Total reads = 12803.

Online News & Reports

- https://www.morningagclips.com/evaluating-aerial-data-access-for-corn-growers/

- https://hayandforage.com/article-3305-Headlands-are-yield-killers.html

- https://www.ndsu.edu/news/view/detail/34679/

- https://bismancktribune.com/news/local/mandan/students-share-in-science-at-research-farm/article_5262ad3d-bf26-53c9-acf1-c532bd6c0f29.html

- https://nnyagdev.org/wp-content/uploads/2021/02/NNYADPSatelliteDroneReportFINAL.pdf

- https://cals.cornell.edu/news/2022/05/digital-agriculture-spark-interdisciplinary-insights