Chetan Badgujar

USDA-ARS SCINet Postdoctoral Fellow,
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Employment History

01/2023 – Present — **USDA-ARS SCINet Post Docotoral Fellow,** Center of Grain and Animal Health Research, Manhattan, Kansas.

01/2018 – 06/2018 — **Ph.D. Research Scholar,** Indian Institute of Technology, New Delhi, India

09/2017 – 01/2018 — **Sr. Research Fellow,** ICAR-Central Institute of Agricultural Engineering, India.

Education

2018 – 2022 — **PhD., Biological & Agricultural Engineering**, Kansas State University, Manhattan, KS.
Thesis title: *Robotic Farming on Marginal, Highly Sloped Land.*
GPA: 4.0/4.0

2015 – 2017 — **M.Tech. Agricultural Engineering,** Punjab Agricultural University, India.
Thesis title: *Development & Evaluation of Metering Mechanism of Tractor Operated Multi-crop Planter for Sowing of Okra Seed.*
GPA: 8.11/10.00

2011 – 2015 — **B.Tech. Agricultural Engineering,** Dr. PDKV, India.
GPA: 8.03/10.00

Research Publications

Journal Articles

1. **Badgujar, Chetan**, Das, S., Figueroa, D. M., & Flippo, D. (2023). Application of Computational Intelligence Methods in Agricultural Soil-Machine Interaction : A Review. *Agriculture*, *13*(2). https://doi.org/10.3390/agriculture13020357

2. **Badgujar, Chetan**, Das, S., Flippo, D., Martinez, D., & Welch, S. (2023). Deep neural network to predict the autonomous ground vehicle behavior on sloping terrain. *Journal of Field Robotics*. https://doi.org/10.1002/rob.22163

3. **Badgujar, Chetan**, Flippo, D., Baldwin, C., & Gunturu, S. (2023). Tree trunk detection of eastern redcedar in rangeland with deep learning technique. *Croatian Journal of Forest Engineering (Accepted)*.

4. Martinez-Figueora, D., Das, S., **Badgujar, Chetan**, Flippo, D., & Welch, S. J. (2022). A Distributed Approach for Robotic Coverage Path Planning Under Steep Slope Terrain Conditions. *2022 IEEE Symp. Series on Computational Intelligence (SSCI)*. https://doi.org/10.1109/SSCI51031.2022.10022252

5. Schmitz, A., **Badgujar, Chetan**, Mansur, H., Flippo, D., McCornack, B., & Sharda, A. (2022). Design of a reconfigurable crop scouting vehicle for row crop navigation: A proof-of-concept study. *Sensors*, *22*(16). https://doi.org/10.3390/s22166203

6. **Badgujar, Chetan**, Flippo, D., Baldwin, C., & Badua, S. (2022). Development and Evaluation of Pasture Tree Cutting Robot : Proof-of-concept study. *Croatian Journal of Forest Engineering*, *44*(1), 11–19. https://doi.org/10.5552/crojfe.2023.1731

7. **Badgujar, Chetan**, Flippo, D., Brokesh, E., & Welch, S. (2022). Experimental Investigation on Traction, Mobility & Energy usage of the Tracked Autonomous Ground Vehicle on a Sloped Soil Bin. *Journal of the ASABE*. https://doi.org/10.13031/ja.14860

8. **Badgujar, Chetan**, Flippo, D., & Welch, S. (2022). Artificial neural network to predict traction performance of autonomous ground vehicle on a sloped soil bin and uncertainty analysis. *Computers and Electronics in Agriculture*, *196*, 106867. https://doi.org/10.1016/j.compag.2022.106867

9. **Badgujar, Chetan**, Hui, W., Flippo, D., & Brokesh, E. (2022). Design, fabrication, and experimental investigation of screw auger type feed mechanism for a robotic wheat drill. *Journal of ASABE*. https://doi.org/10.13031/ja.15199

10. **Badgujar, Chetan**, Mansur, H., & Flippo, D. (2022). Pest-infested Soybean Leaf Image Classification with Deep Learning Techniques for Integrated Pest Management (IPM). *Conference Proceedings, 2022 ASABE Annual International Meeting, Houston, Texas*. https://doi.org/10.13031/aim.202201096

11. **C M Badgujar**, Dhingra, H. S., Gautam, A., Khurana, R., & Mannes, G. S. (2020). Experimental study on okra planter for sowing of soaked seed. *Agricultural Engineering Today*, *44*(04), 22–29. https://doi.org/10.52151/aet2020444.1527

12. **Badgujar, C. M**, Karpe, O. S., & Kalbande, S. R. (2019). Studies on drying characteristics & techno-economic analysis of sprouted moth beans (Vigna Aconitifolia) in solar tunnel dryer. *Indian Journal of Agricultural Research*. https://doi.org/10.18805/A-5180

13. **Badgujar, C M**, Dhingra, H. S., Manes, G. S., Khurana, R., & Gautam, A. (2018a). Engineering properties of okra (*Abelmoschus Esculentus*) seed. *Agricultural Research Journal*, *55*(4), 722. https://doi.org/10.5958/2395-146X.2018.00131.X

14. **Badgujar, C.M.**, Karpe, O., & Kalbande, S. (2018b). Techno-economic evaluation of solar tunnel dryer for drying of basil(*Ocimum sanctum*). *International Journal of Current Microbiology & Applied Sciences*, *7*(7), 332–39. https://doi.org/10.20546/ijcmas.2018.707.040

15. **Badgujar, C.M.**, Dhingra, H., Mannes, G., & Khurana, R. (2017). Development & evaluation of inclined plate metering mechanism for soaked okra (*Abelmoschus esculentus*) seeds. *International Journal of Current Microbiology & Applied Sciences*, *6*(12). https://doi.org/10.20546/ijcmas.2017.612.455

Books and Chapters

1. Kumar, P., & **Badgujar, Chetan**. (2019). Flow characteristics of crude oil with additive (P. Saha, P. Subbarao, & B. S. Sikarwar, Eds.). In P. Saha, P. Subbarao, & B. S. Sikarwar (Eds.), *Advances in fluid and thermal engineering*. Singapore, Springer. https://doi.org/10.1007/978-981-13-6416-7_44

Publications & Projects: In-progress

Ongoing Projects

2022–23 Machine Vision & AI for Insect Pest Identification in Stored Grain Products.

Computational Intelligence Methods & AI for Grain and Food Characteristics Modeling.

On Field Traction Testing of Skid-Steer Loader or Tractor.

2019–23 Design & Development of Robotic Wheat Seeder Prototype.

2022–23 Design & Operation of Multi-AGV Fleet for Wheat Drilling on Sloping Terrain.

Awards & Achievements

2022 Awarded with the **USDA-ARS SCINet Postdoctoral Fellowship** on Computer Vision & A.I. for Insect Identification at Center for Grain & Animal Health Research, Manhattan, KS.

Won third place in the *2022 ASABE-AABFEIO Graduate Student Research Paper Competition*, PhD. category, Houston, TX.

K-State Graduate School Travel Award ($450) for ASABE- International Conference, Houston, TX.

Awards & Achievements (continued)

2021
- Graduate Student of the Month (November), Carl R. Ice College of Engineering, Kansas State University.
- Represented the Kansas State University in the **18th Capitol Graduate Research Summit, Topeka** ($250 scholarship).
- Kansas State University- **Research and the State winner 2020**. Poster presentation on "Performance of Autonomous Ground Vehicle on Varying slope".

2019
- **K-State Graduate School Travel Award** ($450) for ASABE- International Conference, Boston, MA.

2018
- Qualified **National Eligibility Test** conducted by Agricultural Scientist Recruitment Board, India.
- **Institute Fellowship** for PhD - Indian Institute of Technology, Delhi.

2015
- All India Rank-11 in ICAR-Post Graduate Exam; Awarded with **Junior Research Fellowship**, 2015-17.

2013
- Represented the Dr. PDKV, University Team in All India University Chess Tournament (Central Zone), Rewa, MP, India.

Conference & Presentation

ASABE AIM -2019
- Poster Presentation on *"Traction performance of Autonomous Ground Vehicle on soil bin"*, Boston, MA.

EPSCoR AIM -2019
- Presentation on *"EPSCoR Robot for Agricultural Remote Sensing"*, Oklahoma State University, Stillwater, OK.

Research & State -2020
- Poster Presentation on *"Performance of Autonomous Ground Vehicle on Varying slope"*, Kansas State University, Manhattan, KS.

18th Capitol Res. Sumt.
- Poster Presentation on *"Performance of Autonomous Ground Vehicle on Varying slope"*, 18th Capitol Grad Research Summit (2021), Capital Building, Topeka, KS.

Research & State -2021
- Poster Presentation on *"Artificial Neural Network to Predict Traction Performance of Autonomous Ground Vehicle on Varying Slope"*, Kansas State University, Manhattan, KS.

ASABE AIM -2022
- Presentation on *"Application of Soft Computing Techniques to Predict Autonomous Ground Vehicle Traction Performance on Highly Sloped Terrain"*, Houston, TX.

ASABE-AIM 2022
- Presentation on *"Deep Learning Techniques for Pest-damaged Soybean Leaves Classification"*, Houston, TX.

USDA-CGAHR 2022
- Seminar Presentation on *"Swarm Robotics in Agriculture"*, Stored Product Insect & Engineering, Center for Grain & Animal Health Research, Manhattan, KS. (July, 2022).

Miscellaneous

Teaching Involvement

BAE 550 (TA)
- Hydraulics & Mechatronics (Spring 2019): Conducting lab & paper grading.

BAE 450 & ATM 450
- Off road Machine Power Components (Spring 2021) (Class strength- 20): Guest lecture on *"Off-road Vehicle Testing & Performance"*.

BAE 610 (Instructor)
- Problems in Biological Systems Engineering (Spring 2022) (Class strength- 5): Mentoring the students on **Scum Baby Robot** prototype, 27 feet algae cleaning robot for water cooling tower at *Jeffrey Energy Center, St Marys, KS*.

Miscellaneous (continued)

BAE 460 (Instructor)
- Computational & Statistical Tools for Engineers (Fall 2022) (Class strength- 18): Taught a studio class on statistical tools for analyzing engineering data. Hands-on practice on introductory to intermediate programming (MATLAB) to develop problem-solving techniques.

Campus involvement & others

Jan 2019-May 2020
- **Sport Director**: Biological & Agricultural Engineering Graduate Student Organization (*BAE-GSO*).

May 2020- Jan 2022
- **Vice President**: Biological & Agricultural Engineering Graduate Student organization (*BAE-GSO*).

July 2022-Present
- **Members-at-large**: Association of Agricultural Biological & Food Engineers of Indian Origin (*ASABE-AABFEIO*).

Aug 2018- Present
- American Society of Agricultural & Biological Engineers (*ASABE*)- Graduate Student Member.

Aug 2019- Present
- Indian Society of Agricultural Engineers (*ISAE*)- Graduate Student Member.

Skills

Programming Languages
- C-Language, Python, R.

Software
- LabVIEW, MatLab, Spyder, R-Studio, SAS, ExpressPCB

CAD
- PTC Creo, CATIA, Pro-E, Solid Edge, Simplify3D

Hardware
- Arduino, MyRio, Campbell Data Logger

Misc.
- 3D Printing, Academic research, Teaching, LaTeX Typesetting & Publishing.

References

Available on Request