**Ryan Ackett**

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# EDUCATION

**Doctor of Philosophy, University of Tennessee (January 2022 – Present)**

Biosystems Engineering and Soil Science

GPA: 4.0/4.0

**Master of Science, North Carolina State University (Fall 2019 – January 2022)**

Biological and Agricultural Engineering

GPA: 3.93/4.0; GRE Verbal: 169, GRE Quantitative: 162

**Bachelor of Science, University of Florida (Fall 2011 – Spring 2016)**

Agricultural and Biological Engineering, Class of Spring 2016

GPA: 3.32/4.0, *Cum Laude*

# Research

**Forecasting field-level daily nitrous oxide emissions in global agricultural ecosystems through multivariate time series analysis (January 2022 - Present)**

* Built a global database of over 1700 multivariate time series of nitrous oxide flux along environmental conditions and management actions. Developing deep learning models and comparing their accuracy in forecasting nitrous oxide flux to process based models commonly used in the field (such as DayCent).
* Built a Random Forest classification model detecting the occurrence of nitrous oxide “hot moment” emissions with 93% accuracy based on a small set of environmental measurements

**The use of novel pole mounted camera imagery in the assessment of turfgrass quality under varying levels of deficit irrigation (Fall 2019 – January 2022)**

* Developed an algorithm automating the process of calculating the average NDVI of 24 research plots from raw red and near infrared image files taken by a pole mounted camera system. Achieved a correlation coefficient >0.8 with ground truth data.
* Designed and built a pole mounted field camera system for remote and automated data acquisition. A Raspberry Pi was programmed to control two cameras and could be remotely accessed.

**Response of drought tolerant turfgrass visual quality to varying levels of deficit irrigation (June 2020 – January 2022)**

* Designed and conducted a 24 plot, 8 treatment research trial subjecting TifTuf bermudagrass to varying levels of deficit irrigation. Deficits were calculated as a fraction of Penman-Monteith estimated evapotranspiration, and visual quality was measured by expert rating, handheld NDVI meter, and a novel pole mounted camera system.

**Novel weighing lysimeter with lower boundary control (August 2019 – January 2022)**

* Developed a low cost weighing lysimeter with a novel mechanism of lower boundary control through use of a fiberglass wick, the applied suction of which may be modulated through the manipulation of water level of the wick containing tube.

**Citrus Farm Image Classification (August 2015 - May 2016)**

* Used a light-field camera to collect image data from citrus trees over the course of a growing season, and classified image data categories as fruit, leaf, branch, et cetera.
* Used MATLAB to analyze image classifications and create RGB profiles for each.

# Publications

Ackett, R., Hilafu, H., Gelfand, I., Saha, D. (2023) The Use of Outlier Detection to Define and Identify Hot Moments of Nitrous Oxide Emissions in Agroecosystems. (Under internal review).

Ackett, R., Manus, L. (2023). A Green New Deal for the Farm Bill. Climate and Community Project. (Under internal review).

# Presentations

**Predicting Agricultural Nitrous Oxide “Hot Moment” Occurrences and Drivers Using Machine Learning Techniques (November 2022)**

* Gave an oral presentation on my research using machine learning and global data of environmental conditions to predict key moments of soil nitrous oxide emissions.
* Won First Prize in the Global Climate Change Community student competition at the 2022 Soil Science Society of America Annual Conference.

**Visual Quality of TifTuf Bermudagrass in Response to Varying Degrees of Deficit Irrigation, American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting (July 2021)**

* Presented research using novel imagery techniques to investigate the visual quality in response to deficit irrigation of a new drought tolerant variety of bermudagrass.

**Labor Outcomes and Ethics of Agricultural Automation (July 2021)**

* As a finalist in the ASABE Ethics Essay Competition, I presented my exploring the ethical considerations and competing public interests surrounding agricultural labor automation, especially from the perspective of farmworkers. (Archive: http://web.archive.org/web/20211209205011/https://asabe.org/EthicsEssay)

**Novel Weighing Lysimeter with Lower Boundary Control, ASABE Annual International Meeting (July 2020)**

* Presented the design, construction, and preliminary results of a novel weighing lysimeter at the first ever Online ASABE International Conference.

# Industry Experience

Junior Fellow, Climate and Community Project (May 2023 – August 2023)

* Lead author on soon-to-be-published policy report proposing a Green New Deal for the US Farm Bill and Agricultural Policy

Research and Development Supervisor, A. Duda & Sons (June 2016 – July 2019)

* Designed and developed a low-cost mesh radio network of sensors for soil moisture datalogging and management.
* Developed a web app (full stack, [scouter.duda.com](http://scouter.duda.com)) which automates several critical grove operations, including rust mite and psyllid scouting data entry and custom report generation, and leaf tissue sample data visualization.
* Developed a computer vision program which analyzes images of water sensitive paper to measure spray coverage area to research and evaluate spray applications and configurations.
* Designed and managed field research trials to evaluate the efficacy of fungicide to reduce Postbloom Fruit Drop (PFD) and juice quality, the effect of tractor speed on abaxial and adaxial spray deposition, and the effect of soil surfactant applied monthly on volumetric soil moisture.
* Managed grove wide pest scouting program and daily activities of field scouts as part of integrated pest management (IPM).

Mechanical Engineering Intern, John Deere (January 2015 - May 2015)

* Designed electronic control of tractor subsystem for use across multiple compact tractor platforms, including design, CAD modeling, fabrication, testing, and implementation.
* Tested tractor components and functionality for data collection and product verification using a wide array of transducers, electrical instrumentation, and data acquisition systems.

**Seed Production Intern, Monsanto Company (May 2014 - August 2014)**

* Created a water balance irrigation scheduling tool, calculating soil moisture and irrigation requirements through atmometry and mathematically modeling surface and soil hydrology.
* Managed a team of 10 field inspectors assessing crop development and health, led daily meetings, and facilitated communication between inspectors and area supervisors.

# Leadership and Community Involvement

**University of Tennessee United Campus Workers, Co-Chair (August 2022 – Present)**

* Represent over 1000 graduate student members and lead organization meetings with the University of Tennessee chapter of United Campus Workers.
* Led UCW Campaign for a Living Wage which won $5.7 million/year investment in increasing graduate stipends across campus
* Organize alongside multiple working groups on University of Tennessee campus for campaigns: family and medical leave for graduate workers; opposing department displacement; a living wage and end to harassment of building and facilities workers

**Feed the Pack Student Food Pantry, Volunteer (August 2020 – January 2021)**

* Stocked shelves and managed the register each week for NC State’s student run food pantry for all university community members.

**Summer Climate Book Club, Organizer (May 2020 – August 2020)**

* Organized and led a summer book club for all department graduate students featuring nonfiction literature focused on climate change.
* Led biweekly discussions with fellow graduate students covering the climate crisis from scientific and social angles.

**Meals On Wheels, Volunteer (August 2019 – May 2020)**

* Delivered hot and cold meals to elderly and disadvantaged members of the community across the city of Raleigh on a weekly basis.

# SKILLS

* 7 years experience in Python, Raspberry Pi, and Arduino
* 5 years experience in Full Stack Web Development: Django, SQL, HTML, CSS, Javascript, MySQL, PostgreSQL
* 2 years experience in CRBasic and Campbell Scientific software and hardware
* 1 year experience in experimental statistics in R and JMP
* 1 year experience in OpenCV computer vision package

# References

Debasish Saha, Ph.D. (Assistant Professor, University of Tennessee)

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Garey Fox, D.WRE (Professor and Department Head, North Carolina State University)

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