Yanqiu Yang

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With a robust background in agricultural and biological engineering, complemented by hands-on experience in cutting-edge projects and interdisciplinary research, my goal is to foster innovative teaching, research, and collaboration to address the challenges and opportunities in sustainable agriculture.

EDUCATION

The Pennsylvania State University — University Park, PA
Ph.D., Agricultural and Biological Engineering — expected Spring 2025
Dissertation: "Innovative Integrated Pest Management: Data-Driven Approaches and Noninvasive Technologies for Enhanced Monitoring and Decision-Making in Specialty Crops."
Advisor: Professor Paul Heinemann

China Agricultural University — Beijing, China
M.Eng., *Digital Image Processing*, Mechanical Engineering — 06/2019
Thesis: "Development of a Non-Contact Anthropometric System Based on Machine Learning."

Harper Adams University — Newport, UK
M.Sc., Applied Mechatronic Engineering — 02/2018
Thesis: "Development of a Shock Simulation Jig Based on Data Analysis of Cow Behavior Monitoring Sensors."

China Agricultural University — Beijing, China
B.Eng., Mechanical and Electronics Engineering — 06/2016
Thesis: "Development of a Quality Detection System for Maize Seeds Based on Android."

RELATED PROFESSIONAL EXPERIENCE

Google Women Techmakers — Hybrid
Women Techmakers Ambassador — 08/2024 - Present

- Engaging in community activities, including organizing events, mentoring, and sharing knowledge to promote diversity and inclusion in technology.
- Participated in professional development resources provided by Google Women Techmakers.

bioWatch — State College, PA
Founder & AI Lead Engineer (Part-time) — 01/2024 - Present

- Led a cross-functional team to design and implement AI algorithms for biodiversity conservation.
- Mentored four undergraduate students on AI and machine learning applications, leading to one published conference paper and two summer internships (one in industry and one with Penn State Nittany AI Alliance).
- Guided a junior Ph.D. student who has received several presentation awards; currently collaborating on multiple publications.
- Provided mentoring on time management, research practices, and academic development.

John Deere, Intelligent Solutions Group — Tianjin, China
Program Manager (Full-time) — 09/2020 - 08/2021

- Coordinated with engineers and leadership teams from the US, Germany, and China to deploy telematics in the Chinese market.

John Deere, China Technology Innovation Center — Tianjin, China
Product Engineer (Full-time) — 07/2019 - 09/2020

- Conducted yield mapping calibration in the factory and performed field testing on state farms.

Baidu Inc. — Beijing, China
Business Operations Specialist (Internship) — 05/2018 - 07/2018

- Conducted data analysis to support decision-making and improved customer satisfaction.

IceRobotics Ltd. — Edinburgh, Scotland
Product Engineer (Internship) — 08/2017 - 10/2017

- Developed and implemented a shock testing jig to improve the housing design for dairy cow leg-mounted sensors, ensuring durability and comfort.
- Conducted hands-on work on dairy farms, using accelerometers to collect data on cow kick behavior, which informed design improvements for sensor placement and comfort.
- Collaborated with farm managers to address practical challenges in precision livestock farming, enhancing sensor reliability and animal welfare.

RESEARCH AND TEACHING INTERESTS

Precision/Digital Agriculture	Agricultural IoTs	Agricultural Automation
High-Throughput Phenotyping	Remote Sensing	Data-Driven Decision Making
UAV Applications	AI in Agricultural Systems	Sustainability in Agriculture

SCHOLARLY PUBLICATIONS

- Pawikhum, K., **Yang, Y.**, Heinemann, P. H., & He, L. Development of a Machine Vision System for Apple Bud Thinning in Precision Crop Load Management. *Computers and Electronics in Agriculture* (under review).
- **Yang, Y.**, Mali, P., Arthur, L., Molaei, F., Atsyo, S., Geng, J., He, L., & Ghatrehsamani, S. (2025). Advanced technologies for precision tree fruit disease management: A review. *Computers and Electronics in Agriculture*, 229, 109704. https://doi.org/10.1016/j.compag.2024.109704
- **Yang, Y.**, Heinemann, P. H., Pawikhum, K., & Peter, K. A. (2024). Presymptomatic detection of fire blight in apple orchards using portable diffuse reflectance spectroscopy: A machine learning approach. *Proceedings of the 2024 ASABE Annual International Meeting* (Paper No. 2400975, pp. 1-9).
- **Yang, Y.**, He, L., & Peter, K. A. (2023). Smartphone-assisted apple scab identification and quantification using artificial intelligence. *Proceedings of the 2023 ASABE Annual International Meeting* (Paper No. 2300116, pp. 1-10).
- **Yang, Y.**, He, L. (2022). Apple Scab Severity Detection and Quantification Using Computer Vision. *Proceedings of the 2022 Northeast Agricultural and Biological Engineering Conference (NABEC)*.
- Liang, X., Chen, B., Li, M., Wei, C., **Yang, Y.**, Wang, J., & Feng, J. (2019). Dynamic counting method of cotton rows in video based on centroid tracking. *Transactions of the Chinese Society of Agricultural Engineering*, 35(2), 175-82.
- Zhu, D., Chen, B., Liang, X., & **Yang, Y.** (2018). Apparatus for synchronous measuring three dimensional parameters of maize seeds based on oblique photography. *Transactions of the Chinese Society of Agricultural Engineering*, 34(4), 201-208.
- **Yang, Y.**, Cheng, Z., Luo, L., & Yang, S. (2017). Terra. *Proceedings of the 15th Field Robot Event* (pp. 34-38). Harper Adams University.

FIRST AUTHOR MANUSCRIPTS IN PROGRESS

- "Development and Deployment of ScabDoc: Advanced Segmentation Models for Apple Scab Severity Quantification and Decision Support Using Environmental Data." To be submitted to Journal of ASABE.

- "MothNet: Integrated Computer Vision Solutions and Smart Traps for Invasive Box Tree Moth Identification and Monitoring." To be submitted to Smart Agricultural Technology.

- "bioWatch: Mobile Computer Vision Technology for Detecting Spotted Lanternfly Life Stages." To be submitted to CVPR 2025.

- "Spectrophotometric and Machine Learning Approaches for Early Detection of Apple Fire Blight." Under internal review.

- "Hyperspectral Imaging and Machine Learning for Noninvasive Detection of Tomato Defense Proteins Induced by Corn Earworm." Under internal review.

SECOND AUTHOR MANUSCRIPTS IN PROGRESS

- "Development of an End-Effector for Robotic Mushroom Harvesting." Under internal review, focusing on the design and implementation of a robotic system for efficient and non-damaging mushroom harvesting.

- "Development of a Computer Vision-Assisted Apple Bud Thinning System." Manuscript in progress, emphasizing the integration of machine vision and robotics to optimize apple bud thinning.

SELECTED AWARDS AND HONORS

- **CAS Graduate Student Travel Awards**, College of Agricultural Sciences, Penn State University 01/2025
- **Student Leader Scholarship**, Penn State University 12/2024
- **Harold V. and Velma B. Walton Doctoral Student Endowment in Agricultural and Biological Engineering**, College of Agricultural Sciences, Penn State University 10/2024
- **2nd Place**, Ethics Essay Competition, American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting 07/2024
- **1st Place**, Graduate Student Poster Presentation Competition, Northeast Agricultural and Biological Engineering Conference (NABEC) 07/2024
- **1st Place**, Nittany AI Challenge, Penn State University 04/2024
- **1st Place**, Graduate Student Poster Presentation, Gamma Sigma Delta (GSD) Research Expo, Penn State University 04/2024
- **1st Place**, Engineering Research Poster Presentation & Data Visualization Award, Graduate Research Exhibition, Penn State University 04/2024
- **Top 9 Finalist**, Digital Ag Hackathon, Cornell University 02/2024
- **Prototype Winner**, Nittany AI Challenge, Penn State University 02/2024
- **INSECT NET Travel Award**, Penn State University 01/2024
- **3rd place**, Engineering Research Poster Presentation, Graduate Research Exhibition, Penn State University 04/2023
- **Exceptional Collaborators Award**, Intelligent Solutions Group, John Deere 04/2021
- **Scholarship Award**, China Scholarship Council 02/2017
- **Silver Medal Winner**, Women Volleyball College Competitions 05/2013
- **Best Debater**, Freshmen Debate Competitions, China Agricultural University 12/2012

MAJOR RESEARCH GRANT ACTIVITY

Project Title	Role	Source	Amount Funded	Dates of Project

MothNet: AI Portal and Smart Trap Systems for Automatic Box tree Moth Monitoring	PI	CAS Graduate Student Competitive Grants Program	$3,000	01/2025 – 12/2025
Smartphone-assisted apple diseases identification and quantification using artificial intelligence	Co-PI	State Horticultural Association of Pennsylvania	$7,479	02/2023 - 02/2024

CONFERENCE PRESENTATIONS

- "MothNet: AI-Driven Tools for Invasive Box Tree Moth Monitoring and Sustainable Pest Management." Oral presentation delivered at the AI in Agriculture conference, Mississippi State University, Starkville, MS, April 2025.

- "Approach to Biodiversity Protection: Employing AI and IoT Systems for the Containment of Box Tree Moth Proliferation." Invited oral presentation delivered at the American Society for Horticultural Science (ASHS) Annual Conference, Honolulu, HI, September 2024.

- "Presymptomatic Detection of Fire Blight in Apple Orchards Using Portable Diffuse Reflectance Spectroscopy: A Machine Learning Approach." Invited poster presentation delivered at the National Agricultural Producers Data Cooperative (NAPDC) Conference, University of Nebraska-Lincoln, Lincoln, NE, August 2024.

- "Fields of Automation: Navigating the Ethical Terrain of AI and Robotics in Agriculture." Oral presentation delivered at the American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, Anaheim, CA, July 2024

- "Presymptomatic Detection of Fire Blight in Apple Orchards Using Portable Diffuse Reflectance Spectroscopy: A Machine Learning Approach." Poster presentation delivered at the American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, Anaheim, CA, July 2024.

- "Harnessing AI and IoT Systems for Monitoring and Controlling the Spread of Invasive Box Tree Moths.", Poster presentation delivered at the Northeast Agricultural Biological Engineering Conference (NABEC), State College, PA, July 2024.

- "Smartphone-assisted Apple Scab Identification and Quantification Using Artificial Intelligence." Poster presentation delivered at the American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, Omaha, NE, July 2023.

- "Smartphone-assisted Apple Diseases Identification and Quantification Using Artificial Intelligence." Poster presentation delivered at the Mid-Atlantic Fruit and Vegetable Convention (MAFVC), Hershey, PA, February 2023.

- "Apple Scab Severity Detection and Quantification Using Computer Vision." Oral presentation delivered at the Northeast Agricultural Biological Engineering Conference (NABEC), Edgewood, MD, August 2022.

- "Deep Learning and Augmented Reality Toward a Mobile Solution for Scab Detection and Measurement in Apple Orchards." Oral presentation delivered at the American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, Houston, TX, July 2022.

INVITED TALKS

- **Guest Lecturer**, "Precision Technologies for Animal Behavior Monitoring." Delivered at the ANSC 480 Course at the University of Tennessee, Knoxville, TN, April 2025.

- **Guest Speaker**, "Innovative Integrated Pest Management." Delivered at the ABSM 424 Course at the Pennsylvania State University, University Park, PA, November 2024.

- **Guest Speaker**, "Precision livestock Farming." Delivered at the ABSM 424 Course at the Pennsylvania State University, University Park, PA, October 2024.

- **Guest Speaker**, "Approach to Biodiversity Protection: Employing AI and IoT Systems for the Containment of Box Tree Moth Proliferation." Delivered at the AI Innovation for Horticulture Colloquium for American Society for Horticultural Science (ASHS) Annual Conference, Honolulu, HI, September 2024.

- **Panelist**, "AI in Ornamentals." Delivered at the AI Innovation for Horticulture Colloquium for American Society for Horticultural Science (ASHS) Annual Conference, Honolulu, HI, September 2024.

- **Guest Speaker**, "Technology for Precision Pest Management." Delivered at the INSECT NET 597 Course at the Pennsylvania State University, University Park, PA, September 2024.

- **Guest Speaker**, National Agricultural Producers Data Cooperative (NAPDC) Conference Invitational Meeting, University of Nebraska-Lincoln, Lincoln, NE, August 2024.

- **Selected Speaker**, "Guardians of Green: Combating Box Tree Moth Proliferation with AI & IoT." Delivered at the Technologies for Agriculture and Living Systems Symposium at the Pennsylvania State University, University Park, PA, May 2024.

TEACHING AND ADVISING EXPERIENCE

Teaching Assistant Penn State University, University Park, PA
Tech and AI for Living Systems (Professor Christina Grozinger) Fall 2024

- Developed course materials, including descriptions, instructions on data annotation, and code for computer vision tasks.
- Delivered a presentation on the application of AI in living systems, drawing on real-world examples and encouraging student engagement with advanced AI topics.

Teaching Assistant Penn State University, University Park, PA
Precision Agriculture (Professor Shirin Ghatrehsamani) Fall 2023

- Delivered an instructional session on yield mapping and monitoring to a class of 19 students across agriculture disciplines, focusing on practical applications in precision agriculture.
- Facilitated a session on precision livestock farming, where I shared my personal experience with dairy cow monitoring and led discussions on the integration of AI and IoT in livestock systems, supported by a guest speaker's insights.
- Developed and led a comprehensive review paper project tailored for five graduate students, focusing on current trends and advancements in precision agriculture.
- Graded student presentations, assessing their understanding and ability to communicate complex concepts effectively.

Teaching Assistant China Agricultural University, Beijing, China
Digital Image Processing (Professor Bingqi Chen) Spring 2018

- Assisted in lab sessions on programming to achieve image processing tasks, providing guidance on practical implementations.

Mentor Harper Adams University, Newport, UK
Engineering Workshop Spring 2017

- Guided high school students in learning about sensors and satellite navigation systems, assisting them in completing an autonomous toy car competition.

Mentor China Agricultural University, Beijing, China
Undergraduate Capstone Fall 2016

- Managed and mentored an undergraduate student at China Agricultural University, overseeing a thesis project and facilitating research assistant at Beihang University.

Invited Lecturer Yangxin Elementary School, Anhui, China
Mathematics Teacher Spring 2013

- Developed and implemented lesson plans, taught multiple mathematics sessions, and inspired students by sharing personal earning experiences.

RESEARCH AND STUDY EXPERIENCE

- Conducted 12 months of Ph.D. fieldwork in apple orchards in Biglerville, PA, USA (05/2022 - 05/2023), focusing on precision pest management practices using advanced technologies in precision agriculture.
- Executed fieldwork for John Deere China in Heilongjiang and Xinjiang (04/2021 and 07/2021), contributing to the deployment of precision machinery in diverse crops across various agricultural environments.
- Completed a 12-month study at Harper Adams University, England, UK (02/2017 - 02/2018), focusing on the development and implementation of autonomous tractors in agricultural settings.
- Carried out master's thesis fieldwork on dairy farms in Scotland, UK (08/2017 - 10/2017), specializing in sensor-based monitoring of dairy cow behavior to enhance livestock management practices.
- Engaged in undergraduate fieldwork in Tianjin, China (Spring 2016), developing practical skills in agricultural engineering and technology.

EXTENSION AND OUTREACH ACTIVITIES

Biodiversity Monitoring & Management, Penn State Ag Progress Days, Rockspring, PA 08/2024

- Delivered a presentation and live demonstration on data-driven strategies for managing the invasive box tree moth, highlighting innovative approaches in biodiversity conservation.

Scouting BSA, Penn State Agricultural Progress Days Site, Rockspring, PA 04/2023

- Introduced young scouts to the applications of UAVs in agriculture settings, emphasizing the role of drone technology in modern farming practices.

Plant Protection Field Day, Penn State Fruit Research and Extension Center 09/2022

- Demonstrated the use of an autonomous orchard sprayer to representatives from chemical companies, showcasing advancements in precision agriculture technology.

Penn State Ag Progress Days, Rockspring, PA 08/2022

- Volunteered at the "Climate-Smart Agriculture and Forestry" booth, engaging with visitors and discussing sustainable agricultural practices.

Penn State Fruit Research and Extension Center Biennial Field Day 07/2022

- Assisted in setting up and demonstrating a LiDAR-based intelligent sprayer for local apple growers, contributing to the promotion of precision spraying technology.

Franklin County, PA 06/2022

- Provided on-site instruction to local growers on the setup and operation of smart irrigation systems, enhancing water management practices in agriculture.

Field Demo, John Deere (Tianjin) Works 07/2021

- Conducted a demonstration of AutoTrac Turn Automation and Yield Mapping technologies for leadership and local farmers, highlighting the benefits of precision machinery in crop management.

Factory Fly-in, John Deere (Tianjin) Works 01/2021

- Led training sessions for customers on satellite navigation systems and John Deere guidance products, ensuring effective use of advanced agricultural technologies.

China Internation Import Expo, Shanghai, China 11/2020

- Demonstrated cutting-edge John Deere technologies, including AutoTrac Guidance, Turn Automation, RowSense, and Telematics, to a wide audience of visitors.

LEADERSHIP AND ACADEMIC ENGAGEMENT

Judge, Graduate Exhibition, Penn State University (2025)
Member, Advancing Standards Transforming Markets (ASTM) International (2025 - present)
Reviewer, *Journal of Testing and Evaluation* (2025)
President, Department of Agricultural and Biological Engineering Graduate Student Council (2024 -2025)
Treasurer, Department of Agricultural and Biological Engineering Graduate Student Council (2023 - 2024)
Conference Reviewer, TAROS 2024: 25th Annual Conference Towards Autonomous Robotic Systems (2024)
Reviewer, *Frontiers in Plant Science* (2023)
Elected Member Engineer, Alpha Epsilon - Honor Society of Agricultural, Food, and Biological Engineering (2023 - Present)
Committee Member, ITSC 230 Biosensors, American Society of Agricultural and Biological Engineers (2022 - Present)
Judge, Future City Competition, American Society of Agricultural and Biological Engineers (2022)
Member Engineer, American Society of Agricultural and Biological Engineers (2021 - Present)
Member Engineer, Institution of Agricultural Engineers (2017 - 2018)
Member Engineer, Future Engineers Association, Institution of Mechanical Engineers (2012 - 2013)

PROFESSIONAL CERTIFICATION

- **Penn State CIRTL Teaching Certificate**, Fox Graduate School at Penn State
- **Broadening Extension through Student Training (BEST)**, Penn State Extension
- **Remote Pilot License (Small Unmanned Aircraft System)**, Department of Transportation, FAA

WEBSITE OR APP PUBLISHED/LAUNCHED

Name	Description	Link	Role
MothNet	AI-powered web portal for box tree moth identification, hosted on Penn State's VMhost. Developed AI model, frontend and backend.	https://diagnose-invasive.vmhost.psu.edu/	Lead Developer
bioWatch	Invasive species monitoring app focusing on the spotted lanternfly. Available in the App Store. Responsible for AI model, UI/UX, frontend, backend, and database server.	https://apps.apple.com/us/app/biowatch/id6480581494	Lead Developer

WEBSITE OR APP DEVELOPED (NOT LAUNCHED)

Name	Description	Link	Role
ScabDoc	AI-based web app for apple scab identification and quantification. Developed AI model, frontend, and flask backend.	N/A	Lead Developer

SOFTWARE COPYRIGHT

- Object Geometric Measurement System Based on the Mobile Terminal, 2018SRBJ0741
- Circular Steel Pipe Counting System Based on Machine Vision, 2018SRBJ0685
- Boundary Detection System of Farming Operation Area, 2018SRBJ0684
- Vision Navigation System for Corn Harvester, 2018SRBJ0595

SKILLS AND TECHNIQUES

- **Expert-level knowledge** in multispectral and hyperspectral image analysis, remote sensing, and high-throughput phenotyping.
- **Proficient in computer vision, image processing, machine learning, and data analytics** using Python, MATLAB, and R, with applications in **plant, insect, and livestock systems**.
- **Experienced in sensor development, deployment, and integration** for precision agriculture.
- **Skilled in engineering design, simulation, and prototyping** using SolidWorks, PTC Creo, and AutoCAD.
- **Knowledgeable in environmental sustainability practices and precision management** for agricultural systems.

REFERENCES

Paul Heinemann, Ph.D.
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