PURDUE UNIVERSITY
Institute for Digital and Advanced Agricultural Systems

## Directors' Opening

Our Institute for Digital and Advanced Agricultural Systems (IDAAS) had a strong presence at the 2026 AI in Agriculture Conference hosted by NC State University Many affiliates of our Institute contributed meaningfully to the event by delivering a keynote presentation, presenting research posters, and actively engaging in networking opportunities with researchers, industry leaders, and colleagues from other universities. This event and overall attendance clearly demonstrated the importance of AI in Agriculture and the need for further investments to advance this critical work across the country. The 2027 meeting will be hosted by our colleagues at the University of Kentucky in Lexington. Our Institute will collaborate to support their work, and we hope to see a great number of our affiliates and their students contributing to this conference. Lastly, adding to the milestones of our Institute, Purdue and IDAAS were selected to host the conference in 2028, recognizing the Institute's growing leadership and impact in the field of AI-enabled agricultural systems. We are looking to build this great conference together with our affiliates and all our Purdue community!

Our team is also working on an exciting workshop to bring together leaders across the country and discuss the role of AI on shaping our agricultural systems.

For more about our Institute, check our recent news.

Stay tuned for more information on these events coming out before the end of this year!

Have a great and very productive summer!

Wishing you the best,

Dennis R. Buckmaster Ignacio Ciampitti

**Explore the latest from IDAAS—click here to stay connected!**

## IDAAS Seminars, Webinars, Events

### IDAAS Hosts First Digital Ag Connect: Networking & Poster Session

The Institute for Digital and Advanced Agricultural Systems (IDAAS) recently hosted its first IDAAS Digital Ag Connect: Networking & Poster Session on May 8, 2026, in Marriott Hall. The event brought together faculty, staff, and students to network, collaborate, and explore innovative research and emerging technologies shaping the future of digital agriculture.

Co-sponsored by the Center for Food and Agricultural Business (CAB), Institute for Physical Artificial Intelligence (IPAI), the Institute for Sustainable Future (ISF), Plant Sciences, Digital Forestry, and the Open Ag Technologies and Systems Center (OATS), the event highlighted the importance of interdisciplinary collaboration and provided attendees with the opportunity to engage in meaningful conversations surrounding cutting-edge advancements in agriculture and technology.

The poster session featured a wide variety of innovative research projects and sparked valuable discussions among participants across multiple disciplines. We would like to congratulate our top poster presentation award winners:

🥇 1st Place – Joshi Binod
🥈 2nd Place – Rojas Oropel Suyapa Fabiola
🥉 3rd Place – Pereira de Souza Maria Victoria

Thank you to all participants for sharing your research, ideas, and expertise and for helping make the inaugural event such a success. It was exciting to see so many connections, collaborations, and conversations taking place throughout the afternoon.

Be sure to mark your calendars for the next IDAAS Digital Ag Connect: Networking & Poster Session scheduled for April 16, 2027, from 3:00-6:30 PM in Marriot Hall!

Image: Presenters and poster session winners at the Digital Ag Connect: Networking & Poster Session event

### Industry Leaders Drove Conversations in the IDAAS Data-Driven Seminar Series

Throughout the Fall 2025 and Spring 2026 semesters, the Institute for Digital and Advanced Agricultural Systems (IDAAS) Data-Driven Seminar Series brought together industry leaders and innovators from across the digital agriculture space to share insights, emerging technologies, and real-world applications shaping the future of agriculture.

The seminar series featured speakers representing a wide range of organizations working at the intersection of agriculture, technology, automation, data science, artificial intelligence, and digital innovation, including:

- Aaron Shew - ACRES

- Chris Boomsma - CAST
- Phil Burbrink and Doug Hasselbring - CGB Enterprises
- Byron Sleugh - Corteva
- Rob Janek - CTB, Inc.
- Ryan Bartlett - Pairwise
- Neil Carpenter – Bayer
- Drew Garretson - Keystone

Presentation recordings are available here.

These seminars provided valuable opportunities for students, faculty, staff, and industry partners to engage in conversations surrounding precision agriculture, AI applications, data-driven decision making, workforce development, sustainability, and the evolving role of technology in modern agriculture.

IDAAS looks forward to continuing the seminar series throughout Fall 2026 and Spring 2027 with an ongoing emphasis on industry engagement and collaboration across the digital agriculture ecosystem.

Image: (L to R) Drew Garretson (Keystone), Phil Burbrink (CGB), Aaron Shew (ACRES)

## Research Spotlight

### Recognizing the Pattern: How Understanding Disease Development Can Shape Crop Management

By: Brenden Lane

Ever since I was a kid, the natural processes that exist in this world have always left me in awe. I spent every moment I possibly could outside, experiencing firsthand how the natural world works. There is still a lot I do not understand, but one thing became clear to me early on: this planet runs on patterns. Certain signs often point to what comes next — an east wind means rain is coming, bluegills near shore mean big bass are close, and south-facing slopes usually produce the first morels of the season. Nature is constantly providing clues; you just have to pay attention.

As my curiosity surrounding natural patterns grew, I realized those patterns could also be measured. That realization opened my eyes to the idea that natural systems can be studied, understood, and even predicted. One especially important system here in the Midwest is disease development in crop fields. Managing crop disease is ultimately about recognizing the signals early.

That curiosity led me to focus on tar spot, a relatively new and economically significant corn disease in the United States. Working alongside my affiliated faculty advisor, Christian Cruz, I conducted a multi-year study tracking disease development from planting through harvest. Week after week, I returned to the same corn fields to scout for stromata — the small black fungal structures associated with tar spot — and record disease severity throughout the canopy.

At first glance, tar spot can appear unpredictable to growers because symptoms often seem to emerge suddenly. However, the data revealed something very different. The disease does not explode overnight; it begins quietly, often with just a few stromata on a handful of leaves that are easy to overlook. Each stroma can produce thousands of spores, initiating another round of infection. Over time, those infection cycles stack on one another, eventually leading to severe epidemics.

One of the most important discoveries from the study was that timing drives disease severity. The earlier the initial infection occurs, the more infection cycles the fungus can complete before harvest. Simply put, more cycles equal more disease. As more leaves emerge during the growing season, the fungus gains additional opportunities to colonize the canopy and continue spreading.

Using a Markov chain framework, I translated field observations into a mathematical representation of how disease moved through the crop canopy over time. Across multiple growing seasons, a consistent pattern emerged. Epidemics followed a predictable rhythm: an early establishment phase where disease presence was sparse and difficult to detect, followed by a lag phase where stromata quietly accumulated across nearly every leaf, though still at low levels. Eventually, the system shifted into an exponential growth phase where millions of spores accelerated disease spread and significant yield loss became likely.

The findings reinforced an important lesson: the damage farmers observe late in the season is not sudden. It is the result of weeks of quiet buildup. Recognizing those patterns fundamentally changed how I think about disease management. Instead of reacting after symptoms become severe, farmers and researchers can focus on understanding where the epidemic is within its development and what is likely to happen next.

For me, this research is about more than plant disease. It is about understanding how patterns shape agricultural systems and how data-driven approaches can help make farming more resilient, efficient, and predictable. Looking ahead, I hope to continue developing faster and more high-throughput ways to recognize these patterns earlier and use that knowledge to support practical decision-making in real production systems.

At the end of the day, it all comes back to recognizing the pattern.

Read full publication here.

Image: Brenden Lane analyzing tar spots on corn

## Awards & Recognitions

### Congratulations to IDAAS Affiliates and Executive Committee Members on Recent Awards and Honors

The Institute for Digital and Advanced Agricultural Systems (IDAAS) proudly congratulates several IDAAS affiliates and Executive Committee members on their recent awards, recognitions, and professional achievements. These honors reflect the continued excellence, leadership, innovation, and impact of Purdue faculty across research, teaching, extension, and service.

We are excited to celebrate the following accomplishments:

Sylvie Brouder – Named Fellow of the Soil Science Society of America

Ignacio Ciampitti – Named Fellow of the Crop Science Society of America

Krishna Nemali – Named Fulbright Program Scholar (India)

Songlin Fei – Recipient of the Herbert Newby McCoy Award

Brady Hardiman – Named University Faculty Scholar

Amanda Deering – Recipient of the PUCESA Excellence in Extension Mid-Career Award & Purdue Agriculture TEAM Award - Student Farm

Ken Foster – Recipient of the PUCESA Career Award

Dan Quinn – Recipient of the Eric G. Sharvelle Distinguished Extension Specialist Award

Robert Stwalley – Recipient of the Superior Paper Award from the American Society of Agricultural and Biological Engineers for "The Heat Transfer Properties of a Stainless Steel Sow Cooling Pad Variant"

Trey Malone – Recipient of the 2025 Community Development Society Best Paper Award

Michael Langemeier – Recipient of the Distinguished Extension/Outreach Program Award from the Agricultural and Applied Economics Association

Nicole Widmar – Recipient of the ESGR Patriotic Award from the United States Department of Defense

Valerie Kilders – Recipient of both the ESGR Patriotic Award from the United States Department of Defense and the North American Teaching Award from North American Colleges and Teachers of Agriculture

Christian Cruz – Recipient of the Excellence in International Service Award from the American Phytopathological Society

Jacquelyn Boerman - Cargill Animal Nutrition Young Scientist Award, American Dairy Science Association

Brad Kim - Meat Research Award, American Society of Animal Science

Allan Schinckel - Superior Paper Award for "The Heat Transfer Properties of a Stainless Steel Sow Cooling Pad Variant" published in Applied Engineering in Agriculture, American Society of Agricultural & Biological Engineers

Christian Butzke - 20 years of service

Yaohua "Betty" Feng - Outstanding Graduate Educator

Bryan Pijanowski - Distinguished Landscape Ecologist, International Association for Landscape Ecology

Ariana Torres - Multistate AgInnovation Research Award, Multistate Research Committee

These recognitions showcase the remarkable breadth of expertise and leadership represented within the IDAAS community. From groundbreaking research and extension excellence to international service, teaching innovation, and industry impact, these faculty members continue to advance the future of digital and advanced agricultural systems while strengthening Purdue's leadership in agriculture and technology.

Congratulations again to all award recipients on these well-deserved honors and thank you for your continued contributions to research, education, extension, and innovation.

## Extension Spotlight

### April Outreach and Innovation Drive Momentum in Digital Agriculture

April was a full and productive month for our Digital Agriculture and Extension efforts, with strong engagement across education, outreach, and professional collaboration.

We continued advancing hands-on learning through UAV applications, including seeding clover for research at ACRE and supporting experiential instruction in the AGRY 598 course. Our team also had a strong presence at community events such as White County Ag Day, Montgomery County Ag Days, and Tri-Central STEM Night, where we connected with students, educators, farmers, and families to showcase digital agriculture in action.

Our outreach efforts included 11 rotating sessions at White County Ag Day, as well as interactive demonstrations and engagement opportunities at Spring Fest and STEM-focused programming. Across the month, we provided consultations to teachers (5), farmers (2), and educators (4), continuing to support workforce development and knowledge sharing in precision agriculture.

Key presentations and demonstrations included:

- UAV Agronomy Course sessions, including drone flight labs and case study discussions
- Seeding clover into wheat at ACRE for applied research
- Interactive youth and community engagement events across multiple counties

In addition to outreach, April included extensive collaboration and professional development. Our team participated in a wide range of meetings and initiatives, including field crops updates, digital agriculture in Extension, AI Readiness course development, and strategic planning efforts such as the BIG IDEAS proposal. We also began coordinating training efforts with Climate FieldView and regional partners, while contributing to statewide and national conversations around AI strategy and conservation programming.

Overall, April highlighted the continued momentum of integrating digital tools, education, and partnerships to advance the future of agriculture.

Image: students testing drone and digital ag van displays

## Education Spotlight

### Digital & Precision Agriculture Workshop for Teachers Provided Hands-On Learning Opportunities Across Indiana

Purdue University’s Digital & Precision Agriculture Workshop for Teachers recently brought together current and future middle and high school agriculture educators from across Indiana for an engaging, hands-on professional development experience focused on the rapidly evolving field of digital agriculture.

Hosted through Purdue University’s Office of Experiential Education in collaboration with IoT4Ag, OATS, and the Institute for Digital and Advanced Agricultural Systems (IDAAS), the workshop provided both pre-service and in-service teachers with practical exposure to emerging technologies and innovative teaching applications designed to prepare the next generation of agricultural leaders.

Throughout the workshop, participants explored a variety of key topics shaping modern agriculture, including:

- Foundations of Digital Agriculture
- Data Management and Data Literacy
- Artificial Intelligence in Teaching and Learning
- Digital Mapping Technologies
- Drone Technology and Applications

The workshop featured interactive, activity-based learning opportunities that allowed educators to engage directly with technologies increasingly used throughout the agriculture industry. Participants experienced live drone demonstrations, hands-on technology stations, collaborative classroom activities, and discussions focused on integrating digital agriculture concepts into middle and high school curricula. Participants also built and programmed small robots that completed assigned tasks, providing firsthand experience with automation and coding concepts connected to modern agriculture. In addition, attendees programmed and flew drones while learning about their applications in precision agriculture, mapping, and field data collection.

Workshop presenters included Yaguang Zhang, Sidd Paul, Adam Shanks, Bruce Erickson, Dennis Buckmaster, Harsh Pathak, and Kwabena Bayity, who shared expertise and real-world applications of digital and precision agriculture technologies.

In addition to technical learning opportunities, the workshop fostered collaboration and networking among educators interested in expanding agricultural technology education throughout Indiana schools. Attendees also received classroom resources, lesson-planning materials, and practical tools to support continued implementation of digital agriculture concepts in their own educational programs.

The workshop highlighted the growing interest in digital agriculture education and workforce development while reinforcing Purdue University’s commitment to preparing educators and students for the future of agriculture. Thank you to all faculty, staff, presenters, organizers, and participating teachers who contributed to making the event both impactful and engaging.

Image: (Top-L-R) Educator group photo, Harsh Pathak teaching educators, Yaguang Zhang teaching educators

### Inaugural offering of Research Foundations in the Era of AI

Several volunteer IDAAS affiliated instructors (Christian Cruz, Ignacio Ciampitti, Jarrod Doucette, Yaguang Zhang, Bruce Erickson, Dennis Buckmaster, Dharmendra Saraswat, and Anna Paltseva) quickly developed and offered a bootcamp-style 1-credit course that may serve as a jump-start to an AI in Ag certificate. More than 50 anxious-to-learn graduate students from several departments participated in a 2-Saturday course with 10 miniature modules related to the ethical and responsible use of AI on topics such as research life cycle, the scientific method, data acquisition, data organization, visualization and analysis, and writing and outreach. Students had significant knowledge/skill gains in nearly every topic covered.

We will be repeating this course in future semesters, so if you're a student, look for it to sign up. If you are a faculty mentor, share this with your students.

Image: Collage of students working together in the AGR 595 class

## Upcoming Conferences & Workshop

### Growing with AI: Registration Open for SyDAg 2026

Registration Now Open for the 2nd Symposium of Digital Agriculture (SyDAg)

📅 Date: September 28, 2026
⏰ Time: 8:00 AM – 6:00 PM
📍 Location: Beck's Center at ACRE

SyDAg is a student-led event that brings together students, researchers, educators, and industry professionals to explore innovation and emerging technologies in agriculture. This year's theme "Growing with AI", will highlight how artificial intelligence and digital technologies are shaping the future of the agricultural industry. The symposium will bring together emerging leaders and established experts to explore how innovations in digital and AI-driven agriculture can address pressing challenges across production, management, and supply systems.

We encourage you to learn more and register at: SyDAg Registration Website

Stay connected with SyDAg:

Instagram: @purduesydag

LinkedIn: Symposium of Digital Agriculture (SyDAg)

Interested in joining the organizing committee? Reach out to the SyDAg team to get involved!

WELCOME to SyDAg
DATA-DRIVEN DECISION-MAKING

Image: Collage of pictures from the 2025 SyDag

## Digital Ag in the News

### Detecting Disease Early with AI

IDAAS Executive Committee member Christian Cruz, associate professor of botany and plant pathology, is leading a newly awarded $100,000 project focused on real-time, AI-driven detection and mitigation of corn tar spot—a rapidly spreading disease that can severely impact yield if not identified early.

The interdisciplinary team also includes Mohammad Jahanshahi, associate professor in the Lyles School of Civil and Construction Engineering, and Alexandria Volkening, assistant professor of mathematics. Together, they are developing advanced AI models designed to operate under real-world field conditions, where factors such as variable lighting, shading, occluded leaves, and background noise make disease detection particularly challenging.

While AI approaches for plant disease detection have shown promise in controlled research settings, scaling these tools to on-farm use remains difficult. This project addresses that gap by leveraging prior data to infer disease probability despite environmental variability, and by applying cutting-edge computer vision techniques capable of detecting disease features—such as tar spots—at near-pixel resolution.

"Under the right but complex conditions, tar spot can spread quickly and kill leaves, which are essential for crop growth and production," Cruz said. "If farmers don't know where, when, and at what speed it's spreading, they can't respond effectively. Better monitoring supports healthier crops, reduced financial losses, and more efficient management—by catching problems early and avoiding unnecessary treatments."

This work exemplifies IDAAS's mission to integrate digital technologies, data science, and agricultural expertise to generate actionable insights for producers and support resilient, sustainable food systems.

## Connect with IDAAS as an Affiliate

The Institute for Digital and Advanced Agricultural Systems (IDAAS) invites Purdue faculty and staff to become affiliates and join our growing network of researchers and innovators. Affiliates are engaged in areas such as digital agriculture, AI, advanced sensing, data analytics, automation, and related technologies that are shaping the future of agriculture and food systems.

The challenges in these fields are complex and rapidly evolving. Tackling them requires a collaborative, transdisciplinary approach—one that aligns closely with Purdue's Land Grant Mission of building human capital, advancing solutions to pressing global challenges, and partnering deeply with industry and community stakeholders.

To be included in the IDAAS directory of faculty and staff affiliates, please complete the short survey below:

- New affiliates: fill out the form to be added.
- Current affiliates: use the same form to update your information.

Affiliate Form – IDAAS Directory

**Explore the latest from IDAAS—click here to stay connected!**

## Digital Identity

What is Digital Agriculture? It's the use of digital devices to gather, process and analyze spatial and/or temporal data. This data can then guide targeted actions to improve agricultural efficiency, productivity and sustainability.
Contributions to this newsletter are welcomed. Please send your ideas, ideally about one paragraph with links and a photo, to digitalag@purdue.edu.

IDAAS newsletters are compiled and edited by Melinda Smith.