

## Symposium

Virtual event; Registration Required

### Thought for food...

Our global agriculture and food systems require a radical transformation relying on expertise in multiple areas and research collaborations across disciplines that include agriculture, food safety, engineering, information and computer science, biology, business and the social sciences.

More than 100 faculty from across Cornell's colleges – Agriculture and Life Sciences, Engineering, Computing and Information Science, Arts and Sciences, Veterinary Medicine and Business – have come together to develop a robust research agenda for CIDA, **weaving unmatched excellence into holistic solutions for food and agriculture**. CIDA's mission is to inspire learning, catalyze innovation, and integrate fundamental discoveries to achieve new levels of sustainability in agri-food systems and new food for thought.

#### Session 1: "Agricultural robotics around the world"

9:00am-  
10:30am



Agricultural robotics is rapidly developing and sparking strong interest from roboticists in research and industry alike. To effectively contribute to this area, academic research needs to be highly interdisciplinary, and it requires more than the usual attention to the final ecosystem and end consumer for which it is intended. We have invited three leading experts on agricultural robotics from Europe, Australia, and the U.S. to address questions pertaining to the future of agricultural robotics.

#### Session 2: "Digital Agriculture in Low and Middle-Income Countries"

10:40am-  
12:10pm



In developing countries, the rapid adoption of mobile phones and other digital tools that have accelerated the deployment of agricultural services for farmers and other value chain actors resulting in enhanced access to information, knowledge, financial services, markets, and farm tools. Despite the numerous opportunities presented by the digital agriculture revolution, its future in developing countries remains uncertain due to challenges such as the growing digital divide, weak enabling environments, slow pace of policy reform and lack of sustainable models for scaling up.

#### Session 3: "Promoting sustainable and resilient animal agriculture through DA"

1:10pm-  
2:40pm



Digital agriculture tools are poised to contribute to more environmentally sustainable and resilient food animal production systems. This session will discuss the contribution of existing technologies and current gaps in technological innovations for estimating the environmental footprint of food producing animals. Improving animal health and welfare is also central to the resilience and sustainability of food animal production systems. Thus, we will discuss recent applications in smart sensing and computer vision systems for monitoring animal health and welfare in modern farm animal operations.

#### Session 4: "Smarter food safety through data sharing among food businesses"

2:50pm-  
4:20pm



Digital tools have a tremendous potential for enhancing food safety. However, a key obstacle to a digitally enabled "smarter food safety" approach is a tension between the data utility and privacy and the resulting reluctance to share data. This session will discuss digital and smarter food safety through data sharing that maximizes the data utility but also protects privacy. The focus is on data sharing among food processing businesses, although concepts are applicable to other sectors in the food and other industries.

## 9:00am-10:30am: "Agricultural robotics around the world"



**Moderator: Kirstin Petersen**  
Assistant Professor, Electrical and  
Computer Engineering  
Cornell University



**Salah Sukkarieh**  
Professor, Robotics  
and Intelligent  
Systems  
Sydney University



**Yu Jiang**  
Assistant Research  
Professor, School of  
Integrative Plant Science  
Cornell University



**Jochen Hemming**  
Senior Researcher, Computer  
Vision and Robotics in  
Horticulture  
Wageningen University and  
Research (WUR)

## 10:40am-12:10pm: "Digital Agriculture in Low and Middle-Income Countries"



**Moderator: Ed Mabaya**  
Research Professor,  
Global Development  
Cornell University



**Kateryna Schroeder**  
Agriculture Economist,  
Food and Agriculture  
Global Practice  
World Bank



**Benjamin Kwasi  
Addom**  
Adviser, Agriculture  
and Fisheries Trade  
Policy (Digital)  
The Commonwealth  
Secretariat



**Meng Zeng**  
Information  
Technology Officer,  
Food and  
Agricultural  
Organization  
United Nations



**Jaron Porciello**  
Associate Director for  
Research Data  
Engagement, Global  
Development  
Cornell University

## 1:10pm-2:40pm: "Promoting sustainable and resilient animal agriculture through DA"



**Moderator: Julio Giordano**  
Associate Professor, Animal  
Science  
Cornell University



**Mario Herrero**  
Professor, Global  
Development  
Cornell University



**Hao Gan**  
Assistant Professor,  
Biosystems Engineering  
and Soil Science  
University of  
Tennessee-Knoxville



**Stacey Gunter**  
Research Leader, Rangeland and  
Pasture Research  
U.S. Department of Agriculture

## 2:50pm-4:20pm: "Smarter food safety through data sharing among food businesses"



**Moderator: Renata Ivanek**  
Associate Professor, Population  
Medicine and Diagnostic  
Sciences  
Cornell University



**Martin Wiedmann**  
Professor, Food  
Science  
Cornell University



**Ranveer Chandra**  
Managing Director for  
Research for Industry/  
CTO of Agri-Food  
Microsoft



**Qing Zhao**  
Professor, Electrical and  
Computer Engineering  
Cornell University



**Jayadev Acharya**  
Assistant Professor,  
Electrical and Computer  
Engineering  
Cornell University

Agricultural robotics is rapidly developing and sparking strong interest from roboticists in research and industry alike. Compared to factory automation, agricultural operations are significantly more complex and present a diverse set of challenges for robots: from the autonomous field operation to compatibility with end users that vary widely in operational scales, technological background, and risk adversity. To effectively contribute to this area, academic research needs to be highly interdisciplinary, it does not lend itself well to isolated lab tests, and it requires more than the usual attention to the final ecosystem and end consumer for which it is intended. We have invited three leading experts on agricultural robotics from Europe, Australia, and the U.S. to address questions pertaining to the future of agricultural robotics, specifically: 1) What is the state-of-the-art in agricultural robotics? 2) How do we translate state-of-the-art robotics research from labs to stake holders? 3) How can roboticists in academia achieve the most synergistic relationship with stakeholders and Agritech industry?



**Moderator: Kirstin Petersen**

*Assistant Professor, Electrical and Computer Engineering, Cornell University*

Prof. Petersen runs the Collective Embodied Intelligence Lab at Cornell University. Her research involves simple robotic solutions to complex problems, with a focus on bio-inspired design and coordination of robot collectives, as well as studies of their biological counterparts. Major topics include swarm intelligence, embodied intelligence, autonomous construction, digital agriculture, bio-cyber physical systems, human-swarm interaction, and soft robot swarms.



**Salah Sukkarieh**

*Professor, Robotics and Intelligent Systems, University of Sydney*

Prof. Sukkarieh will present his work in linking small solar-electric mobile ground robotics, AI and smart tools to improve on-farm production processes in a sustainable manner. Examples will be given from the Australian context in horticulture, grains, and grazing livestock.

Salah Sukkarieh is the Professor of Robotics and Intelligent Systems at the University of Sydney, and is the CEO of Agerris, a new Agtech startup company from the ACFR developing autonomous robotic solutions to improve agricultural productivity and environmental sustainability.



**Yu Jiang**

*Assistant Research Professor, School of Integrative Plant Science, Cornell University*

The use of artificial intelligence (AI) and robotics enables high-throughput plant phenotyping in both research and production, which provides rich information to enhance our understanding of complex agrifood systems. Prof. Jiang will focus on the development of autonomous imaging robots with deep learning-powered analysis of grape downy and powdery mildews.

Yu Jiang is an Assistant Research Professor in the Horticulture Section, School of Integrative Plant Science at Cornell. He leads the Cyber-Agricultural Intelligence and Robotics (CAIR) Laboratory in Cornell AgriTech and develops systems engineering solutions for critical challenges in agriculture.



**Jochen Hemming**

*Senior Researcher, Computer Vision and Robotics in Horticulture, Wageningen University and Research (WUR)*

The presentation is about the Robs4Crops project, a newly awarded project lead by WUR to accelerate the shift towards large-scale implementation of robotics and automation in European farming, bringing precision and feasibility to reduce mundane, repetitive, and unhealthy labor tasks.

Dr. Jochen Hemming holds a position as Senior Researcher Computer Vision and Robotics in Horticulture at the contract research part of Wageningen University and Research (WUR) in the Netherlands. His research is focused on developing new robotic and mechatronic solutions together with industry and international partners.

# “Digital Agriculture in Low and Middle-Income Countries”



Monday, October 11, 10:40am -12:10pm EDT

Digital agriculture solutions hold a promise to build an agri-food system that is efficient, environmentally sustainable, and inclusive. In developing countries, the rapid adoption of mobile phones and other digital tools that have accelerated the deployment of agricultural services for farmers and other value chain actors resulting in enhanced access to information, knowledge, financial services, markets, and farm tools. Despite the numerous opportunities presented by the digital agriculture revolution, its future in developing countries remains uncertain due to challenges such as the growing digital divide, weak enabling environments, slow pace of policy reform and lack of sustainable models for scaling up.



## **Moderator: Ed Mabaya**

*Research Professor, Global Development, Cornell University*

Dr. Ed Mabaya is a scholar and a development practitioner with more than two decades of experience working on development, agribusiness value chains and food security issues with a regional focus on Sub-Saharan Africa. He is a Research Professor in the Department of Global Development where his work focuses on economic development in Africa.



## **Kateryna Schroeder**

*Agriculture Economist, Food and Agriculture Global Practice, World Bank*

The presentation introduces the report “What’s Cooking: Digital Transformation of the Agrifood System” that investigates how digital technologies can accelerate the transformation of the agrifood system by increasing efficiency; improving farmers’ access to output, input, and financial markets; strengthening quality control and traceability; and improving agriculture policies.

Kateryna Schroeder is an agriculture economist in the Agriculture and Food Global Practice of the World Bank. In her work she focuses on digital agriculture, agricultural and trade policy analysis, and food security.



## **Benjamin Kwasi Addom**

*Adviser, Agriculture and Fisheries Trade Policy (Digital), The Commonwealth Secretariat*

The talk discusses the framing of smallholder digital agriculture and dives into the policy implications of the current approach to data infrastructure being built across the developing nations in support of digital agriculture.

Ben is an international expert in smallholder digital agriculture. He had first-hand experience of smallholder agriculture in Ghana and understands the language of digital innovators. He currently leads the Supply-Side Connectivity Cluster of the Commonwealth Connectivity Agenda for Trade and Investment (CCA) in London.



## **Meng Zeng**

*Information Technology Officer, Food and Agricultural Organization, United Nations*

The ‘Digital Agriculture Report: Rural e-commerce development-experience from China’ contributes to the discussion on e-commerce for agriculture and rural development at the international community. It improves methodologies, approaches, and solutions to accelerate inclusive and sustainable development through digital innovation in rural communities.

Meng works in digital agriculture for the Office of Innovation at FAO. She manages several innovation initiatives, such as Digital Agriculture Forum, Global AgrilInno Challenge, Digital Agriculture Bootcamp and Digital Agriculture Report.



## **Jaron Porciello**

*Associate Director for Research Data Engagement, Global Development, Cornell University*

This presentation covers findings of a new study, Agriculture in the Digital Age, that explores the role of digital services and technologies in agriculture in an effort to reveal what the past 20 years of agricultural research reports about the challenges farmers face in sub-Saharan Africa, Latin America and Southeast Asia.

Jaron Porciello is an information scientist interested in how computation and collaboration impact human-decision making, especially in policy and development. She is a faculty member in the Department of Global Development at Cornell University and primary investigator and director of Ceres2030: Sustainable Solutions to End Hunger.



# “Promoting sustainable and resilient animal agriculture through DA”

Monday, October 11, 1:20pm -2:40pm EDT



Digital agriculture tools are poised to contribute to more environmentally sustainable and resilient food animal production systems. This symposium will focus on the role of digital technologies for overcoming current and future environmental sustainability and production challenges for the food animal industry. We will discuss the contribution of existing technologies and current gaps in technological innovations for estimating the environmental footprint of food producing animals. Improving animal health and welfare is also central to the resilience and sustainability of food animal production systems. Thus, we will discuss recent applications in smart sensing and computer vision systems for monitoring animal health and welfare in modern farm animal operations.



**Moderator: Julio Giordano**

*Associate Professor, Animal Science, Cornell University*

Prof. Giordano’s research focuses on dairy cattle reproductive physiology, health, and the implications of health and reproductive performance on the economics of dairy farms. A key component of his research supports the development and on-farm implementation of new technologies to simplify reproductive and health management programs and to enhance the potential of dairy cattle.



**Mario Herrero**

*Professor, Global Development, Cornell University*

The livestock sector requires a deep transformation to ensure it contributes to sustainable food systems. Novel technologies exist for creating the necessary transitions to more sustainable states. This talk discusses these technologies and all the ancillary actions and socio-technical bundles that are required to ensure their improved adoption.

Mario Herrero is a professor of sustainable food systems and global change in the Department of Global Development, a Cornell Atkinson Scholar, and a Nancy and Peter Meinig Family Investigator in the Life Sciences. His research focuses on increasing the sustainability of food systems for the benefit of humans and ecosystems.



**Hao Gan**

*Assistant Professor, Biosystems Engineering and Soil Science, University of Tennessee-Knoxville*

Dr. Gan will talk about recently applications of smart sensing systems in animal production. He will discuss sensors and computer vision systems, and their applications in monitoring animal health and welfare.

Dr. Gan is an assistant professor in the Biosystems Engineering and Soil Science Department at the University of Tennessee, Knoxville. Gan’s expertise include sensor development, wireless sensor networks, agricultural IoT, agricultural robotics.



**Stacey Gunter**

*Research Leader, Rangeland and Pasture Research, U.S. Department of Agriculture*

In an effort to more precisely manage the performance and efficiency of grazing cattle for more sustainable outcomes, scientists at the Southern Plains Range Research Station over the last couple decades have been conducting research using digital technologies to assess the metabolism of grazing cattle. We have been extensively involved in developing indirect calorimetry techniques for grazing cattle using respiration gas flux data, modelling energy intake and comparing it to measured energy intakes. Further, we have been working to improve digesta kinetics modeling techniques that utilize external markers to more precisely and easily model the site and extent of digestion within a ruminant's digestive tract.

Stacey Gunter is currently the Research Leader at the USDA-ARS Southern Plains Range Research Station in Woodward, Oklahoma. During his 34-year career, he has conducted research in grazing livestock nutrition and management. Stacey and his colleagues have authored 104 peer-reviewed articles and 316 proceedings, research reports and scientific abstracts concerning the nutritional management of grazing cattle.

# “Smarter food safety through data sharing among food businesses”

Monday, October 11, 2:50pm -4:20pm EDT



Digital tools have a tremendous potential for enhancing food safety. However, a key obstacle to a digitally enabled “smarter food safety” approach is a tension between the data utility and privacy and the resulting reluctance to share data. This session will discuss digital and smarter food safety through data sharing that maximizes the data utility but also protects privacy. The focus is on data sharing among food processing businesses, although concepts are applicable to other sectors in the food and other industries.



**Moderator: Renata Ivaneck**

*Associate Professor, Population Medicine and Diagnostic Sciences, Cornell University*

Dr. Renata Ivaneck is an Associate Professor of Epidemiology in the Department of Population Medicine and Diagnostic Sciences. The overarching goal of her research is to advance One Health -- the interconnected health of people, animals, plants and their shared environment. Her computer lab develops new and sustainable data- and model-driven approaches for improving food safety, controlling infectious diseases, and optimizing food production systems.



**Martin Wiedmann**

*Professor, Food Science, Cornell University*

In his presentation, Martin will provide an overview of food safety challenges and discuss how modelling and digital food safety decision support tools can provide for more efficient approaches to assure food safety from farm to table.

Martin is the Gellert Family Professor of Food Safety in Food Science at Cornell University. His research interests focus on farm-to-table microbial food quality and food safety and the application of molecular and digital tools to study the transmission of foodborne pathogens and spoilage organisms, including translation of the associated research findings into reducing foodborne illnesses and food spoilage.



**Ranveer Chandra**

*Managing Director for Research for Industry/ CTO of Agri-Food, Microsoft*

Ranveer will discuss privacy, and how we can protect data at rest, in transit, and in use, using some of the technologies – some in research, and some in product.

Ranveer Chandra is the CTO of Agri-Food at Microsoft. He also leads research & innovation across different industry verticals at Microsoft, including Retail, FSI, Energy, and others. He started the FarmBeats project in 2015, which shipped as a Microsoft product in 2019.



**Qing Zhao**

*Professor, Electrical and Computer Engineering, Cornell University*

This talk focuses on statistical inference and learning algorithms for pathogen detection with limited samples. It will also explore distributed learning across facilities to leverage data sharing for improved learning efficiency.

Qing Zhao is the Joseph C. Ford Professor of Engineering at Cornell University. She is a Fellow of IEEE, a Marie Skłodowska-Curie Fellow of the European Union research and innovation program, and a Distinguished Lecturer of the IEEE Signal Processing Society. Her research interests include machine learning, statistical inference, and stochastic optimization.



**Jayadev Acharya**

*Assistant Professor, Electrical and Computer Engineering, Cornell University*

While data sharing promises several benefits in food safety, concerns of data leaks can often be a deterrent for the organizations. We will discuss the role of differential privacy as a potential solution to this problem.

Jayadev Acharya is Assistant Professor of Electrical and Computer Engineering. His research focuses on information theory, algorithmic statistics, and machine learning. Of particular interest is understanding the trade-offs between resources (e.g., data, memory, time, etc) for problems in statistical learning.

A Special Thank You to our Sponsors:

