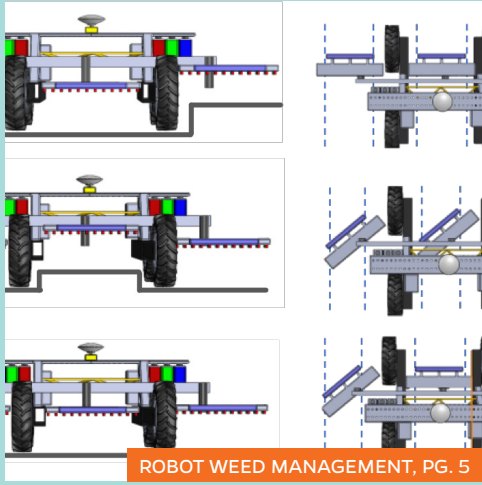


ABE UPDATE

SUMMER 2020



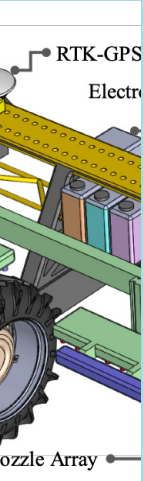
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nozzle Array



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HUMAN MOBILITY AND ENVIRONMENTAL CHANGE, PG. 10

UF UNIVERSITY of FLORIDA

AGRICULTURAL AND BIOLOGICAL ENGINEERING

Research to Change the World

Showcasing the Research Expertise in Agricultural and Biological Engineering

Summer 2020

UF/IFAS Agricultural and
Biological Engineering
Department

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Dear ABE friends,

This summer has been different at Frazier-Rogers and our other UF locations around the state. We are operating under constraints of a global pandemic; our meetings are on Zoom and students are online. Our Florida Section meeting and our National Society meetings were re-envisioned.

We also, as a global society, are witnessing the frustration within our communities with social injustice. [A letter by ASABE leadership](#) stated our support as a society to denounce acts of racism and violence which included a statement I feel reflects what we hold true as a discipline.

“At the heart of the profession that ASABE represents lies its mission to uplift people and livelihoods throughout the world, and to care for our shared planet. We can fulfill that mission only if we fully recognize the humanity of all of those we serve, and that of the colleagues at whose sides we serve.”

As we continue to protect our family and friends and grow in our understanding of inclusion and allyship of all people, we press forward in the work of the discipline. One of the core elements of the ABE department is our innovative and diverse research programs. These programs not only strive to contribute to a better, science-based world, but also to educate the next generation of leaders. This issue highlights a few of our research programs and outstanding graduate students. Another aspect of research in ABE is our undergraduate research program – which resulted in two undergraduate award winners at the ASABE K.K. Barnes competition this year.

One area of research that continues to grow due to a need for greater optimization and better resource management, is digital agriculture. This area of research, and others that use Artificial Intelligence (AI), will benefit from a new AI initiative at UF. UF has launched this initiative in partnership with NVIDIA. The result will be a UF-NVIDIA supercomputer, the world’s fastest AI supercomputer in academia, with 700 petaflops of AI performance. We are excited about the capabilities of this new machine and look forward to how it will integrate into our research programs.

We were not able to cover all the excellent research activities in ABE into this brief update. If you find yourself wanting to know more about ABE research, please visit our website at abe.ufl.edu.

#GatorsWearMasks,

Kati Migliaccio
Chair and Professor



KATI MIGLIACCIO, PH.D.
CHAIR AND PROFESSOR

 @hydroKati

Welcome to our new
UF/IFAS Senior Vice
President!



DR. J. SCOTT ANGLE

 @IFAS_VP

High Throughput Multi-Robot Weed Management for Specialty Crops

featuring...

DR. YIANNIS AMPATZIDIS

Assistant Professor, UF/IFAS Agricultural and Biological Engineering

@PrecAgSWFREC

Most conventional sprayers apply agrochemicals uniformly, despite the fact that distribution of pests is typically patchy, resulting in wastage of valuable compounds, increased costs, crop damage risk, pest resistance to chemicals, environmental pollution and contamination of produce.

The main goals of this project are to (i) develop a low-cost precision sprayer utilizing artificial intelligence; (ii) develop a fleet of low-cost and multi-crop robotic platforms equipped with the precision sprayer for specialty crops (e.g. tomato, pepper); (iii) develop an intelligent and adaptive multi-robot coordination system to optimize spraying application; and (iv) quantify the economic parameters necessary for the system to be commercially successful.

The proposed system will revolutionize the specialty crop industry by reducing spraying costs, reducing dependence on agrochemicals and labor, and increasing profits. In order to achieve the goals of this project, the four objectives were defined:

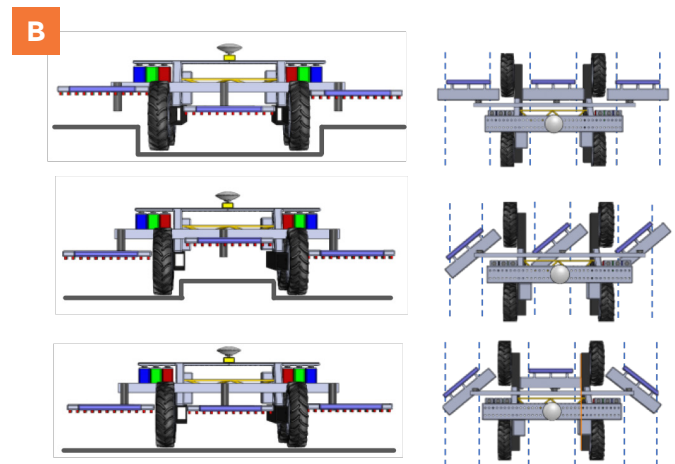
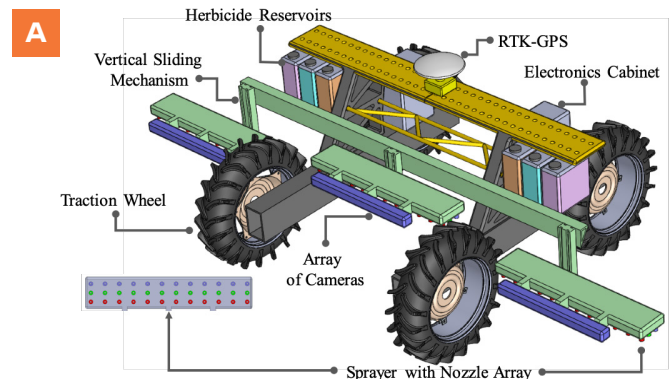
- I. Develop a low-cost, high throughput, and smart technology to simultaneously scout and spray a variety of weeds with different herbicides
- II. Develop low-cost and multi-crop autonomous vehicles equipped with the precision spray technology
- III. Design and develop a high-level task planning and control system for the autonomous precision sprayers
- IV. Conduct comprehensive economic analyses of the proposed multi-robot system

So far, Dr. Ampatzidis' team has developed a initial prototype of a low-cost smart sprayer, utilizing machine vision and artificial intelligence, that achieved more than 90% weed detection and spraying accuracy (Partel et al., 2019).

This project will develop, integrate, and apply novel technologies to provide the specialty crop industries with a commercially viable precision sprayer at a lower cost (affordable to medium and small growers) that will reduce dependence on labor. It tackles both system-level and subsystem-level research questions, and develops a data transfer framework for smart sensors (e.g. vision-based) that will motivate novel researches toward other big data (and data-driven) applications in many other scientific and engineering communities.

The project is funded by a grant from USDA NIFA.

Reference: Partel V., Kakarla S.C., and Ampatzidis Y., 2019. Development and Evaluation of a Low-Cost and Smart Technology for Precision Weed Management Utilizing Artificial Intelligence. *Computers and Electronics in Agriculture*, 157 (February 2019), 339-350. ■



Self-reconfiguring and modular design of the autonomous sprayer: a) major system components; b) Six of the many possible combinations showing the adaptability of the sprayer mechanism to different row widths and crop heights.

Climate Adaptation and Mitigation in Fruit and Vegetable Supply Chains

featuring...

DR. SENTHOLD ASSENG

Professor, UF/IFAS Agricultural and Biological Engineering
 Fellow, American Association for the Advancement of Science
 Director, Florida Climate Institute

Americans are encouraged to eat more fruits and vegetables as part of a healthy, balanced diet. However, meeting increased demand for these highly nutritious foods will be challenging for domestic production regions in the United States. California is the leading domestic source of many fruit and vegetable crops, but climate change coupled with increased competition for land, water and other natural resources will likely limit greater production in that state.

Project researchers are using crop modeling, economic modeling, and environmental modeling to determine current and future climate and water availability impacts on yield, quality, price, and environmental profile of selected fruit and vegetable crops, specifically: carrots, green beans, oranges, potatoes, spinach, strawberries, sweet corn, and tomatoes. This project focuses on strategies and land use change resulting from relocation of these crops from California to new regions in the Pacific Northwest (PNW) and Southeast (SE).

The goal of this project is to identify and test climate adaptation and mitigation intervention strategies that can be applied to enhance sustainability and resilience of fruit and vegetable

supply chains in the US, thereby providing actionable strategies to maintain a nutritious, reliable, affordable and environmentally-sound food supply.

The team hopes to assist decision makers, growers and other stakeholders in fruit and vegetable supply chains with evidence base and decision-support tools to adapt to climate change impacts and mitigate greenhouse gas emissions, assisting the migration of production of selected fruit and vegetable crops from California to the PNW and SE. Stakeholder feedback will strengthen the underlying modeling approaches and contribute to a long-term strategy for enhancing policy effectiveness through improvement of decision-support methodologies.

The project is funded by a grant from USDA NIFA (Award #2017-68002-26789). This team includes Project Director Senthold Asseng (University of Florida), David Gustafson (Agriculture and Food Systems Institute), Marty Matlock (University of Arkansas), Greg Thoma (University of Arkansas), Clyde Fraise (University of Florida), Kaiyu Guan (University of Illinois), Gerrit Hoogenboom (University of Florida), Chad Kruger (Washington State University), John Kruse (Washington State University), Sherman Robinson (International Food Policy Research Institute), and Claudio Stockle. ■



Agricultural Research Data Network

featuring...

DR. GERRIT HOOGENBOOM

Professor and Preeminent Scholar, UF/IFAS Agricultural and Biological Engineering

After a research project ends, the journal articles have been published, and researchers have moved on to the next project, what happens to all the data that was carefully collected and analyzed? In recent years, funding mandates require that data is accessible to the public at the end of the project but it is often difficult for anyone to reuse the data because variables were not clearly defined, units of measurement were not recorded, or information that was obvious to the researcher was not well-documented. Even the most organized and well-documented datasets are difficult to reuse. These legacy datasets are potentially valuable resources that could improve research efficiency, if they could be interpreted by automated processes. The Agricultural Research Data Network (ARDN) is providing a means to annotate datasets so that they can be interpreted and combined with other datasets over multiple environments, managements, and genetics, generating new novel research products.

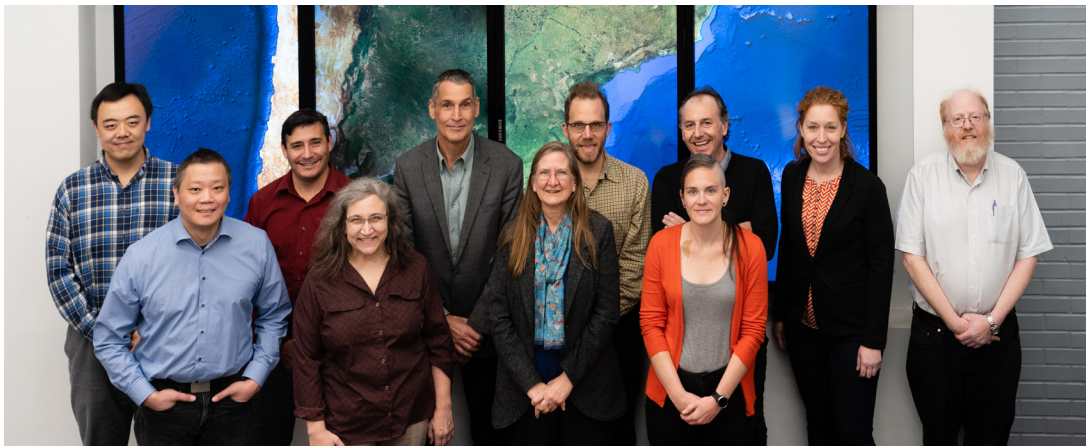
The project is modeled after the data interoperability efforts made by the medical research community in the last few decades. Because data collected in clinical trials use a common vocabulary and similar formats, they can be aggregated across research projects to create entirely new data products which has facilitated advances in medical research and provided additional data for multi-factor analytics.

The goal of ARDN is to create a distributed network for harmonized crop systems research data and to make these data available through the USDA National Agricultural Library’s data portal, Ag Data Commons (ADC). In addition to the core metadata required by ADC, datasets which qualify for ARDN will be annotated with machine readable instructions for converting these datasets to a format developed by the Agricultural Model Intercomparison and Improvement Project (AgMIP). The raw datasets can be left in their original form but the supplementary annotation allows a subset of the data to be interpreted and reused for modeling, data analytics, and other quantitative analyses. Tools are being developed at the University of Florida (UF) to allow end users to obtain the data in various end-user formats including crop model-specific formats. UF researchers are also developing tools that make it easy for data providers to annotate their data for inclusion in ARDN.

A widely adopted ARDN will increase research efficiency by reducing the need for new field experiments while giving credit to researchers who contribute data to the network. Data intensive research will be possible using data mining and artificial intelligence techniques using a data source with consistent vocabulary and formats and unambiguous meanings. This new source of data will facilitate model improvement including advances in gene-based model development.

The project is funded by a grant from USDA NIFA (Award #2019-67021-29921). This team includes Gerrit Hoogenboom (University of Florida), Cyndy Parr (National Agricultural Library), Bruno Basso (Michigan State University), David

LeBauer (University of Arizona), Lori Abendroth (Iowa State University), George Vellidis (University of Georgia), Cheryl Porter (University of Florida), Chris Villalobos (University of Florida), and Meng Zhang (University of Florida). ■



The Agricultural Research Data Network (From left to right) Front Row: Ming Chan, Cyndy Parr, Cheryl Porter, and Kristina Riemer | Back Row: Meng Zhang, Chris Villalobos, Gerrit Hoogenboom, David LeBauer, Bruno Basso, Lori Abendroth, and Brian Baer

Linking Deforestation, Urbanization, and Agricultural Expansion for Land-use Decisions in Ghana

featuring...

DR. JASMEET JUDGE

Professor, UF/IFAS Agricultural and Biological Engineering
Director, UF Center for Remote Sensing

West Africa has experienced significant deforestation over the last decades. Much of the tropical forest has been lost as a result of agricultural expansion, mining, logging, and rapid urbanization. These changes are particularly visible in Ghana, a country where farmlands and cities are expanding rapidly into the savannas, woodlands and forests. Agricultural lands represent more than a third of Ghana's land area today, against 13% in the mid-1970s. During the same period, the population of the country has been multiplied by three.

The Ghana Land Use Project (GALUP) is a public/private partnership with a goal of providing an effective planning framework to land managers in Ghana. The framework will integrate remote sensing and Geographic Information Systems (GIS) to model the linkages between deforestation, urbanization and agricultural expansion in the country. The project will also identify potential conflicts between different land uses, such as agriculture, mining or conservation, and predict land-use change scenarios.

The GALUP project will enhance the current operational planning framework and building capacity for effective land use planning in Ghana. Working in close collaboration with national and regional authorities in Eastern and Central Ghana, the project aims to build local capacity in the region regarding remote sensing and GIS, and transfer the land use planning framework for continued planning.

The GALUP project has been awarded by SERVIR, a joint venture between NASA and the U.S. Agency for International Development to help developing countries use Earth-observing satellites and geospatial technologies for managing climate risks and land use. It is led by Professor Jasmeet Judge in the UF/IFAS Agricultural and Biological Engineering (ABE) Department, in collaboration with researchers from UF, the Centre for Remote Sensing and Geographic Information Services (CERSGIS) in Ghana, the University of Ghana, and Pivot Partnerships. ■

abe.ufl.edu/galup/
[@GALUPGhana](https://twitter.com/GALUPGhana)



The landscape of Accra, the capital of Ghana.

Biomimetic Entropic Patterning of Nanobiosensors

featuring...
DR. ERIC MCLAMORE
 Associate Professor, UF/IFAS Agricultural and Biological Engineering
 @NanoBio_Sensors

To take inspiration from nature’s elegant design guide to fabricate sensor structures. The idea of “biomimicry” is not new, and may be as old as human civilization. It is a feature of chemistry, physics, and biology that traverses scales (from nanometers to kilometers).

By taking inspiration from nature’s design guidelines, Dr. McLamore and his team are enacting this ancestral idea onto flexible electronics in an attempt to improve key performance indicators. Systemic studies of the efficiency of various fractals can help us understand why some patterns may be unique for a given application.

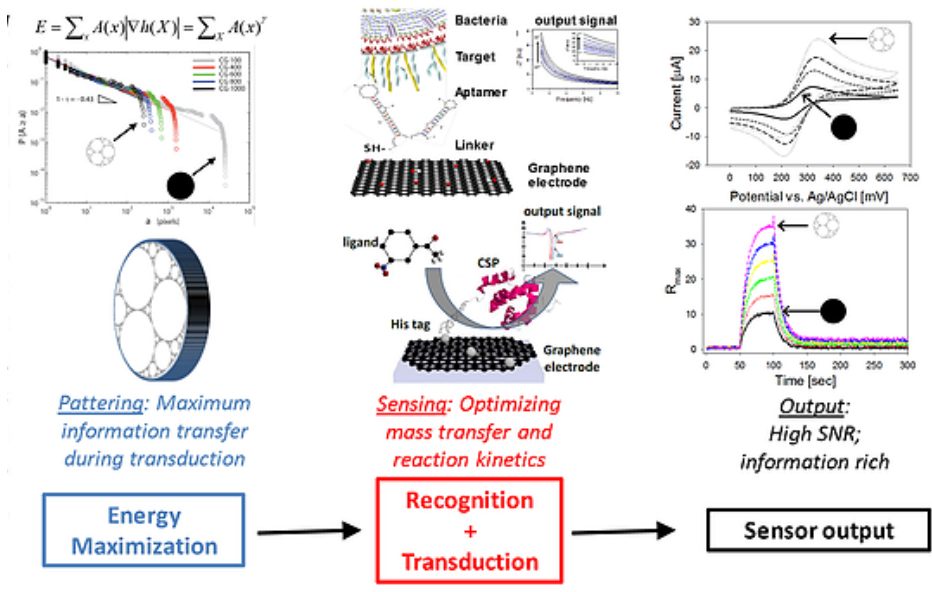
The goal is to create Biomimetic Entropic Patterning (BEP) sensors that have improved sensitivity, response time, accuracy, and durability.

This project is using laser-patterning to “print” conductive carbon films in fractal shapes (we have tested over 100 different shapes). These fractal shapes are then coated with

biological materials for creating sensors that target small molecules (pesticides), viruses, or bacteria. The sensors will be challenged in the field (soil, creek, marine environments) and durability will be further challenged by intentionally scratching or damaging the sensor surface. We want to know what the sensor can withstand, and which types of operational environments are allowable. We will simultaneously compare the sensors to commercial tools and “conventional” sensors fabricated in our lab.

This team has discovered that all fractal patterns are an improvement over “conventional” sensors that use basic geometries for electrode fabrication (e.g., a circle). Among these, there are candidates for “best performer” which have a relatively high level of entropy (disorder). This finding is in accordance with ecosystem-scale and watershed-scale findings from other researchers. The difference here is that we may be showing that certain features of this logic are also pertinent in the microscale domain.

This project is funded by the National Science Foundation (NSF) Nanobiosensors program (Project No. 1805512). This team includes Dr. Eric McLamore (University of Florida) and Dr. Cherie Kagan (University of Pennsylvania). ■



Biomimetic entropic patterning (BEP) uses scale free network theory to engineer nanomaterial receptors on a sensors surface using in siico 2D patterns based on network energy maximization of the pattern surfaces. BEP significantly increases transduction and signal-to-noise-ratio for electrochemical and plasmonic sensors. The facile method results in durable handheld nanobiosensors for field analysis of targets ranging from molecules to whole cells.

Towards a Multi-Scale Theory on Coupled Human Mobility and Environmental Change

featuring...

DR. RACHATA MUNEEPEERAKUL

Associate Professor, UF/IFAS Agricultural and Biological Engineering

DR. RAFAEL MUÑOZ-CARPEÑA

Professor, UF/IFAS Agricultural and Biological Engineering

Fellow, American Society of Agricultural and Biological Engineers

Tens of millions of people are migrants: many fled conflicts; others sought better economic opportunities. Such population movements can be caused by—as well as affect—natural systems: droughts may lead to social conflicts; migrants may overwhelm the natural resources and in turn social fabric at destinations. The magnitudes and problems associated with migration are of grave concern, but a satisfactory, mechanistic and predictive theory of the interdependence between human mobility and environmental changes is still lacking. Such a theory is necessary for successful intervention and contingency plans.

This transdisciplinary project, titled Towards a Multi-Scale Theory on Coupled Human Mobility and Environmental Change, aims to develop a modeling platform that is flexible enough to explore different approaches at multiple spatiotemporal scales as well as strike the right balance of predictive power and facilitation of the development of an integrative theory of coupled dynamics of environmental change and migration.

To achieve that overarching goal, the team has worked to detect empirical patterns of migration and how they interact with environment forcing; to develop novel data analysis techniques to extract insights from migration datasets; to develop mechanistic models of migration; and to integrate the observed patterns and the models. A multi-method approach, in which methods from different disciplines have been borrowed and integrated, has been employed to pursue these goals.

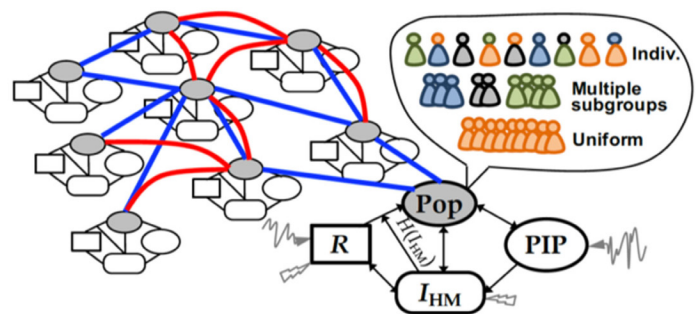
The project has so far been producing intriguing pieces of the big puzzle: stylized facts to guide model development; clusters of countries with similar refugee flow patterns; groups of factors that drive the refugee flows; statistical evidence of flooding as a driver of internal displacement; a new method

to extract more complete understanding from migration networks; food security models that can be linked to migration models; and so on. These pieces will be put together in the coming years, making them a particular exciting phase of the project.

With all these efforts, the project hopes to have a mechanistic, flexible model (or models) that has clear linkages to an integrative theory, and thus contribute to deeper understanding of the coupled dynamics of human migration and environment change.

This project is funded by the Department of Defense’s Army Research Office (ARO) through the Multidisciplinary University Research Initiative (MURI) program (W911NF-18-1-0267). Other investigators on the team include Drs. Rafael Muñoz-Carpena (University of Florida), Jeffrey Johnson (University of Florida), Upmanu Lall (Columbia University), Michael Puma (Columbia University), and David Griffith (East Carolina University). This project also involves and trains a group of post-doctoral researchers and graduate students across the three universities, thereby preparing the next generation of scientific human capital better equipped to tackle wicked problems of the future. ■

abe.ufl.edu/muri-migration



Schematic diagram of the proposed approach.

Robust and Intelligent Optimization of Controlled-environment Agriculture Systems for Food Productivity and Nutritional Security

featuring...

DR. ZHAOHUI TONG

Associate Professor, UF/IFAS Agricultural and Biological Engineering

DR. ADITYA SINGH

Assistant Professor, UF/IFAS Agricultural and Biological Engineering

🐦 @aditya_arch

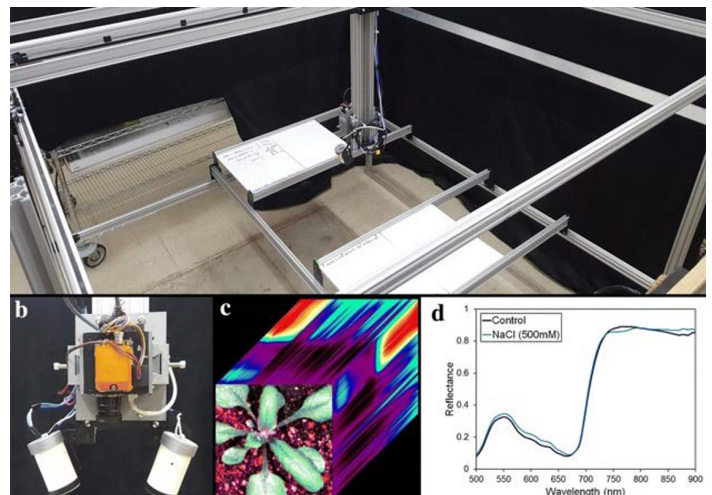
To improve America’s food system resilience and sustainability, this project proposes to decentralize vegetable production by coupling the water and nutrients (e.g. nitrogen and phosphorous) in domestic wastewater (DWW) to high-productivity controlled-environment agriculture (CEA) systems. Food production in urban CEAs requires the DWW-CEA operating cost reductions accompanied by increased productivity and nutrition.

The purpose of the project is to study novel optimized technology-driven CEA systems that can achieve high-areal vegetable productivity to increase food and nutritional security of urban communities with low operating cost and reduce energy consumption. This project will provide a sustainable food system through improving agricultural productivity and nutrition in an increasingly constrained environment.

Their project focuses on two core cyber-physical systems (CPS) research areas, control and data analytics, inspired by the design and operation of a Pilot-Testbed at their collaborators’ location to couple the water and nutrients in domestic wastewater (DWW) to high-productivity CEAs. However, it is highly challenging to control and optimize this complex system of subsystems. In this case, they need to coordinate the Pilot-Plant and Pilot-Farm, examine their inter-correlation, and support dynamic and robust optimal decisions to achieve the highest yield, while simultaneously satisfying various performance specifications, i.e., nutrient composition, operating cost and energy consumption, with the guarantee that food safety requirements are met. Moreover, the profound impact of numerous operating conditions and parameters on vegetable phenotype, yield and nutrient composition during different growth periods needs to be thoroughly understood. The project must progress from model-driven CPS fundamentals to an integrated data-driven model-based approach.

This project addresses one of the 21st Century grand challenges “Sustainably Supply Food, Water, and Energy” identified by The National Academies of Sciences, Engineering and Medicine. It will provide principled process designs and control policies to produce vegetables in CEAs that will benefit environment control and food security. The availability of low-cost vegetables and fruits will promote a healthy diet for people. Profitable and technology-driven CEAs will foster new employment opportunities and will have a positive impact on city/urban planning. The project will help to train new generations of scientists and engineers with interdisciplinary skills and capabilities in a diverse set of areas, such as data science, machine intelligence, optimization and control, agriculture, and chemical engineering, and food science.

This project is a collaborative work supported by the United State Department of Agriculture (USDA) through the National Science Foundation (NSF) Cyber Physical Systems program. The team includes Drs. Zhaohui Tong and Aditya Singh from University of Florida Department of Agricultural and Biological Engineering. Their collaborators include George Lan and Xiaoming Hou from the School of Industrial and Systems Engineering and Yongsheng Chen from the School of Civil and Environmental Engineering at the Georgia Institute of Technology. ■



Non-invasive Sensor Suite developed by Agricultural and Biological Engineering’s Dr. Aditya Singh

ASABE K.K. Barnes Student Paper Award Competition

ABE undergraduate students **Sirapoom Peanusaha** and **Alex DiCairano** received second and third place in the K.K. Barnes Student Paper Award Competition. Sirapoom received second place with his entry titled Identifying causal relationships for land cover changes in Ghana using satellite remote sensing. Alex received third place with her entry titled Single-Use and Reusable Plastic Materials and Containers: A Survey of Agricultural Students' Usage and Sentiments. As undergraduate researchers, Sirapoom was mentored by Dr. **Jasmeet Judge** and Alex was mentored by Dr. **Adam Watson**.



Sirapoom Peanusaha

2nd Place in the K.K. Barnes Student Paper Award Competition

***Paper Title:** Identifying causal relationships for land cover changes in Ghana using satellite remote sensing*

This research aims to provide effective land use planning framework to land managers in Ghana using satellite remote sensing and GIS-based analysis tools to meliorate land use planning in Ghana. Newly developed methodology was used in this study in four districts in Ghana to test its applicability and its potential to provide precursor of land cover change insight. According to the results of this study, land cover patterns have a significant impact on the comprehensive indicator.



Alex DiCairano

3rd Place in the K.K. Barnes Student Paper Award Competition

***Paper Title:** Single-Use and Reusable Plastic Materials and Containers: A Survey of Agricultural Students' Usage and Sentiments*

This research focused on understanding student sentiment, usage, behavior and familiarity at the University of Florida with single-use and reusable plastic containers after recent changes in local ordinances and policies. Most preferences towards reusable containers were revealed to be based on environmental concerns rather socio-economic factors. Decreasing pollution and waste, environment protection, and wildlife protection were cited as the top three reasons for using reusable containers and materials.



Victoria with sister and fellow ABE doctoral student Savannah Morgan in front of the department's building.



Victoria installing water filters in Guatemala with Filters of Hope.



Victoria won first place at 2019 Nano Florida Conference Poster Competition.

Dr. Victoria Morgan

Doctoral Graduate / [@Sci4BetterWorld](#)
 Advisors: Drs. Eric McLamore and Greg Kiker

Growing up on a lake, I developed a deep appreciation for water. The lake was beautiful, clean, and refreshing, and I never had to worry about the water quality from the tap it supported. However, I quickly learned that was not always the case for people, especially if you lived in a lower-income area like the coal mining towns in my county. I wanted to contribute to the solution to eradicating environmental inequality.

I received my bachelor's degree in Biology from a liberal arts school (Millsaps College), where I attained minors in mathematics, business administration, and environmental studies. During my summers, I explored various research opportunities, including collecting and studying arthropod specimens in the Southwest United States, engineering efficient ways to develop graphene in a lab at the University of Alabama, and working on National Science Foundation (NSF) start-up teams to incorporate business into engineering.

Now, my research aims to improve water quality from multiple angles for marginalized populations in rural Colombia impacted by artisanal small-scale gold mining (ASGM). This mining practice often leads to hazardous practices for miners, land degradation, and poor water quality for the surrounding community due to the use of mercury to extract gold.

I've developed decision support tools to empower communities in rural Colombia with the knowledge on how to prevent adverse effects associated with ASGM while flourishing economically. I engineered low-cost nanosensors coupled with risk tools on smart devices to deliver intelligible information to end-users in the community. The data from these tools have been used to develop a decision analysis with the community to identify appropriate solutions to current mining practices that protect people's health and the environment while prospering financially, such as mercury-free mining techniques, retorts, and alternate forms of income. The modeling work that I completed for ASGM communities will be applied to analyze performance and financial parameters for wastewater treatment in resource-limited settings.

Next, I will be pursuing a postdoctoral fellowship at the University of Illinois Urbana-Champaign. I will contribute to a Bill and Melinda Gates Foundation (BMGF) project for Water, Sanitation, and Hygiene (WASH) applications. After working on publications, reports for the BMGF, and grants with the faculty supervisor, I plan to pursue a faculty position in academia to continue finding transformative engineering solutions for water quality in low-income populations. ■

Valerie Valerio

Ph.D. Candidate / [@v_valerioh](#) / Advisor: Dr. Greg Kiker

I was born in the States but grew up in the capital of Dominican Republic (DR), so in some ways I am both a national and an international student at UF. My parents came from humble beginnings in agricultural areas in the North of the DR, where they worked in agricultural lands to help their families make ends meet. Their experiences with work and agriculture throughout their lives made them instill the value of education and food in me from a young age.

Out of my interest in math and improving systems, I pursued a bachelor's degree in Industrial Engineering. I started my career as a consultant for food and beverage manufacturers, where I realized I wanted to immerse myself in food systems research in the future. ABE at the University of Florida offered outstanding and diverse faculty expertise, the prestige of being a top program in the field, and the flexibility I needed to redirect my career. And of course, proximity to my family!

Thanks to the USDA National Needs Fellowship, I was able to work with Dr. Kiker, who leads the Future Systems inquiry area of the Feed the Future Livestock Systems Innovation Lab. My research for the Lab consists in developing data and system models of livestock value chains – consumption, distribution, and production. Computational models of value chains are useful because they offer a cost-effective alternative to generate evidence, carry out experiments, and explore potential trade-offs and unintended consequences of value chain development interventions.

My research advocates for approaching livestock value chains as complex and interconnected systems. A project I led on livestock trade networks in West Africa found that because of its organization, livestock trade is particularly vulnerable to targeted market attacks and border closures, which are both common in the region. Our study provided one of the first quantitative geospatial descriptions of one of the most important economic activities in West Africa – livestock trade – and was recently featured in the June edition of Nature Foods. This and other research projects I lead have helped to better understand potential effects of value chain shocks and interventions on the food and nutrition security of vulnerable populations, such as border closures due to the COVID-19 pandemic.

My time at ABE has prepared me for my future by providing the training, skills, and professional relationships to move food systems research forward. I am very grateful for the motivating environment and intellectually challenges that ABE has provided, as well as the community support system I developed here. After my graduation, I will use the skills and expertise obtained at ABE to advance sustainable agricultural development and food security in the US and the world. ■



Valerie enjoying the Florida outdoors with fellow ABE graduate students: Ratna Suthar, Tori Morgan, and Patricia Moreno Cadena.



Valerie served as a historian and vice-president of the Latino-Hispanic Organization of Graduate Students (LOGRAS)



Valerie stresses the importance of having a strong support system for maintaining mental health in graduate school.

Awards and Accomplishments

- Chair and Professor **Kati Migliaccio** received the ASABE Presidential Citation for her outstanding leadership of the Code of Conduct ad-hoc committee writing policies to support an inclusive and equitable culture within ASABE.
- Professor **Wonsuk “Daniel” Lee** was named an Agricultural and Biological Engineers (ASABE) Fellow.
- Assistant Professor **Haimanote Bayabil** and his colleagues were awarded a USDA/NIFA Agricultural Engineering Program Area grant to implement the project “Integrating Data from Ground Measurements, Unmanned Aerial Vehicles, And Modeling to Quantify Plot Scale Evapotranspiration.”
- Professor **Sanjay Shukla** received the Netafim Award from the American Society of Agricultural and Biological Engineers (ASABE).
- Assistant Professor **Eban Bean** received the Outstanding Young Engineer award from the ASABE Florida Section.
- Associate Professor **Christopher Martinez** received the Distinguished Achievement award from ASABE Florida Section.
- Senior Lecturer **Richard Scholtz** received the Teacher of the Year award from ASABE Florida Section.
- Assistant Professor **J. Adam Watson** received the Outstanding Service award from the ASABE Florida Section.
- Assistant Professor **Sandra Guzmán** received the Outstanding Young Extension Worker award from the ASABE Florida Section.
- Assistant Professor **Haimanote Bayabil** received the Outstanding Young Researcher award from the ASABE Florida Section.
- Assistant Professor **J. Adam Watson** received the UF College of Agricultural and Life Sciences Innovation in Teaching Award.
- Undergraduate Student **Douglas Santos** received the Outstanding Student award from the ASABE Florida Section.
- The **ABE Gator Robotics team** received the Best Written Report award in the ASABE Robotics Competition Advanced Division. This includes Team Captain Xue Zhou, Bryce Askey, Robert Herring, Austin Kee, Jacob Paulette, and Congliang Zhou. This team is advised by Dr. Yiannis Ampatzidis and Dr. Wonsuk “Daniel” Lee.
- Undergraduate Student **Jenna Phillips** received the ASABE Florida Section Scholarship.
- Undergraduates Students **Peter Nguyen** and **Lejla Ramic** on received the John B. Boy U.S. Sugar Corporation Scholarship from the ASABE Florida Section.

New Hire

Serap Gorucu, Ph.D.

Assistant Professor in Agricultural Safety and Health

✉ serappgorucu@ufl.edu
🐦 @GALUPGhana



Assistant Professor **Serap Gorucu** has joined the ABE department, specializing in agricultural safety and health. Dr. Serap Gorucu earned her bachelor’s and master’s degrees in Agricultural Engineering from Cukurova University, Turkey and a Ph.D. in Biosystems Engineering from Clemson University.

Department News

- **Ben Weeks** joined the ABE department staff as an Engineer.
- Graduate Student **Ron Fox**, along with his advisor, **Eban Bean**, and friends, worked to help the local community by donating roughly half of the leftover 10,000 pounds of compost used in his soil research project to the nonprofit Working Food.

Summer 2020 Doctoral Degree Graduates



Nicholas Cavallaro

Doctor of Philosophy (Ph.D.)
Biosensors
Advisor: Dr. Eric McLamore



Yujing Gao

Doctor of Philosophy (Ph.D.)
Crop Modeling
Advisor: Dr. Gerrit Hoogenboom



Victoria Morgan

Doctor of Philosophy (Ph.D.)
Biosensors and Decision Analysis
Advisor: Dr. Eric McLamore



Enrique Orozco López

Doctor of Philosophy (Ph.D.)
Hydrologic Modeling and Water Quality
Advisor: Dr. Rafael Muñoz-Carpena

Summer 2020 Master's Degree Graduates



Alwin Hopf

Master of Science (M.S.)
Biological Modeling
Advisor: Dr. Gerrit Hoogenboom



Jovana Radovanovic

Master of Science (M.S.)
Land and Water Resources
Advisor: Dr. Eban Bean



Shubham Shirbhate

Master of Science (M.S.)
Remote Sensing and Precision Agriculture
Advisor: Dr. Aditya Singh



Dong Xiang

Master of Science (M.S.)
Biological Engineering
Advisor: Dr. Eric McLamore

Summer 2020 Bachelor's Degree Graduates



Brandt Bessell

Bachelor of Science (B.S.)
Agricultural Production Engineering



Sirapoom Peanusaha

Bachelor of Science (B.S.)
Biosystems Engineering

**UF/IFAS Agricultural and Biological
Engineering Department**

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staff.

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