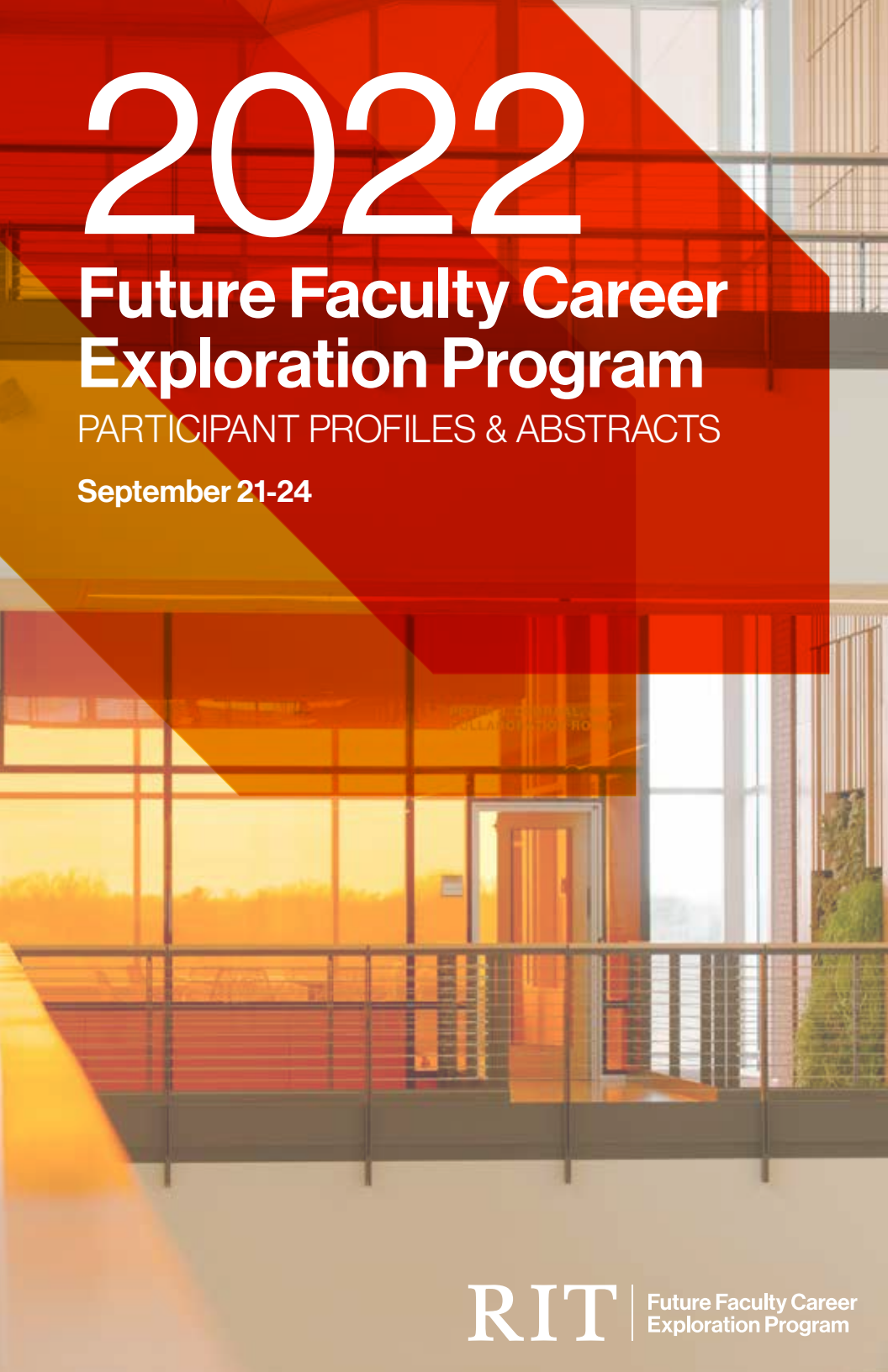
2022

Future Faculty Career Exploration Program

PARTICIPANT PROFILES & ABSTRACTS

September 21-24



RIT | Future Faculty Career Exploration Program

The Rochester Institute of Technology is pleased to welcome you to its 19th Future Faculty Career Exploration Program. These are unprecedented and challenging times in our world. With the landscape of higher education ever-evolving, we are glad you can join us this year for our annual program.

RIT is again welcoming a large, diverse incoming freshman class. We are a place where innovation and ingenuity come together to give our students a unique experience. Our campus is transforming with several construction projects, including the SHED - Student Hall for Exploration and Development, a 100,000-plus-square-foot facility. The SHED will become the epicenter of RIT with a huge makerspace, classrooms, a black-box theater, a dance studio, and music rehearsal spaces. In addition, our athletic facilities are undergoing a facelift, major renovations are underway at our business and art & design colleges, and we soon will break ground on a new performing arts complex. RIT also will begin offering two new Ph.D. programs beginning in the fall of 2023. The Saunders College of Business will offer a PhD. in business administration, and the College of Liberal Arts will offer a doctoral degree in cognitive science.

As a leader in higher education, RIT is compelled to reexamine our history, renew and refocus our existing commitments, and expand our impact by leveraging our passion to create a more diverse, equitable, and inclusive society. With input from RIT students, faculty, staff, and alumni, we developed an Action Plan for Race and Ethnicity that is guiding RIT's efforts over the next several years as we launch new programs, services, and policies to help create equal access, opportunities, and respect for all students, faculty, and staff.

RIT is more committed than ever to grow in its diversity, and create an environment that allows diversity to thrive. Using this plan as a guide, we look specifically at initiatives to recruit and retain a diverse and excellent faculty. RIT's strong commitment to the Future Faculty Career Exploration Program is key to the success of our efforts.

We welcome you for a productive and exciting visit!

David C. Munson, Jr.
RIT President

Future Faculty Colleagues,

I am delighted to welcome you as part of the 19th cohort of the Future Faculty Career Exploration Program (FFCEP) at Rochester Institute of Technology. This program plays a crucial role in recruiting exceptional faculty to RIT, and creates opportunities for you to build a network among peers as you prepare for your university career. Congratulations on being selected to participate in our annual program!

At RIT, we place a high value on having a diverse community of scientists, artists and intellectuals which allows us to be a strong and vibrant university – one that attracts creative and innovative students. FFCEP plays an integral part in making RIT a more diverse, equitable, and inclusive university.

This nationally recognized program is designed to help us learn more about you, your research and career interests. It also allows you to get a first-hand look at RIT. Through FFCEP you'll connect with our faculty and have the opportunity to share your research, scholarship, and artistic work.

I am proud of the efforts the Office of Faculty Diversity and Recruitment has made to recruit and welcome prospective faculty. This year's cohort includes individuals at all stages of their careers – from Ph.D. candidates to recent graduates to postdoctoral fellows. FFCEP allows participants at the earliest stages of their academic careers to explore academic career opportunities and experience RIT as a prospective workplace.

Thank you for participating in this engaging and exciting professional development opportunity, and welcome to RIT.

Sincerely,

Ellen Granberg, Ph.D.
Provost and Senior Vice President for Academic Affairs

Congratulations on being selected to participate in the 19th class of Rochester Institute of Technology's Future Faculty Career Exploration Program! I applaud your many achievements to date and take great honor in formally welcoming your participation in this exciting three-day RIT event.

RIT embraces inclusive excellence as we advance the exceptional! Diversity and inclusion are fundamental aspects of RIT's identity as an institution and are intrinsically tied to its historic strength as one of America's most innovative and forward-looking universities. RIT enjoys national recognition among leaders in diversity in higher education. The article, "Growing Diversity", not only captures the innovative approaches the Office of Faculty Diversity and Recruitment utilizes in recruiting an excellent and diverse faculty but also highlights FFCEP and three former participants who joined the RIT faculty. INSIGHT Into Diversity magazine has recognized Rochester Institute of Technology as a 2021 Higher Education in Diversity (HEED) Award recipient and a 2021 Diversity Champion. This marks the eighth year in a row RIT has been named a HEED Award recipient and seventh consecutive year as a Diversity Champion. Winds of Change magazine, for the 9th year in a row, listed RIT as one of the "Top 200 Colleges for Native Americans. Further, RIT was named by STEM Workforce Diversity magazine among its top 20 universities in 2021 for RIT's work to help diversify the STEM workforce.

Today, RIT positions itself to increase the number and percent of African American, Latinx and Native American (AALANA) and female faculty, especially in STEM fields. We understand well the importance of diverse, talented faculty in moving RIT forward in greatness through difference. So, we are honored to welcome you to our campus as we learn more about each other.

An outstanding three-day program has been prepared for you. During this time, I hope your many questions regarding RIT/NTID—our students, staff, faculty, programs, departments, colleges, campus and community—are addressed and answered. Most important, I hope you get a better idea of your potential space in the RIT family as we both explore the many opportunities for a wonderful relationship.

Dr. Keith Jenkins

Vice President and Associate Provost for Diversity & Inclusion

Dear Colleagues,

Congratulations on being selected to participate in the 18th class of Rochester Institute of Technology's Future Faculty Career Exploration program! I commend your accomplishments to date and take pleasure in welcoming your participation in the program. This program is an exemplar of our longstanding commitment to inclusive excellence at RIT. We place high value on a diverse and excellent faculty, recognizing that different perspectives support creativity and innovation in the classroom, in research and scholarship, and across the campus.

The Office of Faculty Affairs is focused, in part, on providing faculty career development opportunities through best practices, polices, programs, and professional development that help our faculty build successful careers at RIT. I am looking forward to sharing with you more about the support our office provides to faculty at all stages of their career.

I am pleased that you have chosen to be part of our future faculty program and look forward to working with you to identify opportunities to launch your career forward at RIT. Thank you for helping with RIT's mission to "shape the future and improve the world through creativity and innovation!"

LaVerne McQuiller Williams

Associate Provost for Faculty Affairs

Dear Colleagues,

Congratulations on your acceptance into the 19th cohort of our Future Faculty Career Exploration Program, and of course, welcome to the Rochester Institute of Technology.

Many of your names and faces are familiar to me, as we have met some of you through our Pathways to RIT events, virtual conference presentations and campus visits. It is a pleasure to see you again and I look forward to learning more about your work and career aspirations.

Before we get too far into programming, presentations, and workshops, please take a moment to congratulate yourself. After all, at the conclusion of an exhaustive and rigorous nationwide search, you were selected to join this prestigious cohort. In addition, each of you represent the best minds in higher education, as articulated and represented by your research, art, expertise and skill sets. Your presence represents a longstanding commitment to inclusive excellence here at RIT that is dedicated to recruiting the best talent in America; so again, please take a moment to celebrate your success.

Over the course of the next few days, I highly encourage you to attend and take advantage of the many great workshops, panels, and networking events. My hope is that you seize the opportunity to engage, collaborate, and cultivate relationships with other participants as well as RIT faculty. I too hope that over the course of this program, you will experience the same magnetism that drew me to RIT, and discover the quality, beauty and innovation that sets RIT apart.

Again, congratulations on your acceptance and for those of you I have not met, I look forward to personally making your acquaintance.

Donathan Brown, Ph.D.

Assistant Provost and Assistant Vice President for Faculty Diversity & Recruitment

Contents

College of Art and Design

Jessica Oler, M.F.A.

Jessica Oler, M.F.A.

Conceptual Artist
Chautauqua School of Art Residency Program

Profile

Jessica Oler is a Conceptual Artist who holds an M.F.A, B.A. in Sociology, and three A.A.'s in Social Science, Liberal Arts, and Sociology. Upon completion of her graduate studies she was accepted into the Chautauqua School of Art Visual Art Residency. Oler has received multiple invitations to present her work at the University of California, Davis Betty Irene School of Nursing. There she presented the girth of her artistic practice and research endeavors surrounding patient narrative. In 2021 she was invited by Harvard School of Medicine to be one of the three interviewees (patients) for The Healing Power of Stories: Narrative Theory and Narrative Practice. For this course each patient was matched with a medical student to "coach the students through the process of working with an individual facing illness to craft their story for a Healing Story Session."

Through photography, social abstraction, and large photographic installation, her practice centers on displacement, histories, and Black geographies. Her present work is involved with space, movement, and history. Oler utilizes socio-political research and patient narrative as a guiding force to work through larger racial, geographical, and social investigations. She continues to work through the concept of "unprotected Black female flesh" which was initially born from her lived experience with multiple sclerosis thus far. Through her practice the various offshoots of engrained, systemic injustices are investigated.

As of late, Oler received an invitation to curate the 2023 Annual Black History Month Art Show at the San Francisco State Building. Her work has been shown at California College of the Arts, Chautauqua and Brooklyn, New York; Philadelphia, Pennsylvania; Miami, Florida; Alameda, Oakland, and San Francisco, California; and Alexandria, New South Wales, Australia.

Abstract

A Detailed Map of the Surface

Conceptual Artist and Scholar, Jessica Oler will discuss her artistic practice, a detailed map of the surface, including her current collaborative work in progress, and her artistic process as a whole. Oler's lens based practice is deeply influenced by abstraction and non traditional ways of the use of photography. Each individual piece is built with a similar process of creation with its own singular visual uniqueness. This talk will highlight her process, ruminations, and creative destinations. The innovative, pioneering nature of RIT has the potential to create a succinct working relationship with her forward thinking, creative, expansive mindset and practice.

It's all connected in an orderly complicated fashion. Her studio is full of paper. Torn paper. Shredded pieces of paper. Paper she seems to have forgotten but cannot let go of and video footage she has not shown. Fabric and nails. Each piece plays an important part. Photography paper. Notes and quotes and necessities. Traces. A compilation of traces. An inventory. Evidence that she was (is) here. Evidence that we were (are) here. Seriality and collage are her instincts. A collection of various, specific things. Photographs. Tree bark. Trees. Her body. Doorways to unknown lands. Skin. Implications of skin. History. Compositionally sound amongst the chaos.

The practice of reprinting and tearing her prints germinated into a sensical art form. Tearing her prints apart to put them back together again in a new finished form. Sound deeply influences her work. From the sound of the tearing of the paper to the instrumental music she builds her pieces alongside, collaboratively or individually. Said practice of engaging sound privately or publicly elicits a feeling that allows for her to be transported to another figurative space.

Her perspective of the world shifted when she was diagnosed with multiple sclerosis 2012. Life became aggressively bombastic, urgent, confusing, pressing, and generative in a new and rigorous way. As Gustav Klimpt once said, "art is a line around your thoughts." That throughline runs through her work with consistent abandon. She has found her voice in abstraction. Oler's search for answers to the complicated, intricate, ingrained questions has changed how she works artistically. Tearing images apart and putting them together. Reshaped anew as she continues to wrestle with the Black geographic, abstraction, and the unknown.

B. Thomas Golisano College of Computing and Information Sciences

Andrea Cuadra, Ph.D.
Matheus Venturyne Xavier Ferreira, Ph.D.

Andrea Cuadra, Ph.D.

Postdoctoral Scholar
Stanford University

Profile

Dr. Andrea Cuadra is a Postdoctoral Scholar in the Computer Science Department at Stanford University. She completed her Ph.D. at Cornell Tech in the Department of Information Science, where she worked with Deborah Estrin (chair), Nicola Dell (co-chair), and Malte Jung (minor member). Prior to Cornell, Dr. Cuadra studied Engineering with a Concentration in Interaction Design at Olin College (B.S. 2013), and Product Design at Stanford (M.S. 2017). Additionally, she conducted studies in other research contexts while working as a User Experience Researcher at Google (Search and Chrome), Sidewalk Labs (recently acquired by Google), Yahoo, and Hopper. Dr. Cuadra's research has been funded by Mozilla, the National Science Foundation, and a Digital Life Initiative doctoral fellowship.

Dr. Cuadra's field is Human-Computer Interaction, and her work lies at the intersection of interaction design, inclusivity, and artificial intelligence. She studies the needs of marginalized groups who may particularly benefit from or be harmed by the outcomes of technology design decisions that affect us all. In addition, she employs her design skills to generate and advocate for more-inclusive design alternatives. Dr. Cuadra's research has been published in HCI venues including ACM's CSCW, ASSETS, and CUI conferences, ACM's THRI journal, and Springer's Persuasive Technology conference.

Dr. Cuadra spent time working as an entrepreneurial product designer prior to starting her Ph.D., and later studied and taught classes at the Stanford d.school. In total, she has been a teaching assistant for over 15 classes across five different institutions. Her work and teaching experience have shaped her student-centered, hands-on teaching philosophy.

Abstract

Designing Voice Assistants Inclusively

Not everyone's needs receive sufficient attention when building the technology of the future. For example, voice assistants, like Alexa or Siri, have unfulfilled potential to make a difference in the lives of some marginalized groups, such as older adults. Voice assistants are a promising technology because users only need to speak to them to get a response. However, older adults' needs and preferences are underrepresented in their design, which results in usability and usefulness challenges. In this talk,Cuadra will describe voice assistant technology, inclusive design, and some of the challenges older adults face with this technology. She will introduce two projects that explicitly account for older adults' needs in the design of voice assistants. This talk aims to enrich students' understanding of inclusive design, and empower them to carry out this type of work themselves.

Matheus Venturyne
Xavier Ferreira, Ph.D.

Postdoctoral Fellow
Harvard School of Engineering and
Applied Sciences

Profile

Dr. Matheus Venturyne Xavier Ferreira is a Postdoctoral Fellow in Computer Science at Harvard School of Engineering and Applied Sciences. He holds a Ph.D. (2022) and an M.A. (2018) in Computer Science from Princeton University and a B.S. in Computer Engineering (2016) from Federal University of Itajubá. His research focuses on market design, the computational economics of decentralized systems, and computational security against economically motivated adversaries. His research focuses on the computational economics of distributed systems and security against economically motivated adversaries. His research has combined cryptography and game theory insights to design decentralized markets and better understand the foundations of energy-efficient blockchains and underlying applications.

His honors include a CNS Prize for Excellence in Computer Networking from University of California San Diego (2014), a Dean's Grand from Princeton Graduate School (2016), a LATinE Fellowship (2020) from Purdue College of Engineering, and an Award for Excellence from Princeton School of Engineering (2020).

Abstract

Economics and Computation in Distributed Systems

When designing markets, traditional economic theory often requires commitment from market participants. One can enforce commitment via regulation, such as by prohibiting an auctioneer from bidding on their auction. But how to enforce commitment in the Internet age, where the volume of transactions grows exponentially and platforms hold the monopoly over transaction data? Moreover, even with publicly available data, it is impossible to prove the auctioneer is bidding on its auction with a fake identity. Not surprisingly, behavioral economic studies often show that users can be skeptical and behave irrationally because they don't trust the platform. Distributed systems, like blockchains, aim to minimize trust and enable applications with minimum commitment assumptions.

In his talk, Dr. Ferreira will overview the challenges of designing decentralized markets like auctions and exchanges, constructions that overcome known impossibility results from economic theory using mild cryptographic assumptions. In the second part, he will discuss the economic properties of permissionless proof-of-stake (PoS) blockchains, an energy-friendly alternative to Bitcoin's proof-of-work (PoW). By analyzing state-of-the-art protocols, he demonstrates the challenges of implementing PoS protocols that can provide similar economic properties to PoW, and will introduce a PoS protocol that leverages access to external randomness to recover the economic properties from PoW.

Kate Gleason College of Engineering

Paola Baldaguez Medina
Sean Jackson
Stephanie Sandoval

Paola Baldaguez Medina

Ph.D. Candidate
University of Illinois Urbana Champaign

Profile

Paola A. Baldaguez Medina is a Ph.D. candidate in Chemical and Biomolecular Engineering at the University of Illinois at Urbana Champaign (UIUC). She completed her undergraduate degree (B.S.) in Chemical Engineering at the University of Puerto Rico at Mayagüez, where she had multiple research experiences that motivated her to pursue further degrees. While at UIUC, Baldaguez Medina has been a member of the Su group, where she worked on water remediation using electrosorption techniques, and she combined redox-active polymers to adsorb and release a targeted molecule. She has worked with multiple pollutants, including per- and polyfluoroalkyl substances (PFAS). Her research on PFAS led to finding new methods to capture and release these contaminants while using amine-bearing copolymers and incorporating electrocatalytic pathways to completely mineralize the pollutants.

Baldaguez Medina is an Alfred. P. Sloan scholar and a National Science Foundation Graduate Research Fellow. Throughout her Ph.D., she has been very active in mentoring Hispanic students in engineering. Consequently, she was awarded a Grassroots Initiatives to Address Needs Together (GIANT) grant to help undergraduate Hispanic students pursue graduate degrees. Baldaguez Medina also serves as co-president of the Society for the Advancement of Chicanos and Native Americans in Science at UIUC.

Abstract

Environmental Remediation of Organic Micropollutants Using Electochemically-driven Systems

The continuous rise of emerging organic contaminants around the globe has led to an imminent need for new technologies for water remediation. The United States of America and many other countries around the globe seek new techniques for targeting ultra-diluted pollutants in water, such as pharmaceuticals and per- and polyfluoroalkyl substances (PFAS). Methodologies like reverse osmosis and ion exchange are often ineffective for many of these contaminants due to their lack of selectivity, which prevents their successful capture at low concentrations. Thus, electrochemically mediated methods are now a leading alternative to face the pollution problem due to their multiple benefits: they are modular, lower the energetic costs, can be integrated with renewable sources, and eliminate the need for chemical additives.

Combining redox-selective systems bearing redox-active materials with electrochemical methods to capture the toxic compounds in a cell has been proven effective and selective. Additionally, different potentials allow a selective adsorption process and promote in situ regeneration of electrodes. We aim to develop electrochemically based methodologies for selective capture, release, and destruction of organic anthropogenic pollutants using new redox polymers.

Baldaguez Medina will present her work on the selective capture and release of long-chain and short-chain PFAS using a redox functionalized polymer combined with amine groups. This polymer contains a combination of poly(4-methacryloyloxy-2,2,6,6-tetramethylpiperidin-1-oxyl) (PTMA) and poly(4-methacryloyloxy2,2,6,6-tetramethylpiperidine) (PTMPMA), also denoted as PTMA-co-TMPMA. Secondly, she will feature the incorporation of boron-doped diamond (BDD) in an asymmetric configuration to further degrade the toxic compound. Showing how they have fused different redox-active metallopolymers to specify how the electron density can affect the selective capture and release of fluorinated substances. Future outlooks will include different engineered techniques for further upscaling and integrating other contaminants for material conversion.

Sean Jackson

Ph.D. Candidate
Florida Agricultural & Mechanical University

Profile

Sean Jackson is a fifth year Ph.D. candidate at Florida Agricultural and Mechanical University in the FAMU-FSU College of Engineering. His interests lie in the technologies of direct ink writing, a subset of additive manufacturing (AM) which facilitates extrusion of complex ink solutions. In his research, Jackson looks to analyze and optimize the factors governing an ink's printability in efforts to tune the extrudate structure and improve the performance and manufacturing throughput of printed, powerless sensors and electronic devices. His primary research aims to partially automate the fabrication of photovoltaic devices, including solar cells and solar concentrators, utilizing direct ink write manufacturing methods.

Jackson's prior training in Molecular Cell Biology centered around delineating significant internal and external factors governing Arabidopsis thaliana (AT) cell identity, cell fate, and differentiation plasticity. In brief, modification of factors internal and external to AT plant tissue allows for targeted induction of pluripotent stem cell tissue whose fate can be reprogrammed based on controlled chemical environments.

Jackson's current research attempts to leverage established understanding of AM-based sensor fabrication and plant stem cell regeneration to independently explore novel methods of improving 1) sensor and electronic device manufacturing efficiencies and 2) in vitro, AT stem cell regeneration experimental design.

Abstract

Exploration of Direct Ink Writing as an Experimental Method for 1) AM-Assisted Manufacturing of Photovoltaic Devices and 2) AM-Assisted, In Vitro Stem Cell Reprogramming of Arabidopsis Thaliana

Direct ink writing (DIW) is an additive-manufacturing (AM) technique facilitating ink extrusion through a print nozzle. Compared to conventional 2D printing methods such as inkjet printing, doctor blading, spin coating, screen printing alongside 3D printing methods like stereolithography, cold welding, and fused deposition modeling, DIW-printing allows for the extrusion of inks spanning a wide viscoelastic range. DIW printing is becoming a widely used deposition method across engineering, chemical, and biological disciplines.

Regarding engineering applications, DIW printing is often used for deposition of conductive traces and thin film layers to facilitate electron- and ionic-charge transference, respectively, for powering of sensors and electronic devices or facilitating current flow in photovoltaic applications. Print parameters such as 1) nozzle diameter, 2) nozzle velocity, 3) nozzle gap distance from the substrate, 4) and extrusion pressure alongside ink-specific variables such as 1) ink morphology, 2) ink viscosity, and 3) ink elasticity, impact the flow characteristics of the extrudate at nozzle exit and the structure of the extrudate after substrate deposition.

In regards to biological applications, DIW print applications have been utilized for the extrusion of eukaryotic cell cultures, mammalian tissue, and biological fluids. While significant development in the extrusion of cell growth and maintenance medium has been reported, we have yet to identify an existing report describing AM-assisted propagation and maintenance of plant stem cell tissue. Arabidopsis thaliana (AT), a model plant, is hypothesized to be sufficient for exploration of this gap in scientific knowledge.

The proposed research combines knowledge regarding optimization of ink printability for sensor and electronic devices alongside experience conducting in situ plant stem cell regeneration studies in AT to explore a novel method of AM-assisted automation of plate medium deposition and AT seed deposition within a sterile environment.

Specifically, we seek to characterize the printability of 1) AT seed dispersal solutions and 2) AT growth medium solutions and use prior DIW extrusion knowledge to demonstrate AM-assisted, in vitro stem cell regeneration and directed fate specification of AT plant tissue. Furthermore, we wish to analyze the chemical tunability of printed agar-based growth mediums for exploration of in vitro hormone gradient modification within AT seedlings in aims of increasing plant cell cloning efficiencies and improving experimental reproducibility.

Stephanie Sandoval

Ph.D. Candidate
Georgia Institute of Technology

Profile

Stephanie Sandoval is a fifth-year Ph.D. candidate in Materials Science and Engineering at Georgia Tech. She earned her B.S. in Electrical Engineering from the University of Arkansas in 2018. Her research interest lies in electrochemistry, with her Ph.D. focusing on lithium metal and anode free batteries. Throughout her Ph.D, she has been awarded several fellowships including NSF GRFP, the National Gem Fellowship, Alfred P. Sloan Fellowship, and DOE SCGSR.

As a first-generation Latina in STEM, Sandoval is very passionate about outreach and advocacy. Throughout high school and undergrad, she established an engineering girl camp for low-income students. To this day, the camp is still in operation. In graduate school, she helped establish the First Generation, Limited Income student program – a program designed to help first generation students navigate Georgia Tech's complex environment. Additionally, Sandoval helped co-found a conversation series titled Growing Up in Science. As part of an effort to support students on campus as they find a sense of belonging, this conversation series features personal narratives from first generation speakers about becoming a scholar, including frank discussion of an individual's personal career path.

Abstract

Investigating the Effects of Alloy Interfacial Layers in Liquid and Solid-State Anode Free Batteries

In both liquid and solid-state electrolyte battery systems, there is growing interest in developing "anode-free" architectures. Anode-free systems feature no active material at the anode current collector and therefore substantially increase the volumetric energy density compared to standard Li-ion batteries. This configuration additionally simplifies manufacturing by removing the need to process lithium (Li) metal. During charging of an anode-free cell, Li+ ions are removed from the lithiated cathode and electrodeposited as Li metal on the anode current collector. Upon discharge, Li is stripped and intercalated back into the cathode. Since there is no excess Li at the anode, it is essential that deposited Li is entirely removed to achieve high Coulombic efficiencies (CE). Thus, it is critically important to understand the nucleation and growth behaviors of Li in anode-free configurations while exploring methods to spatially control Li growth.

The effects of alloy interlayers in liquid electrolyte systems are probed using operando optical microscopy combined with electrochemical methods. We find that thin silver films enable improved CE for Li cycling in multiple electrolyte systems compared to bare current collectors or other alloy layers. Operando optical microscopy reveals reduced growth of dendritic Li on silver-coated current collectors at high current densities compared to bare current collectors, as well as different dendrite growth and stripping dynamics.

Silver layers have also shown beneficial effects in enabling long-term cycling of solid-state batteries (SSBs). Here, we investigate the structural and morphological evolution of alloy interlayers in SSBs using cryogenic focused ion beam (cryo-FIB) methods correlated with electrochemical measurements. Improved CEs are observed using silver and gold thin films compared to bare copper. Performance improvements are investigated using cryo-FIB to probe the Cu| electrodeposited Li| SSE interface. We observe non-uniform growth on bare copper while uniform Li growth is observed in silver- and gold- modified interfaces. Interestingly, we observe distinct morphological evolution comparing both alloy interlayers, which also affects cycling behavior. Electrochemical impedance spectroscopy during deposition and stripping is further used to understand and investigate the influence of the alloy interlayers and correlate to morphology evolution. This work provides new understanding of interfacial modification at solid-solid interfaces in SSBs, which will be important for engineering anode-free SSBs.

College of Engineering Technology

Ibrahim Balogun, Ph.D.
Adurangba (Victor) Oje
Katreena Thomas

Ibrahim Balogun, Ph.D.

Doctoral Graduate
University of Delaware

Profile

Dr. Ibrahim Balogun earned his bachelor's (B.Sc. 2015) and master's (M.Sc. 2019) degrees in Civil and Environmental Engineering from the University of Lagos, Nigeria, and received his Ph.D. in Civil and Environmental Engineering at the University of Delaware.

His research focuses on using machine learning techniques to resolve track defects and investigate railroad accidents (collision and derailment) on major American rail tracks. Interests include machine learning and data analytics, railway transportation systems resilience, autonomous vehicles, and urban transportation systems.

Dr. Balogun is a member of the American Society of Civil Engineers (ASCE), the American Railway Engineering and Maintenance-of-Way Association (AREMA), and the Institute of Transportation Engineers (ITE). He is a recipient of the Black Trailblazers in Engineering Fellowship in 2021, the IEEE Travel Grant Award in 2021, and other notable awards. He has published several papers in high-impact peer-reviewed journals such as ASCE, ASME, and IEEE.

Abstract

Hybrid Covariate Shift Assessment: A Panacea for Railroad Multi-Defect Track System.

Maintenance operations and their attending financial burden can strongly impact the effectiveness of railroad infrastructure systems. Railway track inspectors often impose temporary speed restrictions or permanent line closure on track segments identified as defective. However, combined track defects (surface and geometry) at any track segment pose severe consequences for train operational safety. Upon obtaining a novel dataset (US Class I railroad), this study proposed a Hybrid Covariate Shift Maintenance technique that efficiently addresses both surface and geometry defects on vulnerable tracks in a systemic manner, thereby saving the cost of maintenance, time, infrastructure lifespan, and preventing unrecoverable train accidents (collision or derailment). Hybrid covariate shift detection (HYCODE) technique is a valuable tool in multi-defect track systems.

Adurangba (Victor) Oje

Ph.D. Candidate
University of Georgia

Profile

Adurangba "Victor" Oje is a fifth-year Ph.D. candidate in Engineering at the University of Georgia. He graduated from the University of Ilorin with a B.Eng. in Electrical/Electronic Engineering. He is affiliated with the University of Georgia's School of Electrical and Computer Engineering and the Engineering Education Transformational Institute.

His research focuses on the intersection of learning sciences and engineering education. Specifically his research are centered on the pedagogical and instructional design of Virtual Reality (VR) environments for engineering education. Oje is particularly interested in the use of multimedia and generative learning principles to promote engagement and positive learning outcomes in engineering-focused VR research imperatives. He is also interested on the application of systematic and meta-analysis methodologies in STEM research. His other research interests include evaluation and validation of educational measures in STEM.

During Oje's Ph.D. studies, he was awarded the Joel Terry Hunt Fellowship in Engineering, which is given to an exceptional graduate student in the College of Engineering at the University of Georgia who demonstrates community service, volunteering, leadership activities, and a high moral character. He has served as a reviewer for a number of educational journals, including the Journal of Engineering Education and the International Journal of Emerging Technologies in Learning. Oje is a member of the American Society of Engineering Education (ASEE) and the American Education Research Association (AERA), and has volunteered for leadership and service in both organizations.

Abstract

Effective Instructional and Pedagogical Design in Virtual Reality (VR) Environments for Engineering Education

There has been increasing interest in the educational application of Virtual Reality (VR) technologies in recent times. This growing interest is fueled by the fact that VR technologies facilitate near-real experiences by simulating actual environment or experiences. In engineering education, VR could be utilized to supplement laboratory learning. For example, students could view engineering knowledge in a three-dimensional format, an experience that is unattainable in a textbook.

Because educational VRs can support experiential learning experiences, they have the potential to advance certain engineering pedagogies and promote a positive learning experience for engineering students. Despite this potential however, poorly designed and deployed educational VR can have the opposite impact. For example, improper use of features VR technologies may result in developing VR environments that distract from learning. Several VR studies have concentrated on the characteristics of VR technological features. Very few studies have situated participants' VR learning experience within evidence-based pedagogical frameworks that can help us understand how the educational VR promotes positive or inhibit learning experiences and how VR-based pedagogy can be improved to facilitate effective learning and instruction. Pedagogy-focused educational VR research are particularly lacking within engineering education.

To address this gap in engineering education research literature, Oje's research agenda examines theory-driven VR research by investigating the application of design-based principles to instructional VR use in an engineering context. The primary objective of this research goal is to identify strategies for designing effective VR-based instruction for engineering education applications. The research agenda would result in meta-analytical and empirical studies that could identify important evidence-based recommendations on how instructional designers can design and implement VR to improve the learning experience, student engagement, and knowledge understanding.

Katreena Thomas

Ph.D. Candidate
Arizona State University

Profile

Katreena Thomas is a Ph.D. candidate at Arizona State University in the Engineering Education Systems Design doctoral program. She is a member of the Coley Shifting Perceptions, Attitudes, and Cultures in Engineering (SPACE) Lab research group. She also serves as the Diversity, Equity, and Inclusion Intern for the Journal of Engineering Education.

Her research interests include broadening participation in engineering, engineering leadership, and graduate student experiences in engineering. Her dissertation explores the experiences of early-career Black engineers and engineering students and leadership. She received her B.S. in Industrial Engineering from the University of Pittsburgh and her M.S. in Human Systems Engineering from Arizona State University. Before starting her graduate studies, she worked in the tech industry in operations as a manager. Thomas is committed to justice, equity, diversity, and inclusivity and hopes that her work will impact the culture and environment of the engineering education ecosystem.

Abstract

"You can't be both!" Exploring the Experiences of Early-Career Black Engineers in Leadership

In engineering, the representation of Black engineers has remained stagnantly low. As such, research regarding the experiences of Black engineers has historically viewed Black engineering students from a deficit-framing. Engineering leadership is considered an emerging area in engineering education. We would be remiss to further the area without considering the perspectives of marginalized groups in engineering like Black students. Engineering education has made the call for both diverse leaders as well as diverse engineers. While engineering leadership studies have highlighted elements, skills, traits, or competencies that engineers should have that focus on leadership, the lack of studies describing marginalized engineers' leadership experiences binds our perceptions of engineering leadership.

In this work, Thomas centers Black engineers' authentic voices on how they describe their experiences in leadership. This presentation will include findings from three qualitative studies featuring semi-structured interviews with five early-career Black engineers regarding their experiences with leadership. These studies offer engineering institutions, organizations, and enterprises opportunities to consider how leadership is conceptualized and actualized for Black engineers. In considering these opportunities, leadership development programs for engineers can be enhanced to embrace the unique perspectives and experiences that Black engineers have in their leadership roles and responsibilities. It is critical in engineering that we center the authentic voices of historically minoritized groups in engineering, such as Black engineers. Through understanding their experiences, engineering education can shape leadership and leadership development to be culturally relevant and accessible.

College of Health Sciences and Technology

Chloé Jones

Chloé Jones

Ph.D. Candidate
Auburn University

Profile

Chloé Jones is a Ph.D. student at Auburn University in the School of Kinesiology with a concentration in Physical Activity and Health. She received her bachelor's degree from Kennesaw State University in Exercise Science (B.S.) and her master's degree from the University of Tennessee-Knoxville in Exercise Physiology (M.S.). Her current research interests include integrating behavioral theories and culturally relevant strategies to increase exercise adherence in young Black women with the ultimate goal of reducing health disparities.

During her enrollment at the University of Tennessee, Jones received the Graduate School Student Faculty Research Award funding her thesis, as well as the Summer Graduate Research Assistantship award from the Office of Research and Engagement. Recently at Auburn University, she was the proud recipient of the Presidential Graduate Opportunity Program Fellowship and was a graduate student award winner for the College of Education at Auburn's 2022 Research Symposium. Additionally, as an active member of the American College of Sports Medicine National and Southeastern chapter, she was the first place recipient of the student award from the Minority Health and Interest Group, and has been a fellow of the Leadership Diversity Training Program since 2020.

In addition to her time dedicated towards her graduate studies, Jones has held leadership roles including being the President of Auburn's Black Graduate and Professional Student Association and the co-chair of the School of Kinesiology's Student Academic Advisory Committee. In both roles, she strived to meet the needs of graduate students by developing and providing professional development, networking, and social opportunities throughout the academic year.

In the near future, she plans to obtain a university faculty position allowing her to be an academic resource to students as well as continue her goal of improving physical and mental health of Black women through exercise.

Abstract

Strategies to Improve Exercise Adherence in Young Black Women

Black women have the second lowest rates of physical activity and the highest rates of obesity in the United States. Although exercise is a known method of decreasing obesity and other cardiometabolic disease and risk factors, Black women are consistently underrepresented in the literature surrounding strategies to increase exercise participation and adherence. Given the health disparities that exists between Black women and their racial counterparts, there is need to identify and implement culturally relevant behavioral strategies to increase exercise adherence in Black women.

Of the studies that have explored strategies to increase exercise in Black women, many included methods such as incorporating culturally relevant factors, theoretical frameworks, faith-based values and locations, and various delivery methods. The results of most of these studies yielded unfavorable long-term adherence results or did not examine adherence past six months. This could be attributed to the fact that the majority of research studies focus primarily on one of the above strategies alone, rather than the combination of those strategies. Furthermore, of the studies that utilized theoretical frameworks mainly used the concepts from one framework (the Social Cognitive Theory) rather than integrating components from multiple frameworks. Therefore, the proposed research will aim to address physical inactivity in young Black women by utilizing concepts from the Social Cognitive Theory and the Self-Determination Theory such as self-efficacy, self-regulation, competence, autonomy, and relatedness to augment motivation to exercise. Additionally, culturally relevant strategies will be incorporated such as including Black research staff, educational material reflective of the targeted population, and conducting the intervention in a local recreation center to increase the potential of long-term exercise adherence. Lastly, this study will be informed by previous research conducted in young Black women suggesting favorable characteristics and preferences of exercise programs in order to tailor the intervention to this specific population. It is the ultimate goal that this multifarious approach will educate and motivate young Black women to engage in exercise on a regular basis and improve or prevent cardiometabolic disease and its risk factors.

College of Liberal Arts

Anne Wangari Njathi

Anne Wangari Njathi

Ph.D. Candidate & Instructor
North Carolina State University

Profile

Anne Njathi is a Communication and Digital Media scholar whose research interests are driven by the changing tech ecosystem in Africa and what this means to various actors. Her research focuses on Africa's fast technological uptake along the paths of digital innovation, digital economy, infrastructure, governance/policy, platform economy, user practices, creator economy, digital cultures, and transnational movement of the tech giants.

As a Ph.D. candidate at North Carolina State University's Interdisciplinary Communication, Rhetoric, and Digital Media program, she has a proven publication and teaching record in the field of digital technologies, digital media, FinTech, mobile communication, platformization, ICT for development and global media policy studies. She currently teaches Advanced Topics: Digital Media in Public Relations (COM 493), International and Cross-cultural Communication (COM 392), and Communication Media in a Changing World (COM 200). She is presently undertaking a graduate certificate course in International Development Policy at Sanford School of Public Policy, Duke University.

Njathi is a Chartered Marketer (ACIM), spanning more than eight years of experience in East Africa in building sustainable brands in a multi-cultural international setting. Her multidisciplinary industry work experience in leadership positions includes Telecommunications & IT Industry, Renewable Energy, Non-for-Profit organizations, Media & Advertising, and various Start-Ups. Her notable expertise is in Marketing Communications, Brand Strategy, Digital Marketing, Communications Strategy, Business Development, Budgeting, Customer Experience, Market Research, Project Management, and Account Development. She is a co-founder, in charge of Public Relations, Events and Strategic Global Partnerships of an AgriTech start up, Lofte Kesho based in Nairobi, Kenya.

Abstract

The Glitz and Glamour Platform Economy: Issues for Instagram Monetization for Influencers in Emerging Markets

Like in other parts of the world, Instagram has become a popular platform in Africa — particularly in Nairobi —, for socializing, communicating, entertainment, information seeking as well as a thriving digital marketplace. The platform also permits its users to commodify their private lives online to make a living. As a result, the rapid rise of Instagram influencers, also known as content creators, is scaling up in Africa as well. As such, it is important to investigate how influencers in developing world contexts, such as Nairobi, are contributing to the larger dynamics of the digital economy given its susceptibility to a foreign power, and different cultural and socioeconomic dynamics.

Although it is generally understood that influencers are creating real value for advertisers, there is a lack of consensus on what constitutes how the commodification of self-scores incentivization, especially in emerging markets whose practices and culture are thoroughly differentiated. At the same time, Instagram does not distinguish how influencers monetize their activities online, despite being the current leading platform for influencer marketing. Scholars have focused on Instagram affordances as a digital workplace, self-curation, aesthetic and representation of self, potential for branding and marketing endeavors, and labor, but less so on the specific idiosyncrasies of the economic incentive afforded to influencers.

This study interrogates the practices and subjectivity of Instagram influencers in Africa as commodified subjects of a global cultural phenomenon of platformization. First, Njathi investigates the economic incentives tied to influencers' activities and practices on Instagram. Second, she explores how Instagram's economic incentives impact the activities and practices as well as reproduction of culture given the commodification of self for influencers' interests. Finally, we analyze who, how, and why this incentivization occurs. To answer these questions, Njathi leverages qualitative methods (such as semi-structured interviews, app walkthrough, and document analysis) to further interrogate how Instagram influencers in Nairobi are commodifying their private lives to make a living and how policymakers are attempting to regulate and legislate platformization as an emerging new media economy, taking root in Nairobi.

In addition, she uses Actor-Network Theory to identify and map out the actors involved in the Instagram economy, the obfuscated influencer model adapted by Instagram through mapping out the actors, nuanced complexities, interconnections, messiness, and dynamics of everyday life of an influencer in Nairobi. Preliminary findings of the study indicate that platformization, as an emerging new media economy, is taking root through its infrastructure, technological affordances, influencer model, and ascendancy in Kenya, a developing economy, in rather different shape and format, but strikingly not very different from those in the West. In this process, systems of power and inequalities, including an entrenched digital divide, digital colonialism, and cultural dynamics are getting reproduced, influenced, and reshaped as Nairobi Influencers produce themselves as commodified subjects to fit the Instagram operating model. As such, she argues that platformization in an emerging market such as Nairobi necessitates a pressing need for further investigations to ascertain the platform's values and benefits, as well as policy, regulation, and governance of platforms.

National Technical Institute for the Deaf

Bolanle Salaam

Bolanle Salaam

Ph.D. Candidate
Limited-Term Instructor of Record,
University of Georgia

Profile

Bolanle Salaam received her B.S. degree in Pure Mathematics from Howard University and a M.A.M.S. degree in Applied Mathematics from the University of Georgia. She is currently a limited-term instructor in the Department of Statistics, and a doctoral student in the Department of Mathematics, Science, and Social Studies Education at the University of Georgia. Prior to her current appointment, she spent four years teaching mathematics to high school students. She currently applies her teaching experience and applied mathematical training to the study of student thinking. Her doctoral research, conducted under the direction of Dr. Juan Gutierrez, focuses on undergraduate mathematics majors' sense-making in introductory proof courses.

Salaam also has interests in mathematics education policy, student retention in STEM fields, ethics, quantum cognition, neural networks, and mathematical biology. She is especially interested in increasing the representation of Black, Indigenous, Latino, and Deaf students in mathematical fields to match the proportion of mathematical talent present in these communities. She emphasizes that this requires going beyond admitting more students from underrepresented populations into higher education programs; her long-term work has been focused on collaborating with like-minded scholars to nurture and support mathematical talent in the K-12 space in the attainment of undergraduate and graduate degrees in Mathematics.

Abstract

Undergraduate Sense-making in Transition-to-Proof Courses

While proof is a central component of postsecondary mathematical study, proof construction has historically posed significant difficulties for students who intend to earn mathematics degrees at the undergraduate level. This study investigates how university students use their mathematical discourse to interpret proof tasks and ultimately engage in constructing proofs in response to these tasks. In this presentation, Salaam will discuss: (a) theoretical models of undergraduate students' patterned mathematical activity in response to proof tasks; (b) identified words, phrases, or problem features that evoke this patterned activity; and (c) identified similarities and differences in students' descriptions of their uses for mathematical concepts when compared to how instructors expect students to think about and use mathematical concepts.

College of Science

Melissa Lamanna, Ph.D.

Melissa Lamanna, Ph.D.

Postdoctoral Researcher
University of Florida

Profile

Dr. Melissa Lamanna first encountered zoonotic diseases during a class project on the avian cholera epidemic. It is here where she fell in love with science. She was fascinated in how social economic status, nutrition, transmission, and pathogenicity intertwine to form epidemics. Mechanistically, she was infatuated with how proteins of the zoonotic pathogens function in disparate environments of various host species. With scientific curiosity in hand, she earned the credentials (A.A. in Chemistry, B.S. in Biology from Indiana University Southeast, Ph.D. in Microbiology from Indiana University Bloomington) to unravel complex biological systems such as disease ecology and cellular division (proliferation and subsequent spread of bacteria). During her academia training, she worked on a wide range of organisms (plants, viruses, insects, and bacteria), mastered several versatile techniques (microscopy, genetics, and biochemistry) and received both internal and external funding to support her research. While zoonotic diseases catalyzed her scientific passion, it is the pursuit of solving unknown mechanisms that holds her to science.

As a scientist, Dr. Lamanna investigates the cellular division mechanisms of the intracellular pathogen Chlamydia trachomatis, (post-doctoral associate). Here she asks: how does one cell become two? As she understands the benefits of "standing on the shoulders of giants," Dr. Lamanna is an active mentor of women and people of color in STEM. Through her work, she has heard over 300 young women state "I am a scientist" with conviction and pride. As a teacher (Santa Fe College), she is committed to training and educating the next generation to the best of her ability. Resultantly, she proactively engages in pedagogy workshops and certification programs. For the future, Dr. Lamanna will captain a productive and healthy lab at the cross-section of molecular biology and disease ecology.

Abstract

Two from One: Mechanisms of Cellular Division and Proliferation

To live bacteria must beget two cells from one, a fundamental process known as cellular division. Dr. Lamanna works to elucidate mechanisms of cellular division as 1) solving fundamental processes is cool and 2) bacterial division is the main target of antibiotic medicines. We know that division of bacteria requires assembly of a machine comprised of over 20 different proteins, however, many proteins remain uncharacterized. Attributing function is important as different antibiotics target specific proteins of the machine. Antibiotics are effective as inactivating one protein abrogates machine function and bacterial death ensues. These uncharacterized proteins serve as facile targets for development of new antibiotics, a key need as antibiotic resistance is rising.

Towards unraveling the molecular underpinnings of this machine, Dr. Lamanna studied division of the opportunistic pathogen S. pneumoniae. Specifically, she resolved the role RodZ, a highly conserved bacterial protein implicated in division. Using an arsenal of molecular approaches, including co-immunoprecipitations, transformations, depletion experiments, and co-localization assays, she found that RodZ is required for proper assembly of the division machine. Furthermore, absence of RodZ is lethal to S. pneumoniae, showcasing its essentiality to bacteria. As we tease apart the machine, we discover that division, a simple event, is utterly complex and intwined to its innermost parts. Also, this machine that exists inside bacteria (which may or may not live inside of you) moves. That's right, it is not stagnant, but rather circumferentially transits the bacterial cell body. Probing motion, Dr. Lamanna used high resolution microscopy, single particle tracking, and molecular techniques to identify the driving force behind motion as well as capture the movement patterns of machine proteins. It seems that the chemical, enzymatic reactions of physically making new cell material (peptidoglycan) powers the machine forward in space.

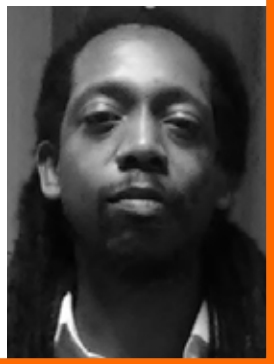
In addition to investigating S. pneumoniae, Dr. Lamanna collaborates openly with the scientific community and is currently tackling division of the obligate intracellular pathogen C. trachomatis. Untreated C. trachomatis infections result in irreversible damage such as blindness (eye) or sterilization in (reproductive) women. Yet, little is known regarding its division mechanisms as C. trachomatis is a recalcitrant system. Resultantly, Dr. Lamanna uses "out-of-the-box" thinking and the technical dexterity to address long standing questions in the field. Her current findings (unpublished works) will be shared during the Program's presentation seminar.

Golisano Institute for Sustainability

Ronald Smith

Ronald Smith

Ph.D. Candidate /Graduate Research Assistant
Purdue University



Profile

Ronald Smith received his B.S. and M.Sc. degrees in plant and soil science from Tuskegee University. He also earned a M.Sc. degree in ecological sciences and engineering in from Purdue University, where he has been a research assistant, research fellow and graduate fellow in the Office of Multicultural Programs. Currently, he is a Ph.D. candidate in agricultural and biological engineering and ecological sciences and engineering. At Purdue, he earned a doctoral fellowship as well as funding to promote diversity, equity, inclusion, and intercultural learning. His interests lie at the intersection of engineering, technological innovation, plant science, decision-making, and resource allocation.

His current work concentrates on technological and social innovation, controlled environment agriculture (CEA), stakeholder engagement, and interdisciplinary planning and collaboration. His dissertation work focuses on the development of CEA in how the United States utilizes agronomic, sociotechnical, and systems approaches to identify trends, opportunities, and challenges associated with the development, diffusion, and acceptance of CEA. This investigation supports reconciling the mismatch between human needs and available resources through research, engagement, and informed decision-making to position CEA as an advancement in the larger agricultural system.

Smith has published research and presented to diverse audiences. He is a member of the American Society of Agricultural and Biological Engineers, Minorities in Agriculture, Natural Resources and Related Sciences, the Agronomy Society of America, the American Society for the Advancement of Science, and the National Society of Black Engineers, among others. As a future faculty member, Smith hopes to implement inverted classroom and distance learning infrastructures and to create an active learning environment where diverse talents are respected and maximized. He plans to develop instructional materials that support learning outcomes that are practical, theoretically and culturally relevant, and allow students and the public to make interdisciplinary connections that translate beyond the classroom.

Abstract

Success in Controlled Environment Agriculture: Context Matters

There are many challenges associated with agricultural systems. Less than half of global land surface is suitable for crop production. Recent advances in engineering and agronomy have positioned controlled environment agriculture (CEA) to improve agricultural production and research currently and in the future. These developments, however, conjure different meanings and applications to various stakeholders, with opportunities and barriers within and across domains that challenge the definition of food, fiber, fuel, and other forms of biomass. This may impact the viability, profitability, and acceptance of CEA in the larger production system.

Controlled environment agriculture can enhance crop production in concentrated and isolated human settlements. However, limited critical research on context-specific factors of success in CEA has been previously conducted. This research identifies factors associated with successful CEA projects. A systematic review approach identified prior related work and categorized CEA to crystallize success as defined in agriculture, engineering, and business in recent years. Themes relevant to primary and related vertical farm stakeholders were utilized to investigate how CEA projects operate in social systems with multiple dynamics that exhibit complexity as they scale.

For this work, Smith will show how success carries different meanings for various stakeholders. While there were differences between agricultural and non-agricultural businesses, commonalities exist that can be applied to understand different industries. Business success varies based on personal identity and experience. Financial or economic indicators of success studied included productivity, profitability, return on investment, turnover, market share, and succession potential.

Not all primary stakeholders regard production, sales, and profit as the only measures of success. Some agricultural stakeholders also value psychosocial measures such as passion, work-life balance, lifestyle alignment, outside interests, family relations, independence, and autonomy. Stakeholders who primarily identify as engineers, however, highlight task measures of success such as project delivery on time, under budget, and to a predetermined level of quality. These results show that an interdisciplinary understanding of different approaches to CEA and vertical farming is needed to determine how success is defined and whether those conditions are likely to be met. This work provides the foundation for future studies of what makes CEA successful and how that success is measured. Additional studies will compare how ideas associated with CEA have evolved over time, what food production will look like in the future, and whether CEA is as important as advocates suggest, now, in the future, and for whom.

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