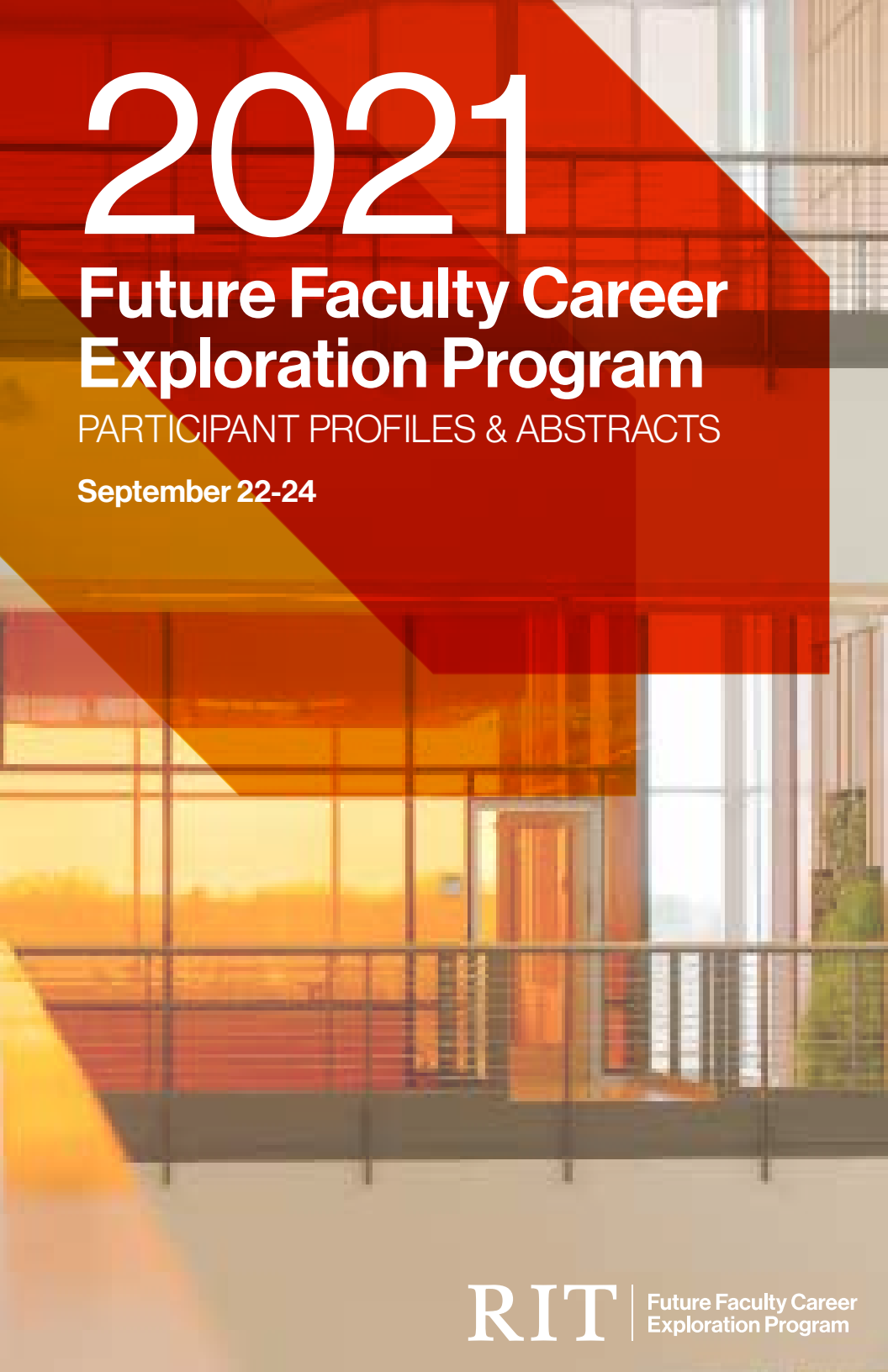

2021

Future Faculty Career Exploration Program

PARTICIPANT PROFILES & ABSTRACTS

September 22-24

RIT | Future Faculty Career Exploration Program

The Rochester Institute of Technology is pleased to welcome you to its 18th Future Faculty Career Exploration Program. In these unprecedented and challenging times, and with the landscape of higher education ever-evolving, we are glad you can join us virtually this year for our annual program.

RIT has managed the pandemic extraordinarily well, keeping our community safe and continuing to offer face-to-face instruction and a full range of student activities and research opportunities. This fall, we have welcomed the largest and most academically qualified freshman class in our history. We are a place where creativity and innovation thrive, providing a unique learning environment for our students. The RIT campus is undergoing a transformation, with multiple construction projects under way, including the SHED - Student Hall for Exploration and Development. This facility will become the epicenter of RIT, with huge makerspaces, a black-box theater, a dance studio, music rehearsal spaces, and flexible classrooms to facilitate modern-day pedagogy. In addition, our athletic facilities are being improved, additions and renovations are under way for our business and art & design colleges, and soon we will break ground on a new performing arts complex.

Our new facilities are designed to stimulate collaboration and the building of community. This aligns with our work in creating a more diverse, equitable, and inclusive society. RIT is one of the few universities in the nation having a Vice President for Diversity and Inclusion, and a Board of Trustees Committee on Diversity, Equity and Inclusion (DEI). Adding to our longstanding dedication to DEI, the RIT administration, students, faculty, staff, and alumni, recently developed an Action Plan for Race and Ethnicity that will help guide RIT's efforts over the next several years as we initiate new programs, services, and policies to further assure equal access, opportunities, and respect for all students, faculty, and staff.

RIT is more devoted than ever to growing its diversity and creating an environment that allows diversity to flourish. Using this plan as a guide, we are putting even more emphasis on the recruitment and retention of a diverse and excellent faculty. RIT's strong commitment to the Future Faculty Career Exploration Program is key to the success of these 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 18th cohort of the Future Faculty Career Exploration Program (FFCEP) at Rochester Institute of Technology. This program plays a crucial role in growing and diversifying our faculty, 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!

FFCEP continues to be the cornerstone of RIT's faculty diversity and recruitment strategies, as highlighted in our recently released Race and Ethnicity Action Plan. At RIT, we place a high value on having a diverse community of scientists, artists and intellectuals that allows us to be a strong and vibrant university – one that attracts creative and innovative students. FFCEP plays a crucial role in making RIT a more diverse, equitable, and inclusive university.

This nationally recognized program is designed not only to help us learn more about you – your research and career interests, but also allows for you to get a first-hand look at RIT. Through FFCEP you'll connect with our faculty, have the opportunity to share your research, scholarship, and artistic works, and experience RIT's commitment to diversity and inclusion.

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 career – from PhD candidates to recent graduates to those who are furthering their research through postdoc assignments. FFCEP serves as a bridge for participants at the earliest stages of their academic careers to explore academic career opportunities.

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 18th 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 Office of Faculty Diversity & Recruitment, for example, received national recognition for RIT's more than ten-year commitment to increasing faculty diversity. RIT was also recognized as one of the "Top 200 Colleges for Native Americans". *INSIGHT Into Diversity* magazine not only recognized RIT as a Diversity Champion, but for the 7th year in a row, RIT was awarded the Higher Education Excellence in Diversity award. The American Society for Engineering Education (ASEE) also honored RIT among award recipients in the inaugural year of the ASEE Diversity Recognition Program.

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 your acceptance into the 18th 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 through our Pathways to RIT program held in the spring, or perhaps on a virtual campus visit last fall. 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 t his 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

* Cohosted by Kate Gleason College of Engineering and Golisano College of Computing & Information Sciences

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College of Art and Design

Dennis Delgado, M.F.A.
Ana Mosquera, M.F.A.

Dennis Delgado, M.F.A.

Adjunct Professor
Cooper Union

Profile

Dennis Delgado was born in the South Bronx and received a BA in Film Studies from the University of Rochester, as well as an MFA in Sculpture from the City College of New York (CUNY). His work examines the forms through which ideologies of colonialism persist and re-inscribe themselves, revealing a historical presence in the current moment. He is interested in how technologies of vision reproduce the scopic regimes of expansionism and neo-liberal governance. Delgado's work has been exhibited at the Bronx Museum of the Arts, the Schomburg Center for Research in Black Culture, El Museo del Barrio, and at the Cooper Union.

Abstract

The Dark Database: Facial Recognition and its "Failure" to Enroll

This presentation looks at the Dark Database project, which examines the presence of blackness in facial recognition systems. It recognizes the systems privileging of Caucasian skin as the central definition of skin tone. The project considers these flaws within the context of photography's history of shaping how people of color are imagined and represented in visual culture. Moving through the structure of a facial recognition system and utilizing that system to create a composite portrait that records what the system can 'see,' and further what that tells us about the overall culture that produced it.

Ana Mosquera, M.F.A.

Multidisciplinary Artist
Creative Designer, Common Ground Management

Profile

Ana Mosquera is a multidisciplinary artist and designer from Caracas, Venezuela. She earned a BA (honors) in Photography and Media Arts from the University College of Arts (UK), a BA (honors) in Architecture and Urbanism from the Central University of Venezuela (Venezuela) and an MFA in Sculpture from Tyler School of Art at Temple University (USA). Currently, she is the Creative Design Manager at Common Ground Management, a business formation company, that helps Black and Latino business owners create visual communication strategies and develop digital marketing campaigns. She is also a researcher for the Global Free Unit, a project that seeks to find and provide solutions towards the formalization of migrants across the Colombian border amidst the Venezuelan refugee crisis, the second largest in the world.

Mosquera´s art practice revolves around digital data collection and analysis, interrogating daily uses of technology. Her work operates from the intersection of art, architecture and information design, creating methods of production that require – data collection, database creation, organization, synthesis and correlation of information, urban and GIS mapping analysis, textile fabrication and space formation through installation. The combination of these multidisciplinary processes allows her to organize and make sense of specific digital experiences while exploring the relationship between physical and digital places.

In 2016 Mosquera won a National Prize from the Museum of Contemporary Art of Zulia with her work "You are always in control of your experience," which explores the vulnerability of users on Tinder. That same year she was awarded a fellowship at PIVO (Sao Paulo) to research the morphology of digital landscapes based on social media content. In 2021, she was awarded an honorable mention by the Henrique Farias Fine Art gallery, for her work "Deception Island: station C" which used the metaphor of a fictional island to think about territories as liminal, non-objective realities informed by digital content.

Mosquera has participated in multiple exhibitions some of which include 16th Eugenio Mendoza award at the Mendoza Foundation (Caracas 2021), Testing Grounds (2020), Maputo Fast Forward: Consciousness of Migration, Mozambique (2019), Crónicas Migrantes, historias comunes entre Venezuela y Perú Museum of Contemporary Art Lima (2019) Passport for an artist Alianza Francesa Lima (2018), First Hall of Contemporary Art. Peruvian North American Cultural Institute, Lima (2018).

Abstract

Mobility, Migration and A Reconstructed Sense Of Belogning In The Age Of Digital Data

In 2014 as mass protests broke out in the streets of Venezuela, Mosquera among many others, increased their use of social media to navigate through the city, as the information posted by users was an effective way to avoid road barricades and police clashes. By 2016, social media was the most common source for non-government censored information and a hub for non-official political activity. And finally, by the end of that same year, social media became a compass on her personal migration process out of Venezuela. Particularly, Venezuelan groups on Facebook were one of many online phenomena, helping people to move across countries more or less effectively, spanning from the border of Colombia to Buenos Aires, through the Darien Jungle to Tijuana and across the ocean into European cities.

Upon arriving in Lima, Mosquera watched the second largest migration crisis in the world unravel, often thinking about how these Facebook groups were impacting human mobility, aiding in the reconstruction of a sense of belonging for the diaspora, and in many cases creating networks for shadow economies. As a frequent user of the groups, she felt the data created by them sometimes digitally mirrored the original geographical space, progressively creating something that felt more like a digital territory on its own right. As she explored this idea, she also realized that the tools and metaphors available to make sense of data mostly came from the discourse of mathematics. Nonetheless this discourse felt short to help her reconstruct its qualitative and sometimes affective value.

This research presents methodologies for mapping and materializing data that go from the access, collection and creative use of data, to consider its role on everyday decisions, actions and relations.

Saunders College of Business

Kinde Wubneh

Kinde Wubneh

Ph.D. Candidate
University of Texas at Austin, McCombs School of Business

Profile

Kinde Wubneh is a management PhD candidate at the University of Texas at Austin, McCombs School of Business. He received his BA degree in Economics from Yale University. He also holds an MS in Applied Economics and Management from the University of Pennsylvania. After graduation, he worked in management consulting for Deloitte Consulting, and later as a data analyst for New York Presbyterian Hospital in New York City. Wubneh joined the University of Texas at Austin, McCombs PhD program in management in 2016.

His research interest lies at the intersection of innovation and strategy, particularly the role of external actors such as institutions, and firms' adaptations to them. His dissertation examines how firms engage in innovation, specifically timing their activities between competing demands of development and refinement of their innovations. It also explores the role of external actors and rivals in influencing these timing decisions. Wubneh also has other projects, one explores how financial analysts' schemas about innovations can influence their reaction to firms' efforts to develop novel innovations, specifically role of failures in shaping these perceptions. In addition to advancing his research, he is currently part of The PhD Project Management Doctoral Student Association.

Abstract

Yes, Get Closer to Your Enemies: Rivals' Product Entry and Focal Firm's Shifts in Exploration Focus

Extant research has long noted the criticality of firms successfully shifting between exploitation and exploration to secure a sustainable competitive advantage. In focusing on internally driven tradeoffs these firms may face, we do not yet have a more comprehensive understanding of the external drivers affecting a firm's exploitation and exploration decisions. Some studies focusing on the influence the environment may have on a firm's decision to exploit and explore note for example market dynamism as predominant stimuli. Yet, we postulate that firms' shifts from exploitation to exploration may be driven due to a specific actor — rivals.

Based on FDA medical devices data from 1990 – 2020, Wubneh shows that exploratory rival entry in a product area prompts domain and firm specific reasons for firms to shift to exploratory entry into that domain as well. Furthermore, his study also finds that several rivals entering, will however reduce this likelihood of entry, while firms with low technological diversity are more likely to develop additional exploratory products in that focal domain.

B. Thomas Golisano College of Computing and Information Sciences

Houston Claure
Brendan David-John

Houston Claure

Ph.D. Candidate
Cornell University

Profile

Houston Claure is a fifth year PhD candidate at Cornell University in the Sibley School of Mechanical and Aerospace Engineering. His interest lies in the field of human-robot interaction (HRI), human-computer interaction (HCI), artificial intelligence, and integrating robots in human spaces. In his research, Claure looks to develop algorithmic and design solutions to allow robots to allocate both physical resources (materials, tools, etc.) as well as social resources (attention, gaze) while considering human notions of fairness. Specifically, Claure is using reinforcement learning and machine learning techniques in combination with laboratory experiments to develop algorithms to enhance human-robot teams.

He is also interested in the design of robotic systems capable of thriving in spaces inhabited by humans. Claure is advised by Dr. Malte Jung and works in the Robots in Groups Lab.

Abstract

Fairness Considerations for Enhanced Team Collaboration

How can a robot collaborate effectively amongst a multi-human team? There is clear evidence pointing towards a future of team-based work structures, shifting away from the hierarchical organizational model. But bringing robots into these complex team environments has brought novel light to a set of problems previously not considered within the prevalent single robot to human paradigm. Specifically, the social dynamics that exist within a team are complex and extend beyond those of the commonly studied dyadic teams.

Consider a factory robot that assists two workers by delivering parts needed for an engine assembly. One worker is experienced and fast, the other inexperienced and slow. How should a robot take expertise into account when dividing its assistance among workers to achieve optimal outcomes? The successful adoption of robots as parts teams requires not only the consideration of team performance (e.g. completion time, or cost), but also of team viability, that is the capability of team members to continue to work cooperatively over time.

Claure's work explores the design of algorithms for social robots (systems social capabilities that are being deployed in homes, offices, schools, etc.) that encapsulates fairness and team social dynamics. Specifically, he focuses on developing artificial intelligence algorithms for well-established resource allocation scenarios where robots must decide how to distribute various resources among team members. Motivated by work that illuminates how intelligent agents can drive interpersonal relationships and influence cooperative or antisocial behaviors within teams, Claure proposes to leverage these methods for incorporating fairness into robot decision making. He additionally looks to show how both these factors influence interpersonal relationships between team members as well as shape team perceptions through deploying robots with my algorithms in real world team environments (e.g. offices and hospitals).

Brendan David-John

Ph.D. Candidate
University of Florida

Profile

Brendan David-John (he/him/his) has a BS/MS from the Rochester Institute of Technology and is currently a PhD student at the University of Florida studying Computer Science. He is from Salamanca, NY, which is located on the Allegany Reservation of the Seneca Nation of Indians. David-John's personal goals include increasing the representation of Native Americans in STEM and higher education, specifically in computing.

He is a proud member of the American Indian Science & Engineering Society and has been a Sequoyah Fellow since 2013. David-John's research interests include eye tracking, mixed reality, human perception, and vision within the field of computer graphics. Specifically, his dissertation work has focused on solutions that address security and privacy risks introduced by eye-trackers in mixed reality environments.

Abstract

Locking Eyes

Eye-tracking technology track where a user looks and is being increasingly integrated into mixed-reality devices. Although critical applications are being enabled, there are significant possibilities for violating user security and privacy expectations. We show that there is an appreciable risk of unique user identification from eye-tracking camera sensors and the resulting eye movement data. Users can be identified through the iris biometric contained within eye images or through features extracted from eye movement patterns. Biometric identification would allow an app to connect a user's personal ID with their work ID without needing their consent, for example.

To address concerns related to the leaking of biometric data through eye tracking this work explored solutions that keep the user's iris pattern secure in eye images and explored techniques that enable the release of eye movement data without the risk of biometric identification. Iris security is implemented through image blur in both software and hardware to provide the user control over their biometric.

Results indicate that the risk of iris recognition can be reduced without significantly degrading eye-tracking applications, like animating the eyes of a virtual avatar. Eye images are processed to estimate where the user is looking, and the resulting data also acts as a biometric used for recognition. Privacy mechanisms are introduced to reduce the risk of biometric recognition while still enabling applications of eye-tracking data streams and datasets. Gaze data streams can thus be made private while still allowing for applications key to the future of mixed reality technology, such as gaze-based interfaces or to drive prediction models necessary for foveated rendering.

Kate Gleason College of Engineering

Houston Claure
Deisy Fernandes, Ph.D.
Joshua Peeples
Javier Stober, Ph.D.

Houston Claure

Ph.D. Candidate
Cornell University

Profile

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Deisy Cristina Carvalho Fernandes, Ph.D.

Presidential Diversity Postdoctoral Fellow
Brown University

Profile

Dr. Deisy Cristina Carvalho Fernandes is a Presidential Diversity Postdoctoral Fellow in Chemical Engineering at Brown University. She started her undergraduate studies in Brazil at the University of Sao Paulo and finished her BS in Chemical Engineering at the University of Illinois at Chicago (UIC). She has had a variety of research experiences during her undergraduate studies in Brazil and now also in her graduate and post-graduate work in the US. She received her PhD in Chemical Engineering at UIC in June, 2015. She loves working with nanomaterials for nanotechnology and biosensing.

During her PhD studies, she received many awards such as The Passage Program and Bridge to the Doctorate. She was also awarded an NSF Graduate Research Fellowship (GRFP), in addition to an NSF Graduate Research Opportunities Worldwide (GROW) fellowship, which allowed her to perform research in France at the University of Bordeaux for six months, and was featured in an advertorial in Science Magazine. She has won awards for research presentations, including the American Institute of Chemical Engineering (AIChE) Presentation Awards in the Chicago Section in 2017 and 2018.

Born and raised in Brazil, Dr. Carvalho Fernandes is passionate about outreach and working with underrepresented groups. She has been involved with outreach through many organizations, including the Society of Women Engineering, Society of Hispanic Professional Engineering, and the Society for Advancement of Chicanos/Hispanics and Native Americans in Science. In addition, she has participated in panels such as at the Annual Biomedical Research Conference for Minority Students (ABRCMS) - “International Collaborative Research: An Important Supplement to Academic and Professional Training” (Nov 15, 2019), Louis Stokes Midwest Regional Center of Excellence (LSMRCE)-Voices of Success Panel Discussion (Oct 26, 2019), UIC College of Engineering Advisory Board- Panel for Woman Programs(Oct 07, 2019), and Dare to Dream: Get Educated, Build the Dream STEM Conference, Fermilab National Laboratory (Apr 14, 2018). She has also won the UIC Chancellor Student Service and Leadership award and the Eugertha Bates Memorial award.

Abstract

2D Nanomaterials for 3D Printing, Biosensing, and Controlled Releasing of Intercalated Molecules

Graphene – a single-atom-thick sheet of carbon atoms arranged in a hexagonal honeycomb lattice – has gained considerable attention due to its exceptional mechanical, electrical, and thermal properties. Compounding on these properties, graphene’s chemical and physical stability has led to numerous applications, including nanoelectronics biomedical applications such as biosensors, antibacterial, drug delivery, cell imaging tissue engineering, and energy storage applications in batteries.

Graphene oxide is one of the most widely studied chemical derivatives of graphene because of its water solubility and fast, scalable synthesis. A fast-evolving research field is the 2D and 3D printing of nanomaterials, including graphene oxide and its composites. In addition to graphene, using other 2D nanomaterials can improve the applicability of these devices. Transition metal dichalcogenides (TMDCs) are graphene-like (2D) nanomaterials, and molybdenum disulfide (MoS2) is one of the most widely studied TMDC. MoS2 has strong light absorption, layer-dependent electronic characteristics where the band structure changes from an indirect bulk form (~1.3 eV) to a direct monolayer form (~1.8 eV). MoS2 can endure high temperatures stability due to strong forces in plane with softness imparted by its van der Waals layered structure, making it suitable for lubrication applications. As previously discussed, these materials can be used in many different applications. Here I will present a few applications using these 2D nanomaterials, such as 3D printing of gels for electronic devices, biosensing for characterizing Glioblastoma heterogeneity (GBM, most common primary brain tumor affecting the adult population) to distinguishing necrosis, tumor, margin, and normal tissue.

Moreover, 2D nanomaterials can hold intercalates and control the release of these intercalated materials, which can be an important technique in many applications, including flavor, fertilizer, pesticide, and drug deliveries. I will demonstrate edge- and basal-plane-specific kinetics of planar, 1D wrinkled, and 2D crumpled nanochannels of graphene oxide films used to control the release rates of molecular intercalants pre-loaded into graphene oxide (GO) gallery spaces. Moreover, showing the transport phenomena release profile of GO and citric acid intercalated experimental and modeling, which gives diffusivity coefficients of 9.92*10-10 mm2/min for planar films, 1.07*10-10 mm2/min for 1D wrinkles, and 2D 5.53*10-10 mm2/min for 2D crumple. This type of fluidic-space manipulation should allow the intelligent design of 2D-material-based technologies such as time-release drug-eluting coatings.

Joshua Peeples

Ph.D. Candidate
University of Florida

Profile

Joshua Peeples received his BS in Electrical Engineering with a minor in Mathematics from the University of Alabama at Birmingham. Peeples is a 5th year PhD candidate in the Department of Electrical and Computer Engineering at the University of Florida (UF). He currently works with Dr. Alina Zare in the Machine Learning and Sensing Lab. During his PhD studies, Peeples plans to develop and refine novel deep learning methods for texture characterization, segmentation, and classification. These methods can then be applied toward automated image understanding, object detection, and classification.

He has been recognized with several awards including the UF Graduate School Preeminence Award, Iva and Norman Tucker UF Transportation Institute Fellowship, UF Board of Education Summer Fellowship, Florida Education Fund's McKnight Doctoral Fellowship, and National Science Foundation Graduate Research Fellowship.

In addition to research, Peeples is dedicated to service and advocacy for students at UF and in the Gainesville community. He serves as a mentor for high school and undergraduate students. He has co-led two summer courses on coding and machine learning for incoming freshman engineering students as a part of the Successful Transition and Enhanced Preparation for Undergraduates Program (STEPUP). He also currently serves as the President of a new organization called the African American/African/African Diaspora in Electrical and Computer Engineering (A3ECE), in addition to other outreach activities.

Abstract

Connecting the Past and Present: Histogram Layers for Texture Analysis

Feature engineering often plays a vital role in the fields of computer vision and machine learning. A few common examples of engineered features include histogram of oriented gradients (HOG), local binary patterns (LBP), and edge histogram descriptors (EHD). Features such as pixel gradient directions and magnitudes for HOG, encoded pixel differences for LBP, and edge orientations for EHD are aggregated through histograms to extract texture information. However, the process of designing handcrafted features can be difficult and time consuming. Artificial neural networks (ANNs) such as convolutional neural networks (CNNs) have performed well in various applications such as facial recognition, semantic segmentation, object detection, and image classification through automated feature learning.

A new histogram layer is proposed to learn features and maximize the performance of ANNs for texture analysis. Current approaches using ANNs or handcrafted features do not perform well for some texture applications due to inherent problems within texture datasets (e.g., high intrinsic dimensionality, large intra-class variations) and limitations in methods that use handcrafted and/or deep learning features.

The proposed approach is a novel method to synthesize both neural and traditional features into a single pipeline. The histogram layer can estimate bin centers and widths through the backpropagation of errors to aggregate the features from the data while also maintaining spatial information. The improved performance of each network with the addition of histogram layer(s) demonstrates the potential for the use of this new element within ANNs.

Javier Stober, Ph.D.

Research Engineer
Massachusetts Institute of Technology

Profile

Dr. Javier Stober is a Research Engineer in the Space Enabled Research Group at Massachusetts Institute of Technology. In that role, he leads the development and operations of the satellite laboratory and fosters collaborations with partnering organizations. Dr. Stober earned PhD and MS degrees in Aeronautics and Astronautics from Stanford University, researching novel propellants in the area of experimental hybrid rocket propulsion. He also earned a BS degree in Mechanical and Aerospace Engineering from the University of Florida.

Dr. Stober worked at various organizations across the engineering landscape, public and private, small and large, foreign and domestic, including NASA, Honeywell Aerospace, Boeing, and Space Propulsion Group.

Abstract

Paraffin and Beeswax for In-Space Hybrid Rocket Propulsion

The presentation details a multiyear research effort to better understand the technical and logistical challenges posed by the implementation of a wax-based hybrid chemical in-space propulsion system. Paraffin and beeswax are being considered as candidate fuels. The overarching effort includes imagery analysis conducted on paraffin and beeswax centrifugal casting tests on progressively higher-fidelity experimental platforms within transparent hardware which aids in optical investigations. Such platforms include a laboratory optical table and vacuum chamber, a parabolic trajectory microgravity aircraft (three flights to date), the Blue Origin New Shepard suborbital launch vehicle (two flights scheduled for 2021/2022), and the Destiny laboratory module of the ISS (launch scheduled for December 2021). Each of these platforms allows for testing in a new environment or longer-duration microgravity. The parabolic aircraft flights allow 20 parabolas of 20 seconds, the New Shepard flight 3 minutes, and the ISS flight one month of continuous microgravity time for testing. Atmospheric vs. vacuum experiments allow for isolation of convective and radiative effects on cooling and solidification of the wax, while 1g vs. microgravity experiments allow for evaluation of the role of buoyancy in the convective cooling process.

In order to determine the response of the liquid wax within the centrifugal casting chamber, an image analysis script was made to track the leading edge of solidification for both beeswax and paraffin wax. This script is able to track the solidification process in any environment, both in the lab and in microgravity, as long as there is video available that displays the solidification over time. Determination of expected solidification time is especially important in situations with tighter temporal constraints, such as choosing the optimal material to use for casting on a microgravity flight with less than 20-180 seconds of continuous reduced gravity. The imagery analysis of the experiments aids in understanding the solidification rate dependence upon rotation rate as well as environmental factors. Solidification rate may impact material properties or mission timing.

In addition to experimental work related to casting, a chemical equilibrium solver is used to compare predicted performance of paraffin, beeswax, and hydroxyl-terminated polybutadiene (HTPB) hybrid rocket fuels under identical conditions which warrants continued study of beeswax as a candidate green hybrid rocket fuel. These results indicate that beeswax, paraffin, and HTPB exhibit very similar performance which corroborates that the renewability and cost advantages of beeswax warrant its further study as a high-performing hybrid rocket fuel.

College of Engineering Technology

George Moore
Maximilian E. Ororbia
Joshua Peeples

George Moore

Ph.D. Candidate
University of California - Berkeley

Profile

Solving “Wicked Problems” is something that will always be at the core of my research efforts. As opposed to “tame” or “benign” problems, where there is strong agreement about whether or not the problem has been solved, wicked problems lack this clarity around how to define, measure, and attain success. While he gives himself space to be curious, his work rarely sits outside of the landscape of environmental sustainability and diversity, equity, and inclusion for underrepresented communities.

George Moore is currently a Mechanical Engineering PhD candidate at the University of California - Berkeley, concentrating in product design. He has earned degree an MS from the University of California - Berkeley and a BS from the University of South Alabama, both in Mechanical Engineering.

Abstract

Journey Mapping the Virtual Prototyping Experience

Reframing failure, individual problem solving, and access to technology are signatures of the “maker movement,” which directly inspired university makerspaces across the globe. In particular, university makerspaces have become a significant resource to students taking courses that require the creation of tangible prototypes. While research investigating a student’s experience prototyping in a makerspace is growing rapidly, not much has been done to investigate the student prototyping experience in exclusively virtual settings.

The goal of this study is to identify trends in the virtual prototyping experience with intentions of informing university instructors, makerspace facilitators, and students of where to anticipate struggles and frustration with the virtual prototyping experience. This study uses journey maps (a qualitative design method) to investigate the virtual prototyping experience for 12 undergraduate students, of diverse academic disciplines, at an R1 university in the United States.

Results from this study suggest that the functional prototyping experience (which emphasizes independent contributions towards a tangible product) generates more emotional volatility than the experiential prototyping experience (which emphasizes collaborative efforts toward a final prototype). Other notable results include statistically significant differences between Female and Male self-reported emotional levels at the beginning of the experiential prototype journey.

Maximilian E. Ororbia

Ph.D. Candidate
The Pennsylvania State University

Profile

Maximilian E. Ororbia is a PhD candidate in the Department of Civil & Environmental Engineering at The Pennsylvania State University. He received a BS degree in Civil & Environmental Engineering at Bucknell University in 2017. His research interests include engineering design, structural optimization, decision-making under uncertainty, and reinforcement learning.

Ororbia has been awarded the Alfred P. Sloan Scholarship (2018-2019 cohort). He is a member of ASCE and ASME and is also the President of the Structural Engineering Institute (SEI) Graduate Student Chapter at Penn State.

Abstract

Structural Design Synthesis through a Markov Decision Process and Reinforcement Learning Framework

In certain disciplines the design of structural systems is often limited to the use of standardized elements of given material and geometric properties for economic and constructability reasons. With respect to the optimization of such systems, the underlying design variables should be treated as discrete values in order to obtain a design that can readily be constructed without introducing approximation. Nonetheless, topology optimization solutions determined from gradient based methods that require continuous design variables are typically used as conceptual designs to inspire the final detailed design. However, the designer is then required to use either penalization, rounding, or other ad-hoc strategies to select discrete elements that will be used to construct the final structure often resulting in an approximate, sub-optimal design that is different than the one determined by the optimizer. Alternative methods for solving discrete optimization problems do exist, e.g., branch-and-bound and non-gradient based methods, however, while each method has its own merit, they can be limited in applicability due to their reliance on mathematical relaxations and can be computationally expensive with respect to converging to global optima.

In this talk, Ororbia will present a framework that mathematically models optimal design synthesis as a Markov Decision Process (MDP) that is solved with reinforcement learning (RL). In this context, the states correspond to specific design configurations, the actions correspond to the available alterations modeled after generative design grammars, and the immediate rewards are constructed such that they relate to the improvement in the altered configuration's performance with respect to the design objective. Since the actions are discrete, the MDP is naturally suitable for design problems with binary or discrete variables. Generally, in optimal design synthesis, the rewards are not known a priori, therefore we employ RL to solve the MDP. The goal of the RL agent is to maximize the cumulative rewards and hence synthesize the best performing or optimal design. The framework is demonstrated for the optimization of planar trusses with binary cross-sectional areas, and its utility is investigated using several numerical examples, each with a unique combination of domain, constraint, external force(s), and material behaviors. The design solutions obtained with the presented framework are also compared with other methods in order to demonstrate improvements in both efficiency and accuracy.

Joshua Peeples

Ph.D. Candidate
University of Florida

Profile

Joshua Peeples received his BS in Electrical Engineering with a minor in Mathematics from the University of Alabama at Birmingham. Peeples is a 5th year PhD candidate in the Department of Electrical and Computer Engineering at the University of Florida (UF). He currently works with Dr. Alina Zare in the Machine Learning and Sensing Lab. During his PhD studies, Peeples plans to develop and refine novel deep learning methods for texture characterization, segmentation, and classification. These methods can then be applied toward automated image understanding, object detection, and classification.

He has been recognized with several awards including the UF Graduate School Preeminence Award, Iva and Norman Tucker UF Transportation Institute Fellowship, UF Board of Education Summer Fellowship, Florida Education Fund's McKnight Doctoral Fellowship, and National Science Foundation Graduate Research Fellowship.

In addition to research, Peeples is dedicated to service and advocacy for students at UF and in the Gainesville community. He serves as a mentor for high school and undergraduate students. He has co-led two summer courses on coding and machine learning for incoming freshman engineering students as a part of the Successful Transition and Enhanced Preparation for Undergraduates Program (STEPUP). He also currently serves as the President of a new organization called the African American/African/African Diaspora in Electrical and Computer Engineering (A3ECE), in addition to other outreach activities.

Abstract

Connecting the Past and Present: Histogram Layers for Texture Analysis

Feature engineering often plays a vital role in the fields of computer vision and machine learning. A few common examples of engineered features include histogram of oriented gradients (HOG), local binary patterns (LBP), and edge histogram descriptors (EHD). Features such as pixel gradient directions and magnitudes for HOG, encoded pixel differences for LBP, and edge orientations for EHD are aggregated through histograms to extract texture information. However, the process of designing handcrafted features can be difficult and time consuming. Artificial neural networks (ANNs) such as convolutional neural networks (CNNs) have performed well in various applications such as facial recognition, semantic segmentation, object detection, and image classification through automated feature learning.

A new histogram layer is proposed to learn features and maximize the performance of ANNs for texture analysis. Current approaches using ANNs or handcrafted features do not perform well for some texture applications due to inherent problems within texture datasets (e.g., high intrinsic dimensionality, large intra-class variations) and limitations in methods that use handcrafted and/or deep learning features.

The proposed approach is a novel method to synthesize both neural and traditional features into a single pipeline. The histogram layer can estimate bin centers and widths through the backpropagation of errors to aggregate the features from the data while also maintaining spatial information. The improved performance of each network with the addition of histogram layer(s) demonstrates the potential for the use of this new element within ANNs.

College of Health Sciences and Technology

Stephanie Carr
Christopher U. Lane

Stephanie Carr

DrPH Candidate
Jackson State University

Profile

Stephanie Carr is a 15+ year master level veteran of clinical therapy who was driven by a major life experience to further her education and pursue her desire to become an epidemiologist. Carr is one year from completing her terminal degree, a Doctorate of Public Health (DrPH), with a concentration in epidemiology and biostatistics from Jackson State University in Jackson, Mississippi.

She completed a community research fellowship training program in August 2020. This program was a collaborative effort of the Mississippi Public Health Institute and the Mississippi State Department of Health, Office of Preventive Health and Health Equity. Carr is a graduate scholar through the Jackson Heart Study as a Daniel Hale Scholar. Daniel Hale Williams, who performed the first open heart surgery, is named over this two-year research mentoring and training program for underrepresented doctoral students. She has also completed additional coursework at the University of Michigan at Ann Harbor, including Epidemiology I, II, and III and Communicable Diseases and has been named to the honor society, Alpha Epsilon Lambda, by Jackson State University in the Spring of 2020.

Carr is a dynamic, relentless and motivated individual with an extensive background in hospice, grief therapy, suicidal intentions, drug use/abuse, psychosocial assessments and mental healthcare. She is passionate about research, especially as it relates to inclusion and diversity. Stephanie's research interest is in cardiovascular health and more specifically, as it connects with Alzheimer's disease.

After graduation, Carr plans to pursue a profound journey through academia and research. Aside from her educational dreams, she enjoys spending time with her daughter Alexcia, her greatest accomplishment, a driven researcher, is a third-year pharmacy student at the University of Mississippi. In addition, Carr enjoys outdoor activities and spending time with her Bichon Frise, Sasha.

Abstract

An In-depth Examination of African Americans within the Jackson Heart Study Who Suffered from Heart and Alzheimer's Diseases Simultaneously

Growing evidence reveals a strong link and likely causal association between the Heart and Alzheimer's disease. The Jackson Heart Study completed exams one, two, and three between 2000 and 2011. During this time, there were some variables discovered on participants that could possibly reveal the association of Cardiovascular and Alzheimer's Disease (AD). Some indicating markers include hypertension, diabetes, high LDL cholesterol and low HDL cholesterol. For decades, researchers have noticed a link between various cardiovascular abnormalities and AD, such as heart failure, coronary artery disease, atrial fibrillation, and vasculopathy. A considerable volume of work has pointed at this head to heart connection, focusing mainly on associations between cerebral hypoperfusion and neuronal degradation.

Cardiovascular disease (CVD) remains among the leading causes of death in the United States since 1975 with 633,842 deaths or one in every four deaths. Heart disease occupied the leading cause of death in 2015 followed by 595,930 deaths related to cancer. According to the World Health Organization (WHO), CVD is the number one cause of death globally with an estimated 17.7 million deaths in 2015. The burden of CVD further extends as it is considered the costliest disease, even ahead of Alzheimer's disease and diabetes with calculated indirect costs of $237 billion dollars per year and a projected increase to $368 billion by 2035.

Alzheimer's Disease is a progressive neurodegenerative disorder that accounts for about 70% of all dementia cases and is projected to affect 13 million individuals in the United States by 2050. AD has become one of the most common chronic diseases in developed countries. One in eight men, and almost one in four women, will develop AD during their lifetime. Additionally, the incidence and prevalence of AD and CVD is higher in African Americans (AAs) than blacks from Sub-Sahara African and compared to persons of European descent. In spite of these statistics, the disease is understudied in AAs.

Carr's research hypothesis points to the research question, "Is there a significant relationship between Heart and Alzheimer's Disease among African Americans in the Jackson Heart Study?"

Her primary research method for this study is a literature review and examination of observational data. Variables will be examined by observing the data from three exams. Exam one was given in 2000-04, exam two was given in 2005-08, and exam three was given in 2009-13. The sample is identified and recruited from the participants already within the Jackson Heart Study. Currently, Trans-Data access to the sample has been granted from the University of Mississippi Medical Center. She will use proportional regression analyses and adjusting for age, sex, body mass, smoking status, hypertension, diabetes mellitus, chronic obstructive pulmonary disease, coronary heart disease, atrial fibrillation and chronic kidney disease. Additionally, Carr will use a quantitative paradigm for this study and this data collection approach will use a correctional research design.

Christopher U. Lane

IRB Manager and Research Compliance Officer
Jackson State University

Profile

Christopher Lane took a position with the DC Department of Health HIV AIDS Administration in 2003 as a project coordinator for a surveillance grant from the Centers for Disease Control and Prevention (CDC) to study the sexual behaviors of high-risk individuals. Prior to his move to Washington, DC, he was a program director for a non-profit agency working with at risk youth of color in Mississippi.

The agency received funding to implement after school programs in school districts that were in critical levels of being administered by the MS Department of Education. Ten schools were piloted under Lane's direction, an additional 15 schools were identified and funded, with successful outcomes in ALL schools.

In addition to Lane's professional experience in program development, management, grant writing and evaluation, he was also very active in his community. He also consults with non-profit organizations to help them establish non-profit status, as well as a grant writer to help identifying funding for programs that would benefit impoverished and economically deprived families, as well as evaluation and strategic planning services.

Lane is currently the Senior Managing Director of 1 Vision Solutions, LLC, an organizational and management-consulting firm based in Jackson, MS. He is a 2006 CDC fellow in the Institute for HIV Prevention Leadership. He has also worked closely with the MS Department of Health to help reverse the path of HIV that is adversely impacting Mississippians. Lane recently obtained his certification in diversity, equity and inclusion in the workplace from University of South Florida. He is currently a doctoral candidate in public health at Jackson State University, with an emphasis in behavioral and environmental health, with the intention of completing his degree in 2021.

Abstract

LGBTQ (Lesbian, bisexual, gay, transgender and questioning) and HBCUs (Historically Black Colleges and Universities): Deconstructing the alphabet soup to provide safer campus environments for LGBTQ students in Mississippi-their health depends on it.

LGBTQ students experience higher rates of harassment on college and university campuses at higher rates than their heterosexual counterparts. These rates increase for LGBTQ students attending HBCUs. The data revealed that 34% of students attending these college and universities felt the need to conceal their sexual orientation and/or identity; 19% of the students were concerned about their physical safety; 28% reported being harassed. These data were not specific to LGBTQ students of color, but the LGBTQ students of color reported more episodes of harassment (32%) than their white LGBTQ counterparts. After an exhaustive search for data on LGBTQ students attending HBCUs, there is little to no data that specifically speaks to these students' experiences. This study will examine the safety and health of LGBTQ students attending HBCUs in the Deep South.

A reliable and valid survey instrument will be administered to students attending five HBCUs in Mississippi. However, students who identify as LGBTQ will be the focus of this study to document their perceptions and health. The students will receive an email with consent and and/or a scan code or link to access the electronic study. Recruitment flyers will be posted on the campus informing students about the study. 15,391 students will be eligible for the study. Students will receive computer generated numerical codes to avoid duplication. The study will be conducted within the minority stress theory framework.

The study is intended to share data that is currently in alignment with the literature. Therefore, a significant number of students are expected to share negative experiences and health concerns that may be a result of the matriculating in spaces that are not safe. It is expected that a large number of LGBTQ participants will codify experiences of harassment because of their sexual orientation, as well as experiencing health concerns such as anxiety, depression and other health related problems.

Meetings with administrators will become aware of the data, and recommendations and strategies will be suggested to address the needs of LGBTQ students. It is expected that more LGBTQ faculty, staff and students will be recruited to obtain positions and placements at these HBCUs.

College of Liberal Arts

Maretta McDonald
Melanie Plasencia
DJ Polite, Ph.D.
Katlyn Turner, Ph.D.
Denetra Walker
Mesi Walton, Ph.D.

Maretta McDonald

Ph.D. Candidate
Louisiana State University

Profile

Maretta McDonald is a first-generation PhD candidate from Oakland, California, by way of Chicago. She earned her BA in Criminal Justice with a minor in Sociology and her MS in Applied Sociology from Southeastern Louisiana University in Hammond, Louisiana. She currently attends Louisiana State University (LSU) pursuing her PhD in Sociology with graduate minors in African and African American Studies and Women's, Gender, and Sexuality Studies.

As a graduate instructor at LSU, McDonald teaches classes in both Sociology and African and African American Studies. Her research interest areas include racial inequality, gender, family, criminology, and public policy. Prior to returning to college as a freshman, McDonald worked in Louisiana state government in the Department of Children and Family Services. Her dissertation, "Enforcing Child Support in the Deep South: An Intersectional Approach" uses mixed methods to examine how race, gender, class, and place matter in the outcomes of nonresident parents who are participants in the child support enforcement system. Her project takes particular interest in understanding whether child support enforcement professionals' practices reproduce inequality across groups and the urban/rural divide.

Her dissertation research is currently funded by the ASA Doctoral Dissertation Research Improvement Grant, ASA Minority Fellowship Program, and LSU Dissertation Fellowship. McDonald's work is published in edited volumes, news media, research blogs, and Sociological Perspectives. She also has a co-authored book forthcoming, The Sociology of Cardi B.

McDonald uses her sociology training in the community and has collaborated on campus climate reports; provided an overview of the demographic change of disadvantaged neighborhoods in Baton Rouge from 1900 to 2017 for an urban renewal project; assembled an accessible history of the Black community of Baton Rouge from 1699 to 2020 for use by local educators and community organizations; and co-taught a college-level course in a women's state correctional facility.

Abstract

Enforcing Fatherhood: Discrete-Time Analysis of Legal Obligation of Child Support

Black families have a historically tumultuous relationship with state institutions. From the destruction of families during slavery to their dismantling as the result of mass incarceration, the agency of Black families has been constrained by oppressive state institutions and policies in the United States for centuries.

When examining systemic racism's effect on Black families across United States governmental systems, few sociologists theorize about the way Child Support Enforcement shapes Black families, particularly Black fatherhood. Child support enforcement research most often focuses on the effectiveness of the program as well as how child support receipts influence economic and psychosocial outcomes. Within the findings of many of these studies, researchers note that Black families are disproportionately represented within Child Support Enforcement. In contrast, far less scholarly attention is given to explaining why Black parents are more likely to be entangled in the CSE web that weaves the welfare system with the criminal legal system. McDonald's project seeks to understand the mechanisms that facilitate the disparity between Black and white fathers' presence within the race-neutral Child Support Enforcement program by unpacking its foundational mission and policies. Using data from the Fragile Families and Child Wellbeing study, she investigated the relationship between race of nonresident fathers and their risk of having a court order to pay child support.

The present study looks at this overrepresentation using the theoretical frameworks of Victor Ray's racialized organization theory and Feagin and Feagin's institutional racism theory. On the one hand, racialized organizational theory conceptualized by Ray is necessary here given its focus how cognitive schemas, like racial stereotypes, connect organizational rules to social and material resources such as self-determination and child support payments. On the other hand, the indirect form of institutional racism forwarded by Feagin and Feagin theorizes that racism is completely embedded in organizations and most likely not intentional.

The findings revealed a) race of the father is associated with risk of being ordered to pay child support and b) race of the father is also associated with timing of the child support order. The results highlight that not only do Black fathers have an increased chance of being ordered to pay child support, the higher risk associated with their race occurs early after the birth of the child and continues as the child grows older. This research speaks to how state institutions continue to constrain the agency of Black families and reinforce racial inequality.

Melanie Z. Plasencia

Ph.D. Candidate, University of California - Berkeley
César Chávez Fellow, Dartmouth College

Profile

Melanie Z. Plasencia is a PhD candidate in the Department of Comparative Ethnic Studies at the University of California - Berkeley, and the incoming César Chávez Fellow at Dartmouth College for 2021-2022. Her research is committed to improving older immigrants' social, economic, and health conditions by learning about the role social support and place have in shaping their health and well-being.

Drawing on more than two years of ethnographic fieldwork in a community of older Latinos on the East Coast and 72 open-ended interviews, her dissertation, "Con Suenos Que Ya Son Viejos: How Aging Latinx Immigrants Confront Inequality in Later Life," examines how older Latino immigrants negotiate the challenges of aging in the context of extreme poverty, deteriorating health, and diminishing government support. Her research shows that older Latino immigrants face enormous financial, familial, medical, and health challenges when they decide to grow old in the United States. As a result, older Latinos must learn new ways of managing healthcare, adapting to fixed incomes, and finding spheres of personal and even moral worth in their retirement years.

This project has been supported by a multi-year University of California (UC) fellowship, the New York Metro Fellowship, the Institute for the Study of Societal Issues, UC Berkeley's Center for Race and Gender, and the Ford Foundation.

Abstract

I Don't Have Much Money, But I Have a Lot of Friends": How Poor Older Latinxs Find Social Support in Peer Friendship Networks

Even though older Latinxs face some of the most economical precarity of any demographic group in the nation, little research has focused on this group and how they survive despite having limited economic means and access to government support. Drawing on two years of ethnographic research in an urban, Latinx community on the East Coast and seventy- two in-depth interviews, this study addresses this knowledge gap by focusing on the role of peer friendship networks in the lives of low- income, foreign-born Latinx older adults. I show that peer friendships have the unique ability to prioritize and affirm their identities as Latinxs and elders and provide returns in the form of medical, economic, and emotional support. For instance, peers often facilitate transportation to medical appointments, provide critical information about medicines and health insurance, and try to emotionally uplift one another, especially when family support is lacking. Understanding the role these networks play in the lives of our most vulnerable has implications for our understanding of aging, poverty, and policy.

DJ Polite, Ph.D.

Visiting Assistant Professor in African American Studies
College of Charleston

Profile

Dr. DJ Polite's research is centered on race, empire, and citizenship. His dissertation was entitled, "Combatting the pillars of political supremacy: Democracy, Citizenship, Puerto Rican Autonomy under the U.S. Jim Crow Empire; 1868-1938." The dissertation primarily explored the mutually reinforcing growth of U.S. Jim Crow policies and empire in the Caribbean, particularly Puerto Rico. It outlined the ways that the solidification of both relied on each other, and cemented secondary citizenship status for African-Americans, Puerto Ricans, and especially women of both groups.

Dr. Polite earned his PhD in History from the University of South Carolina. He also earned an MS in education from CUNY Brooklyn and a BA from Williams College. He has served on the Southern Historical Association Graduate Council and was a recipient of the Gilder Lehrman Research Fellowship, the Grace Jordan McFadden Scholars Program Fellowship, as well as the Southern Regional Education Board Dissertation Writing Fellowship. He also received the Ralph L. Woodward Prize from the Southern Historical Association.

Dr. Polite has been published in the Proceedings of the South Carolina Historical Association, wrote online pieces for Black Perspectives and Contingent Magazine and a book chapter under contract with Fordham University Press focused on Reconstruction and Empire. He received several awards for his commitment to diversity and equity, as well as public service including Smith Richardson Award for Work on Public Good.

Abstract

The Wilmington Massacre and the Border Making of Democratic Citizenship and Rights under U.S. Empire

This presentation focuses primarily on the turn of the 20th century U.S. approach to the end of the Spanish-American War. By definition then, it is not particularly concerned with the build-up to the war, but rather the path that the U.S. would take in the aftermath. Then, it looks at the debate surrounding the Treaty of Paris, the elections of 1898 which resulted in several "race riots," most prominent of them the coup and massacre in Wilmington, North Carolina and how those circled each other. It takes a series of public figures, authors and black and white North Carolina politicians, to demonstrate that the Wilmington Massacre was a watershed moment in the negotiation of racial hierarchy and the development of domestic and international empire-making.

North Carolina represents a rich history in which to understand the role of race and empire from a Southern perspective at the turn of the century. At a time of Southern Democratic power, it had a Republican and Populist senator, while also being the birthplace of literary white supremacist Thomas Dixon and the Wilmington race massacre that forcibly removed African-Americans from power. As such, understanding the place of North Carolina at the center of the Southern imperial debates is crucial in assessments of the growth of Jim Crow and empire as mutual systems of racialized political hierarchy.

This talk looks at North Carolina from the debates on Hawaiian annexation briefly, but transitions to the centrality of 1898 election inspired race predominantly in the buildup and brief aftermath of the Spanish American War. Across the spectrum on the imperial debates, conventional pro-imperialists and racist anti-imperialists shared assumptions on race and citizenship, but differed in their belief that the U.S. political system could succeed at excluding supposed racial inferiors. Many within the African American community saw the memories of Reconstruction/Redemption and the coming of Jim Crow at the heart of this debate.

The election-inspired coup and massacre in Wilmington, North Carolina was a reminder of the consistent threats to a democracy built on whiteness. In all, this chapter aims to demonstrate the extent to which empire and multi-racial democracy have at times overlapped, but cannot co-exist.

Katlyn Turner, Ph.D.

Research Scientist
Massachusetts Institute of Technology
Media Lab

Profile

Dr. Katlyn Turner is a research scientist at the MIT Media Lab in the Space Enabled Group, and a Research Associate at the Project on Managing the Atom at the Harvard Kennedy School's Belfer Center for Science & International Affairs. She earned her PhD in 2017 from Stanford University's School of Earth, Energy & Environmental Sciences.

Dr. Turner is interested in the ways complex systems and technology often exacerbate social hierarchy and inequity. Whether it's nuclear waste management affecting small communities' safety and land rights, data and algorithms inappropriately categorizing individuals from lower socioeconomic backgrounds, or innovation practices and products producing racist products and results—she is concerned with the design of processes and policies that promote justice and equity, particularly for historically underprivileged groups.

Dr. Turner uses principles of systems architecture, organizational theory, antiracism, feminism, and intersectionality in her work, Dr. Turner designs outcomes that foster equity and autonomy for historically underrepresented populations.

Abstract

Towards Intersectional Equity in Complex Sociotechnical Systems

Complex sociotechnical systems are embedded with the systemic inequities that plague society: for example, racism, classism, sexism, and so forth. Unless technology--and its norms of use and governance--are developed and implemented with the explicit goal of creating and sustaining intersectional equity in mind, the impacts of these systems will continue to be disproportionate; certain groups will systematically benefit from them while other groups are systematically harmed regardless of intent.

Utilizing a systems architecture framework grounded additionally in critical theory to design and reflect upon technology across scale—including technology as **concept, artifact, complex product system**, and **complex sociotechnical system**--may provide a lens through which intersectional equity can be designed for with specificity.

In this talk, Dr. Turner will discuss examples of equity and inequity in **complex sociotechnical systems** within broader society such as: (1) the ongoing response to the COVID-19 pandemic in the United States (focusing on Greater Boston) and its disparate effects along lines of class, race and infrastructure, and (2) the exclusionary cultures and demographics uplifted and amplified in STEM and innovation (focusing on Greater Boston and the Detroit Metro).

Further, within the nuclear and aerospace fields specifically, she will consider the question of equity through examining technologies and field-specific norms across scale. This work currently includes case studies such as (1) the **concept** behind treaty and governance structures in the nuclear and aerospace fields, (2) the development, use, and norms of technological **artifacts** such as nuclear reactors and small satellites, (3) the framing and development of the **complex product system** of US nuclear waste facilities, and (4) the **complex sociotechnical system** of nuclear waste management as a whole.

Denetra Walker

Ph.D. Candidate
University of South Carolina

Profile

Denetra Walker is a doctoral candidate at the University of South Carolina studying Mass Communications. Her area of research focuses on journalist experience in digital age; social justice and activism; police shootings; and maternal health.

Before enrolling in graduate school, Walker worked in several behind-the-scenes roles in television news markets including Augusta, GA; New York, NY; Houston, TX; Columbia, SC; Las Vegas, NV—covering some of the nation's biggest stories.

Her experience working in and managing a newsroom inform her teaching and academic research. She is passionate about addressing issues of diversity, equity and inclusion in college classrooms and newsrooms.

Abstract

"There's a Camera Everywhere": How Citizen Journalists, Cellphones, and Technology Shape Coverage of Police Shootings

This study examines how an evolving technological landscape influences the way television news journalists cover the issue of deadly, highly-publicized police shootings in the United States. Through in-depth interviews of television news journalists, the author analyzes how social media, cellphones, and citizen journalists shape this narrative. Themes include a change in speed and accessibility, accuracy, and a multi-layered challenge to police authority. Practical and theoretical implications on the future digital landscape covering this topic are discussed.

Mesi Walton, Ph.D.

Adjunct Lecturer
Howard University

Profile

Dr. Mesi Walton's research intersects with Africana, Latin American and Cultural Studies. She is interested in how Afro-Diasporic cultures survive and are employed as symbols of identity amid adversity. Dr. Walker uses an ethnographic lens to investigate and analyze the various applications of Ancestral memory of Africans in the Diaspora through instruments, music, song, dance, language and other practices.

Dr. Walton's latest research examines how cultural traditions in communities of African descent influence identity and ideology. Her work highlights how through the application of knowledge, skills and cultural memory, African descendants have resisted within a state of oppression, marginalization, and exclusion from dominant society. As a case in point, we examine the maintenance of Afro-Venezuelan cultural traditions in Barlovento, an area to which enslaved Africans were imported to work on large cacao estates and whose descendants now constitute the majority ethnic population in the region, with cultural traditions that uniquely identify it. Through the application of spiritual and cultural memory, Barloventeños show resolve within the construct of institutionalized racism by adopting a form of double-consciousness when needed.

Abstract

Survival Through Memory: African Retentions in Diasporan Cultural Production of Venezuela's Barlovento Region

This presentation explores issues of identity, cultural practices, memory, language, dance, religion, narrative, and festivals in order to analyze and contextualize them as manifestations of African continuities and cultural transformations in Venezuela, with a specific focus on the Barlovento Region.

This presentation accounts for ways in which these cultural practices have survived for over three hundred years and discuss the future of their continual survival in an effort to add to the current scholarship on Afro-Venezuelan culture. It also aims to demonstrate that in the case of African descendants of the slave trade, memory serves as both a weapon and a tool for survival. Moreover, this work discusses the potential effects of cultural globalization on today's Afro-Venezuelan practices. Lastly, this cross-disciplinary study, supports the idea that the continuation of diasporic culture plays a large role in the survival and resistance of African people within Venezuela. In addition, this presentation will explore how globalization and access to technology are affecting Afro-Venezuelan practices.

Dr. Walton's work aims to petition more scholarly attention towards the manner in which African diasporic scholarship is conducted on Latin American countries, particularly with regard to Afro-diasporic cultural retentions, and to make scholarship on this issue more accessible for future researchers.

College of Science

Cristina Espinosa-Diez, Ph.D.
Alexander Leder, Ph.D.

Cristina Espinosa-Diez, Ph.D.

Postdoctoral Associate
University of Pittsburgh

Profile

Dr. Cristina Espinosa-Diez obtained her PhD (2015) in Molecular Biology and Biochemistry at the “Universidad Complutense” in Madrid, Spain. She is passionate about non-coding-RNAs, and is currently focused on how small and long-non-coding-RNAs influence vascular cell identity. Dr. Espinosa-Diez did her postdoc at Oregon Health Science University in Portland, OR, where she studied non-coding-RNA responses in the tumor microenvironment.

Dr. Espinosa-Diez relocated to Pittsburgh to study the crosstalk of different epigenetic mechanisms such as histone modifications, DNA methylation, and non-coding-RNAs in vascular smooth muscle cells. Her goal is to gain a more in-depth knowledge of vascular disease models such as peripheral artery disease, aortic aneurysms and hypertension.

Long term, Dr. Espinosa-Diez wants to bring together her background in RNA biology, vascular disease, and tumor microenvironment to study the epigenetic changes happening as a secondary response to cancer therapies. In her independent lab, she will aim to identify new RNA therapeutic agents to prevent cardiovascular toxicity in cancer survivors.

She advocates for diversity and inclusion and participates as a board member of organizations such as the University of Pittsburgh Postdoc Association (UPPDA), Spanish Scientist in the USA (ECUSA), and the North Atlantic Vascular Biology Organization (NAVBO).

Outside the lab, Dr. Espinosa-Diez loves a good cup of coffee and classic rock music.

Abstract

Epigenetics mechanism influencing vascular disease development in response to radiation-induced vascular toxicity

Epigenetic regulatory mechanisms involved different molecular processes and are essential to environmental adaptation, including DNA methylation, histone modification, and non-coding RNAs (ncRNAs). Epigenetic changes in response to genotoxic stressors, such as radiotherapy, can accelerate the development of vascular events like atherosclerosis, thrombosis, and peripheral artery disease.

Indeed, cancer survivors have up to an 80% risk of developing cardiovascular events related to therapy. The epigenetic mechanisms by which genotoxic stress triggers the long-term development of vascular disease are not entirely understood. Our data indicate that increased genotoxic stress leads to the induction of a specific long-noncoding RNA (lncRNA) from the DLK1-DIO3 cluster, the lncRNA MEG9. Several publications have suggested a role for the DLK1-DIO3´s lncRNAs in endothelial function and vascular disease. However, only a handful of lncRNAs has been functionally evaluated in response to pathophysiological stimuli over vascular disease states. We observed that MEG9 loss-of-function decreased cell proliferation and correlated with an increase in caspase-3-dependent cell death. Furthermore, MEG9 inhibition diminished sprouting angiogenesis while increased vascular permeability in vitro. To further understand the functional role of MEG9 in the vascular endothelium, we performed an endothelial-specific gene array, followed by gene-ontology analysis.

These results suggested that the most affected genes after MEG9 loss-of-function were involved in blood coagulation and thrombosis. Indeed, we confirmed that MEG9 inhibition in HUVECs promotes fibrin formation in human plasma.

Our work illustrates how epigenetic changes on specific ncRNA loci may affect the long-term cardiovascular function after exposure to genotoxic stressors such as radiotherapy. Our data suggested that the lncRNA MEG9 could have a potential protective role on maladaptive responses to genotoxic stress and that DNA methylation may be a mechanism to modulate vascular injury in response stressors.

Alexander Leder, Ph.D.

California Alliance Postdoctoral Researcher
University of California - Berkeley

Profile

Growing up in a multilingual German-Mexican household in Baton Rouge, Louisiana exposed Dr. Alexander Leder to a wide variety of cultures and perspectives on who physicists are and what they do on a daily basis. The public lectures and colloquia at what is now the Karlsruhe Institute of Technology resulted in his first conversations with physicists, which allowed him to learn about the skills and responsibilities required to be a physicist. During these conversations, he learned that physics valued intense curiosity and that being a physicist was more than just writing long lists of equations on a chalkboard.

Dr. Leder started his education at the Louisiana State University working on developing small pixel gamma ray detectors. From there, he then moved on to MIT where he earned his PhD and became involved with a wide variety of projects over the course of graduate school. Dr. Leder started with developing the next generation of ultra-low background detectors that sought to detect one of the possibly millions of dark matter particles passing through us at any given second – research that he has built upon in his postdoctoral work. He also was on the team that developed new techniques for detecting/monitoring neutrons that are generated as a background in nuclear reactors. Finally, he worked together with colleagues in France to build, instrument and analyze an experiment designed to probe the physics that govern the rates at which heavy nuclei decay. The common thread that binds all these experiments together was that they all utilize ultra-cold detectors that seek to measure processes that occur at the very slowest time scales.

At the heart of any physics experiment lie the instruments that measure the process under investigation. Dr. Leder has always been fascinated by how these instruments work and all the techniques that are used in order to extract the answers that we seek. He hopes to continue to learn about new technologies and pass this knowledge to the next generation of physicists and show that physics is so much more than equations on a chalkboard.

Abstract

Current Analysis of the HAYSTAC Axion Dark Matter Search

Axions represent a leading class of dark matter candidate that has gained considerable interest in recent years. In order to probe the largely unexplored axion parameter space across multiple frequency decades, new experimental/analysis techniques are required. The HAYSTAC (Haloscope At Yale Sensitive To Axion Cold dark matter) experiment is a tunable microwave cavity experiment searching for axions, which also serves as an R&D testbed for new technologies in the 10-100 μeV mass range. HAYSTAC phase 2 utilized Josephson parametric amplifiers to create squeezed states for the first time in a haloscope measurement. Evading the quantum noise can lead to an increase of up to a factor of two in the spectral scan rate. In this talk, Dr. Leader will review the phase 1/2 results, discuss the current phase 3 efforts aimed at exploring as much of the open axion parameter space as possible with quantum squeezing techniques. He will also describe the latest R&D efforts currently underway at UC Berkeley to further expand the sensitivity and reach of the HAYSTAC experiment.

Golisano Institute for Sustainability

George Moore
Mercy Shenge, Ph.D.

George Moore

Ph.D. Candidate
University of California - Berkeley

Profile

Solving “Wicked Problems” is something that will always be at the core of my research efforts. As opposed to “tame” or “benign” problems, where there is strong agreement about whether or not the problem has been solved, wicked problems lack this clarity around how to define, measure, and attain success. While he gives himself space to be curious, his work rarely sits outside of the landscape of environmental sustainability and diversity, equity, and inclusion for underrepresented communities.

George Moore is currently a Mechanical Engineering PhD candidate at the University of California - Berkeley, concentrating in product design. He has earned degree an MS from the University of California - Berkeley and a BS from the University of South Alabama, both in Mechanical Engineering.

Abstract

Journey Mapping the Virtual Prototyping Experience

Reframing failure, individual problem solving, and access to technology are signatures of the “maker movement,” which directly inspired university makerspaces across the globe. In particular, university makerspaces have become a significant resource to students taking courses that require the creation of tangible prototypes. While research investigating a student’s experience prototyping in a makerspace is growing rapidly, not much has been done to investigate the student prototyping experience in exclusively virtual settings.

The goal of this study is to identify trends in the virtual prototyping experience with intentions of informing university instructors, makerspace facilitators, and students of where to anticipate struggles and frustration with the virtual prototyping experience. This study uses journey maps (a qualitative design method) to investigate the virtual prototyping experience for 12 undergraduate students, of diverse academic disciplines, at an R1 university in the United States.

Results from this study suggest that the functional prototyping experience (which emphasizes independent contributions towards a tangible product) generates more emotional volatility than the experiential prototyping experience (which emphasizes collaborative efforts toward a final prototype). Other notable results include statistically significant differences between Female and Male self-reported emotional levels at the beginning of the experiential prototype journey.

Mercy Shenge, Ph.D.

Student Engagement Coordinator,
American Planning Association
Historic District Commissioner,
City of Rockville Maryland

Profile

Dr. Mercy Nguavese Shenge is an Architect and Urban Planner. She holds a bachelor and master degree in Architecture from the Ahmadu Bello University, Zaria, Nigeria, a doctorate in Urban Design from Jackson State University, a certificate in AutoCAD and Drafting from Montgomery College, and another in the fundamentals of Building Green from the San Diego Green Building Council. She is currently undertaking a master degree in Public Health, with an emphasis on Environmental Health, at Grand Canyon University.

Her professional experience spans Architecture, Urban Planning, and Environmental Health Research. She worked as an Assistant Lecturer at the Department of Architecture, Ahmadu Bello University, Nigeria, where she taught both Architecture courses to graduate and undergraduate students and supervised projects and thesis. She was an Assistant Teaching Professor in the Department of Community and Regional Planning, College of Design, Iowa State University, where she taught environmental planning courses and planning studio. In this position, she led senior students to update the comprehensive plan for the City of Monroe, IA. She is on a group of researchers at Jackson State University, where she researched local building materials, environmental health, resilient housing and cities, climate change adaptation, environmental justice, open space disparity, and urban parks and flooding and taught a course.

Dr. Shenge was recently appointed as a Commissioner of the Historic District Commission in Rockville, MD. Her duties in this position include safeguarding Rockville's heritage by preserving districts that reflect the city's architectural history. She is also an instructor of Ecological Architecture at the global studio at the Community Planning & Design Initiative Africa.

Her professional associations include:

- Associate Member, American Institute of Architect
- Member, American Planning Association. Steering committee member of the sustainable communities division, and the student engagement coordinator of the Urban Design and Preservation Division of the association.
- Member, American Public Health Association

Abstract

Enhancing Sustainability and Resilience in Open Spaces using Green Infrastructure

Green infrastructure can be harnessed to reduce flooding, thereby enhancing sustainability and resilience in open spaces. The study examined selected parks in central and south Tucson to determine if the amount of vegetation found in these parks influences flood control. Central and South Tucson were selected for the Study because of their immediate need for efficient and sustainable flood control.

A study period of 10 years was selected because the time will provide sufficient time to assess the contribution of the parks for flood mitigation. Twelve parks were selected for the Study using a stratified sampling approach. Six were from central Tucson and six from south Tucson. The mixed-method approach was used. Data was collected using case studies and G. Data on the proportion of green spaces and impervious surfaces were estimated from Google Earth. Rainfall data for the area was obtained from published literature; runoff coefficients were determined from runoff coefficient tables. The analysis was done using ANOVA, regression analysis, and time series analysis. Runoff rates were greatly influenced by and strongly correlated with the proportion of green spaces in the parks.

Findings show that the sampled parks were ineffective in mitigating flash flooding. Their effectiveness could be increased significantly by increasing the proportion of green spaces while minimizing the ratio of impervious surfaces. Based on the findings presented, the study recommends that park design focuses on urban landscape designs that aim to increase green spaces.

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