App ID #: 820

Mentor: Sun, Mei Email: msun8@uncc.edu

Title: Associate professor

Department: Civil and Environmental Engineering

Co-mentor: No

Community engaged research: No

Title: Removing "forever chemicals" (PFAS) from drinking water by filtration

Description: PFAS are a group of organic contaminants toxic to human beings and the ecosystem. PFAS are widely used in many products like nonstick cookware and fire-fighting foams, and end up everywhere in our environment. They are very resistant to many existing treatment methods and stay in our body/the environment for years or even decades, therefore are called "forever chemicals". This project aims to improve current filtration methods to remove PFAS from our drinking water. We will use small lab setups to simulate treatment processes in water treatment plants, and optimize PFAS removal by adding different types of chemical reagents and controlling the reaction conditions.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: • Hands-On Experience: Work closely with our experienced research team, gaining practical skills in research laboratories and environmental monitoring.

• Cutting-Edge Research: Contribute to groundbreaking studies on emerging contaminants, addressing real-world environmental challenges and shaping future solutions.

• Methodology to explore new areas: learn how to get started with an unfamiliar territory by finding relevant information, reading literature, making testable hypothesis, implementing a realistic workplan, critically thinking about results, and effectively communicating ideas with others.

• Professional Development: Brighten your resume with enhanced problem-solving, data analysis, and teamwork skills, preparing you for a successful career.

Training Description: The student will first receive lab safety training and then learn basic protocols for conducting experiments, using instruments, and collecting data.

Training hours: 10

Mentoring plan: I and other members of my research team will teach the student the skills needed to conduct this project and, in general, how to do research in a wet lab. The students will also learn

how to analyze the results, draw conclusions, and represent the research findings. I will meet with the student weekly to keep up with progress, answer questions, provide feedback, and finalize action plans.

The student can expect timely communication, resources for help, and opportunities for authorship if they produce high-quality results that can be published in conference presentations or scientific papers.

Applicant Requirements: • Enthusiasm for water quality and curiosity about emerging contaminants.

• Strong attention to detail and ability to quickly learn new techniques.

• Ability to work effectively both independently and as part of a team.

• Prior coursework in environmental science/engineering and chemistry

Applicant Preferences: Good at time management and communication, interest and background knowledge in chemistry

Specific Time considerations/conflicts: N/A

App ID #: 821

Mentor: Hoover, Fushcia Email: fhoover3@charlotte.edu

Title: Assistant Professor

Department: EEGS

Co-mentor: No

Community engaged research: Yes

Title: Environmental Planning through Black Feminist Ecologies Theory

Description: Environmental planning practices to remedy environmental concerns across spatial and social inequities fail, particularly as it relates to climate change. Instead, investments can lead to displacement, and community driven solutions are not integrated into actual decision-making practices. Many Black people, particularly womyn and femmes have historically been at the forefront of identifying the palpable relationship between race, place and the environment, while pushing forward solutions through activism, organizing, and coalition building. In shifting towards holistic environmental planning processes and ecological restoration, Black Feminist Ecology theory is one potential tool we can use.

Research partners will assist with literature reviews, database creation, and data cleaning of interviews transcripts.

Subject areas: urban planning, environmental justice, black feminist ecologies, environmental attitudes and perspectives

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Students will gain substantial knowledge about concepts and practices in environmental planning practices, environmental justice histories and activism, and the emerging theory of Black Feminist Ecology.

Skills that student(s) will develop include interview/transcript cleaning and coding, critical analysis of articles in a literature review, research methods in an interdisciplinary setting, and carrying out work in a small team setting. This experience will benefit any student interested in pursuing research, planning, community engagement or participation, and introduce the student to an array of environmental organizations across the state.

Training Description: IRB CITI Training

Initial reading and summary work to assess reading and writing comprehension

Training hours: 8

Mentoring plan: Students who join the project will complete a mentoring compact and development plan with the Dr. Hoover. This will cover their expectations and goals for participating on the project, as well as Dr. Hoover's expectations around work outputs, meetings, and mentoring. Student(s) on the project will meet weekly with Dr. Hoover, and if available, are encouraged to attend the monthly research group meetings. There is additional mentoring and professional development that student(s) may receive through a postdoc, and other graduate students in the research group.

Applicant Requirements: Students should have strong writing and reading skills, proficiency with Microsoft word and excel, experience searching for literature using Google Scholar or other peer-reviewed search engines. Ideally, they will also have prior technical and literature review writing experience, and be comfortable working independently and in teams.

Applicant Preferences: Students with experience in or having taking courses in the social sciences (e.g. ethnography, qualitative sociology, public health), human geography, geospatial analyses, or related fields to environmental studies, Africana studies or the Global Studies program are strongly encouraged to apply. A strong sense of maturity and professionalism to handling sensitive data is also desired. Dr. Hoover also encourages dialogue among the team as the project progresses, so a genuine interest in the subject matter is important.

Specific Time considerations/conflicts: Student(s) must have availability on Monday, Wednesday or Friday for at least an hour between 9am-5pm for a weekly 1-hr meeting.

App ID #: 825

Mentor: Ravyts, Scott Email: sravyts@uncc.edu

Title: Assistant Professor

Department: Psychological Science

Co-mentor: No

Community engaged research: No

Title: Chronic pain and PTSD symptoms: A systematic review of mediation studies

Description: Chronic pain is one of the leading causes of disability in the United States. PTSD is known to frequently co-occur with chronic pain, yet, there is a lack of research about exactly how PTSD and chronic pain influence one another. The overall goal of this research project is to conduct a systematic review and meta-analysis of the existing literature on this topic. Students will work closely with a faculty member and will be encouraged to participate in all phases of the project including: abstract screening, full-text reviews of included studies, data extraction, data analysis, and scientific writing of the final paper.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: By the end of this research project, the student will:

a) Be familiar with the common procedures and processes involved in conducting a systematic review and meta-analysis

b) Learn how to use Covidence - a systematic review tool.

c) Be a better consumer and evaluator of scientific research

d) Have to opportunity to enhance their scientific writing

Training Description: Students will be required to complete the CITI Basic Social & Behavioral sciences module prior to directly working on the aforementioned research project.

Training hours: 5

Mentoring plan: Students will meet 1 on 1 with the faculty member leading this project for 30 minutes to 1 hour each week. Students will have the opportunity to be a co-author on the peer-reviewed publication that is expected to come out of this research project. Students will also be encouraged to discuss relevant professional development topics during 1 on 1 mentorship meetings including, but not limited to, applying to graduate psychology programs, writing a CV, etc. Finally, students will also have the opportunity to use previously collected lab data to explore their

own health psychology related interests and will be encouraged to present their work at UNCC's annual undergraduate student conference.

Applicant Requirements: Students are required to be majoring in psychology or a closely related field (e.g., public health, social work).

Applicant Preferences: Students who are highly motivated, organized, detail-oriented, and receptive to feedback are strongly encouraged to apply.

Specific Time considerations/conflicts: None

App ID #: 819

Mentor: Miller, Jimmie Email: jamiller@charlotte.edu

Title: Chief Engineer / Deputy Director

Department: Center for Precision Metrology

Co-mentor: No

Community engaged research: No

Title: Intelligent Self-Aware Machining Process enablement

Description: The project involves parametric data collection, analysis and archival to support machine/process intelligence.

Data collection: Develop a computer time-based program to gather data from Ethernet/USB machine and sensor interfaces.

Prefer LabVIEW base but other languages acceptable. The data acquisition will be before and during a machine process.

The pre-process data will provide a baseline for comparison with mid-process data.

Data analysis: Various data parameters will be calculated and compared.

Data Archival: Based on data parameter values data will be stored both locally and in cloud-based mediums.

This project will benefit research programs in machine intelligence, self-aware manufacturing processes and manufacturing capability.

The project will enable machine dynamics analysis during machining processes..

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes:

Familiarization with gathering data through digital interfaces (To be learned)

Machine tool G-code motion programming (To be learned)

LabVIEW knowledge (or other program) (Applications to hardware interfaces to be learned)

Data Analysis concepts (Variation parameters) (To be learned)

"To be learned" may involve independent investigation by the student.

Training Description: The student will be trained to operate a machine tool via manual and G-code bases.

IF any actual machining is to be done, the student will be trained accordingly.

Training hours: 3

Mentoring plan: I will interact daily as required so that the student will know what is expected and suggest resources for maintaining progress toward the end goal.

The day-to-day goals will be based on the students experience, capability and interests.

Applicant Requirements: Desired characteristics of the student

- Self-motivated
- Creative
- Technical Major

Applicant Preferences:

- Understanding of Ethernet/USB interfaces and related computer settings
- Labview Programming
- Software programming of computer interfaces

Specific Time considerations/conflicts: At least 30 minutes from 9-5 on workdays. Should be able to work in blocks of 3+ hours.

App ID #: 818

Mentor: Quinlan, Margaret Email: mquinla1@uncc.edu

Title: Professor, Communication Studies

Department: Communication Studies and Health & Medical Humanities

Co-mentor: No

Community engaged research: No

Title: Communicating Women's Reproductive Health

Description: OUR research experience serves as a research practicum for interested undergraduate students. You will work on a research project and/or research projects and complete specific tasks to get “hands-on experience” through the design and conduct of actual communication studies research. Your project will be structured and include:

Assisting me with my research; depending on the research project, you may be assigned to conduct/write/perform literature reviews, interviews or surveys, coding, data entry, statistical analysis, interview or focus group scheduling, focus group/interview transcription, transcribing of one-on-one interviews, sourcing articles or other related research tasks. Before the semester you will take, we will meet and agree on your tasks and expectations.

Background: Women's reproductive health is an essential aspect of women's overall health and well-being. Women's reproductive health needs to be given the attention it deserves in communication studies. There is a need to explore the communication aspects of women's reproductive health to understand women's challenges and opportunities in this area.

Research Questions: The proposed research will address the following questions (specific health issues will be revealed when OUR student begins):

RQ1: What are women's communication challenges and opportunities for their reproductive health?

RQ2: How do women communicate about their reproductive health with their partners, family members, friends, and healthcare providers?

RQ3: How do media and technology shape women's perceptions and attitudes towards their reproductive health?

RQ4: What are the implications of communication practices for women's reproductive health outcomes?

Methodology: The proposed research will employ a qualitative research design. Data will be collected through in-depth interviews or rhetorical analysis with women who have experienced reproductive health issues, healthcare providers, and women's reproductive health experts to gain their perspectives on communication and reproductive health. The data will be analyzed using qualitative thematic analysis.

Significance: The proposed research will contribute to understanding women's reproductive health in communication studies. The findings will inform the development of communication strategies and interventions to improve women's access to reproductive health services and information. The research will also contribute to developing policies to improve women's reproductive health outcomes.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 4

Anticipated Student Learning Outcomes: Undergraduate Research Assistant: I will work with Dr. Margaret M. Quinlan, Professor, Department of Communication Studies, Interdisciplinary Studies, Health & Medical Humanities at UNC Charlotte. I will help the professor collate, execute and design research. It is competitive.

Dr. Quinlan will guide you to:

gathering information;

analyzing, compiling, and interpreting data; multitasking ability;

clerical work;

administrative functions

Core Skills we will work on developing

Excellent written and oral communication

Excellent administration

Good presentation and organization

Expert in analyzing data

Excellent technical writing

Training Description: I will train the student when the project begins.

To train my undergraduate research assistants to help with my qualitative research on women's reproductive health, I plan to conduct initial training sessions to familiarize them with the research topic, objectives, and methodology. I will explain the importance of sensitivity and empathy when dealing with such personal topics and emphasize the significance of maintaining confidentiality and ethical practices throughout the research process. Additionally, I will provide hands-on training on various data collection methods, such as interviews and focus groups, and guide them on transcribing and analyzing qualitative data effectively. Continuous feedback and constructive evaluation will ensure their understanding and skill development.

Training hours: 2

Mentoring plan: The mentoring plan for the OUR Research Scholar Program involves Dr. Quinlan, who will work closely with students during the internship period. Dr. Quinlan is expected to be committed to the program, provide guidance and direction on the research project, and ensure that the scholar completes all required deliverables promptly. Regular contact with the student is necessary, and daily contact is encouraged. The mentor will also assist the scholar in writing an abstract, research report, and poster based on their summer research project and provide constructive criticism. Finally, Dr. Quinlan will inform the OUR Research Scholar Program Director of the scholar's progress and complete the program evaluation at the program's conclusion.

Applicant Requirements: Interest in gaining:

1. Experience working with a senior researcher.

2. Excellent knowledge of gathering information.

3. Expertise in various fields like correcting, analyzing, compiling, and interpreting data.

4. Multitasking ability and knowledge of clerical work.

5. Expertise in administrative functions.

6. Excellent written and oral communication skills.

7. Excellent administration and organization skills.

8. Good presentation skills.

9. Interest in gaining expertise in analyzing data.

10. Excellent technical writing skills.

Regarding courses or experiences, preference will be given to Communication Studies and Interdisciplinary Studies students with a concentration in Health & Medical Humanities and a background in Research Methods. Additionally, an interest in qualitative methods, feminist methods, and rhetorical analysis is desirable

Applicant Preferences: Preference to Communication Studies students and Interdisciplinary Studies with a concentration in Health & Medical Humanities or other health-related field

Background in Research Methods

Interest in qualitative methods, feminist methods, rhetorical analysis

Some recommended or preferred characteristics, skills, courses, or experiences for the research assistant position include:

• Strong attention to detail and accuracy, focused

• Interested in graduate school

• Health focus in your research interests

• Ability to work independently and take initiative.

• Strong critical thinking and analytical skills.

• Interest in learning software and tools (e.g., Google Docs, Google Sheets).

• Interest in experience with data collection and analysis.

• Knowledge of research ethics and protocols.

• Interest in experience with academic writing and formatting.

• Interest in experience with qualitative research methods.

• Familiarity with feminist methods and rhetorical analysis.

• Interest in experience with interdisciplinary research.

• Strong work ethic, good time management skills, and a willingness to learn and take on new challenges.

Specific Time considerations/conflicts: We will schedule a weekly meeting around 8 or 9 AM EST via Zoom that works for both our schedules (usually on Mondays)

Sunday by 5 PM EST, students are expected to submit timesheets, updated to-do list and research journal.

App ID #: 823

Mentor: Potochnick, Stephanie Email: spotochn@charlotte.edu

Title: Associate Professor

Department: Sociology

Co-mentor: No

Community engaged research: Yes

Title: Advancing the Labor Force Participation of Charlotte's Latina Mothers: Examining Intersecting Employment & Child Care Sector Opportunities and Barriers

Description: Project Importance. The labor force participation of Latina mothers (62.8%) lags behind that of other mothers (71.2%). Addressing Latina mothers' low labor force participation is important because it can lead to upward mobility and better health for Latina mothers,' their families and communities.

Project Team. This is an interdisciplinary, community-engaged research project in collaboration with Camino Health Center, which provides health, employment, and education services to Latino immigrant families in the Charlotte Region. The OUR researcher will be joining the UNCC Child & Family Development Lab, which is an interdisciplinary research lab with graduate, post-graduate, and undergraduate research assistants.

Project Objectives and & Methodology. Using a mixed-methods, community-driven research approach, this project will: (1) Identify Charlotte Latina mothers' overall employment experiences, opportunities, and barriers, and (2) Examine how childcare services shape Latina mothers' employment and identify Latina mothers' suggestions for improvement. To address these objectives, we will use secondary survey data and focus group interviews with Latina mothers.

To provide a broad picture of Charlotte's Latina mothers' employment, we will use multiple Camino data sources and different statistical techniques and software (Excel, STATA) to examine Latina mother employment experiences.

To provide a more in-depth assessment of Latina mothers' employment experiences and how childcare services shape their employment prospects, we will conduct 4 focus groups (6-8 participants each) with Latina mothers with different employment backgrounds. We will record, transcribe, and translate these focus group interviews and use qualitative software (NVIVO) to analyze common trends and patterns.

Based on these data, we will create informative fact sheets with dynamic graphics to disseminate to Camino and key employment and childcare stakeholders to improve services and programs for Latina mothers and families.

OUR Intern Contributions & Duties. The OUR researcher will become a part of the research lab team and attend regular (weekly or bi-weekly) meetings. In the meetings they will receive the necessary training (e.g., how to use the statistical software, code qualitative data, etc) and will work on an assigned task through the week. The Lab provides extensive mentoring and growth

opportunities and flexibility (when possible) for students to work on aspects of the project of most interest to them. By the summer, we will likely be working on transcribing and coding the qualitative focus groups.

Potential Duties: Transcribe focus group interviews, code focus group interviews using qualitative software, help co-create fact-sheets, attend lab meetings.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes: -Learn about research ethics

-Learn to work as part of a larger, collaborative research team

-Cultural competency and how to work in a diverse, bilingual environment

-Learn how to collaborate with community partners

-Learn how to transcribe and code qualitative data; how to conduct focus groups

-Learn how disseminate research findings in a dynamic, informative way

-Learn how to create databases (from administrative data and surveys) in Excel and clean and analyze data with STATA

Training Description: -All students complete research ethics training (CITI) before on-boarding

-Attend weekly lab meetings where training and mentorship are provided for the different research tasks students will be assigned.

-Meet with mentor to ensure project aligns with student preferences/skills and broader OUR program goals/requirements

Training hours: 5

Mentoring plan: The UNCC Child & Family Development Lab is an interdisciplinary research lab with graduate, post-graduate, and undergraduate research assistants. There are approximately 5-8 student participants and 2-3 faculty any given semester.

The main goal of the lab is to foster student growth and development. We do that by having collaborative meetings that connect faculty and students from different backgrounds and stages of career development. The meetings are a collaborative environment where in addition to discussing the specific research project we also discuss different topics of interest to the students (e.g., how to apply to grad school, etc.), and each person on the lab contributes their unique knowledge, skills and viewpoints.

Applicant Requirements: Required: A strong work-ethic, desire to learn new research skills, and the ability to collaborate with a larger research team.

Applicant Preferences: Preferred but not required: Spanish-English bilingual

Specific Time considerations/conflicts: No. We set-up a When2Meet to find a time that fits best for all lab members since everyone's schedule changes each semester.

App ID #: 824

Mentor: Ma, Lin Email: l.ma@charlotte.edu

Title: Assistant Professor

Department: Department of Mechanical Engineering and Engineering Science

Co-mentor: No

Community engaged research: No

Title: Novel Battery Technology Development for Electric Flight

Description: This project aims to develop a novel battery technology tailored for electric flight, addressing the critical challenges of energy density, safety, and weight. The aviation industry is on the cusp of a transformative shift towards sustainable energy solutions, with electric flight offering a promising avenue to reduce carbon emissions. However, existing battery technologies fall short in meeting the rigorous demands of aviation, particularly in terms of energy storage capacity and thermal management. This research will focus on designing and optimizing advanced battery materials and architectures that offer higher energy densities, improved thermal stability, and lightweight solutions without compromising safety. By leveraging cutting-edge materials science and engineering techniques, this project seeks to deliver a breakthrough in battery technology that will enable longer flight durations, faster charging times, and enhanced safety, ultimately paving the way for the widespread adoption of electric aircraft in commercial and private sectors.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Students involved in this project will gain a comprehensive understanding of advanced battery technologies, particularly in the context of electric flight applications. They will develop critical skills in materials science, electrochemistry, and thermal management by engaging in hands-on research and experimentation. Throughout the project, students will learn to apply cutting-edge techniques in battery design, from material synthesis to performance evaluation. Additionally, they will enhance their problem-solving abilities by addressing real-world challenges related to energy density, safety, and weight optimization in aviation batteries. Collaboration within a multidisciplinary team will strengthen their communication and teamwork skills, while regular presentations and reports will improve their scientific writing and public speaking abilities. By the end of the project, students will be well-prepared for careers in battery technology, sustainable energy, and aerospace engineering, equipped with both the technical knowledge and the practical experience necessary to contribute to future innovations.

Training Description: Students will begin by conducting a literature review on current battery technologies for electric flight, identifying gaps and areas for improvement. They will then

participate in hands-on laboratory work, synthesizing and characterizing novel battery materials. Throughout the project, students will perform electrochemical testing to assess battery performance, focusing on energy density, thermal stability, and weight optimization. Regular team meetings will facilitate collaborative problem-solving and knowledge exchange. Students will also present their findings in written reports and oral presentations, culminating in a final project that showcases their contributions to advancing battery technology for aviation.

Training hours: 5

Mentoring plan: Students will receive personalized mentoring through regular one-on-one meetings, where progress, challenges, and career aspirations will be discussed. They will work closely with faculty and graduate mentors who provide guidance on research methodologies, data analysis, and scientific writing. The mentoring plan includes scheduled workshops on technical skills, professional development, and effective communication. Students will also participate in peer-mentoring sessions to foster collaborative learning and build a supportive community. Feedback will be continuous, with a focus on refining research techniques and enhancing critical thinking. This holistic approach ensures students' academic growth and prepares them for future careers in STEM fields.

Applicant Requirements: self-motivation is required

Applicant Preferences: students with chemistry or electrical engineering background will be preferred

Specific Time considerations/conflicts: N/A

App ID #: 826

Mentor: Smith, Michael Email: mssmith1@uncc.edu

Title: Assistant Professor

Department: Engineering Technology and Construction Management/College of Engineering

Co-mentor: No

Community engaged research: No

Title: Enhancing Reliability and Performance of Marine Energy Systems

Description: Marine energy (ME) focuses on harnessing kinetic energy in the world's oceans to generate electricity. For example, point-absorber wave energy converters (WECs) harvest incoming wave-energy in marine environments. In recent years, there has been much interest and advances in ME technologies to support Powering the Blue Economy (PBE) applications. However, much work is still needed to develop, optimize, and test such marine energy systems (e.g., improve resilience, increase efficiency, reduce costs, etc.). To address these challenges, this project focuses on device / component design, prototype fabrication, and testing of marine renewable energy devices to enhance reliability and performance. For example, the design goals are focused on reducing costs, reducing hardware costs, increasing device resilience, and minimizing energy losses, all of which must be addressed in order to advance the marine energy industry.

Dr. Michael Smith is seeking to mentor promising undergraduate researchers on this interdisciplinary project to help address the critical problems that the marine energy industry is facing (e.g., damaged marine energy system components, etc.). This project focuses on developing and enhancing the design of marine energy devices (e.g., WECs) to enhance reliability and performance. The student's duties will include gathering and sorting relevant peer reviewed literature on the topic, collecting and analyzing data, mechanical/electrical component design, creating applicable physics-based models for analysis, prototype fabrication, conducting experimental tests, writing summaries of their work, and collaboration with the research team through regular meetings, as directed.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Anticipated student learning outcomes include critical thinking, teamwork, communication, and technology skills to advance the research area. The student's duties will include gathering and sorting relevant peer reviewed literature on the topic, collecting and analyzing data, mechanical/electrical component design, creating applicable physics-based models for analysis, prototype fabrication, conducting experimental tests, writing summaries of their work, and collaboration with the research team through regular meetings, as directed.

Training Description: Students will be on-boarded through a combination of training activities to quickly equip students with the skills needed to contribute to the project. There will be an initial kick-off meeting to orient the students to the project (e.g., meet the team members, identify the goals/objectives, specify the tasks, etc.). Then, students will work through guided training exercises (e.g., instructional videos, literature review, example representative learning activities/tasks, etc.) to help equip the students with the needed skills to perform the associated tasks. As the project progresses, additional skills/tools will be introduced (with the necessary training/instruction) for the project tasks, as applicable.

Training hours: 10

Mentoring plan: Mentoring on the project will include regular (e.g., weekly) meetings to discuss the project tasks, feedback on the research work, and action items. Students get the opportunity to practice their professional communication skills with weekly presentations based on the aforementioned aspects.

Applicant Requirements: Students with good academic records and related research interests are encouraged to apply. The student must be competent in Microsoft Excel, have strong communication skills (oral and written), and demonstrate keen data organization skills.

Applicant Preferences: Additionally, students with proficiency in machine design (mechanical / electrical devices) and software applications such as Mathcad, Matlab/Simulink, and SolidWorks (or similar CAD application) are desired and will be strongly considered. Training can be provided to students who are willing to learn.

Specific Time considerations/conflicts: We will have regular weekly meetings that are scheduled based on the team's availability during the period of performance for the project.

App ID #: 907

Mentor: Khire, Milind Email: mkhire@charlotte.edu

Title: Professor of Civil & Environmental Engineering

Department: Civil & Environmental Engineering and EPIC

Co-mentor: No

Community engaged research: No

Title: Groundwater Contamination - Visualization using Tracer Experiments and Mass Transport Modeling

Description: Groundwater contamination due to industrial sources is unfortunately all too common, and it's fair to say that only a few deeper groundwater sources remain relatively unimpacted by industrialization. This project will involve the use of a large-scale model in a laboratory to simulate groundwater contamination by common contaminants such as volatile organic compounds (VOCs) and per- and polyfluoroalkyl substances (PFAS), using tracers to simulate these contaminants. Measurements of the contaminant concentrations will be taken.

These measurements will be input into a numerical model to assess the accuracy of the model in predicting the transport of contaminants in groundwater. Additionally, a groundwater treatment system—consisting of pumping using wells and treating the groundwater—will be simulated to project the duration required for such a remediation project. The student will have the opportunity to carry out lab experiments and learn to use sophisticated groundwater modeling programs.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes: Students will learn about the interaction between groundwater and soils, and how groundwater contamination occurs. They will also learn how to simulate groundwater flow in a lab experiment using a scaled model. In addition, the students will learn numerical calculation methods using commercial groundwater software. This project combines hands-on experiments with state-of-the-art computational methods. It integrates principles of physics, chemistry, and mathematics—all in one project.

Training Description: Health and safety training related to basic lab safety, climbing and lifting safety, emergency evacuation, and basic chemical related safety training will be required.

Training hours: 16

Mentoring plan: The student will directly with Prof. Khire. If there are other graduate students in Prof. Khire's lab, the undergraduate student may be expected to help the graduate students for about 8 hours a month to get exposure to other projects.

Professor Khire will meet with the student on a bi-weekly basis during the first four weeks and then on a weekly basis to go over lab experiments and data collection methods. The student will be trained to analyze the results in Excel and also using a graphing software called KaleidaGraph. Professor Khire will also train the student to run a commercial groundwater code. The student will be expected to carry out monthly presentations of results summarized in a PowerPoint format. The student will also participate in a graduate symposium and prepare a poster of their results at an annual departmental event where other graduate students and undergraduate researchers showcase their results.

Overall, the student will learn experimental, analytical, numerical, communication, and presentation skills that are highly important to be a successful engineer.

Applicant Requirements: The student should have strong analytical skills and thinking ability that is innovative. Curiosity and desire to find answers is critical to be motivated to explore and experiment. Good knowledge of basic maths and physics are highly desirable. Should be independent once the tasks are spelled out.

Applicant Preferences: Student should have passion for protecting environment which includes the air, water, trees, humans, wild life and little to big ecological species. The student should also have broader knowledge that we humans have created a number of chemicals that we use to enjoy our lifestyle has also created environmental problems. The student should be passionate to learn and contribute using innovation. The student should present what classes they took, what projects they worked on, what voluntary service they did that pertains to environmental pollution

Specific Time considerations/conflicts: Hours will be flexible!

App ID #: 827

Mentor: Janies, Daniel Email: djanies@uncc.edu

Title: Carol Grotnes Belk Distinguished Professor of Bioinformatics and Genomics

Department: Department of Bioinformatics and Genomics

Co-mentor: Yes

Richard Allen White III, rwhit101@charlotte.edu, Department of Bioinformatics and Genomics

Community engaged research: No

Title: The Use of Artificial Intelligence and Advanced Computer Systems to Respond to Emergent Infectious Diseases

Description: The rapid emergence of pathogens that threaten human health is apparent. Thus the rapid development of therapeutics against pathogens is imperative. Recent developments in Artificial Intelligence (AI), structural biology (SB), and Molecular Docking (MD) powered by High-Performance Computing (HPC) allow for rapid evaluation of drug candidates against pathogen protein targets. The team at UNC Charlotte's Center for Computational Intelligence to Predict Environmental and Health Risks (CIPHER) have developed and demonstrated the use of AI, SB, and MD in a scalable, novel, and flexible molecular modeling computational workflow. We have applied these technologies to rapidly assess antibody performance against SARS-CoV-2 variants, Malaria, and Avian Influenza.

We seek studnets to help with data collection and preparation. This includes use of molecular databases (e.g. the National Center for Biotechnology Information's GenBank), text management, and scripting. As students' skills mature, they will take on more complex tasks such as executing analyses (AI, SB, MD) on HPC and contributing to publications and presentations.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: The students will learn valuable and portable analytical skills. In the past our students have excelled and have become co-authors or first authors on peer-reviewd publications.

Training Description: Evalation of computing skills. Use of databases, scripting, text management, and process control on HPC systems.

Training hours: 3

Mentoring plan: Each laboratory in the Center for Computational Intelligence to Predict Health and Environmental Risks has one to several lead scientists who participate in undergraduate, graduate, and postdoctoral training.

CIPHER derives success through a flat administrative structure to foster research and free exchange of ideas, concepts, expertise, and guidance from other fields with the common goal of predicting and preventing outbreaks and spread of infectious diseases. For example, we have a CIPHER coffee hour and lunches in which students are given opportunities to meet and have informal conversations with faculty and extramural scientists that are not their major advisor. All of our students are supported financially and scientifically. As a result, we are very successful in publishing, making connections, and fostering students of all backgrounds to their next career stages and employment in meaningful work.

CIPHER is a research center that is fully recognized and supported by the University of North Carolina System. CIPHER has significant space and institutional funding to host visiting scientists and community partners from key areas that complement our work. Since we moved into our new physical space in January 2023 our current resident population has grown to over 80 scientists. Our plans for visiting scientists include virologists and experts in artificial intelligence.

We will continually challenge CIPHER scientists and students to translate our work to real-world impact while understanding the societal expectations and impacts of our work in pandemic prevention. For example, we focus on addressing health disparities and vaccine hesitancy exposed by the pandemic. On the educational front, we focus on the nature of science instruction to tune minds to expect that science is a process of discovery and revision of public health guidance.

Students will participate in frequent group meetings, publications, and presentations.

Applicant Requirements: We need computing skills, conscientiousness, and persistence. Details matter in our work. Often we have to refine datasets and analyses over several versions.

Applicant Preferences: We need computing skills, conscientiousness, and persistence. Details matter in our work. Often we have to refine datasets and analyses over several versions.

Specific Time considerations/conflicts: NA

App ID #: 894

Mentor: Smith, Aimee Email: asmit715@charlotte.edu

Title: Assistant Professor

Department: Psychological Science

Co-mentor: No

Community engaged research: No

Title: Pediatric HEART Lab Pediatric to Adult Healthcare Transition

Description: This project focuses on supporting youth with chronic illnesses as they transition from pediatric to adult healthcare. It involves three key components: piloting a chronic illness self-management group for UNC Charlotte students, conducting a systematic review of healthcare transitions, and preparing for a study that uses electronic monitors to track medication adherence.

Students working on this project will be responsible for assisting in various research tasks, including completing the systematic review, drafting literature reviews, and developing materials for the self-management group. Additional responsibilities include recruiting participants, observing group sessions, attending lab meetings, and setting up and testing electronic medication monitors. Timely completion of tasks and maintaining confidentiality with participants and data are essential. Students will also represent the lab professionally in all interactions.

There are several with the lab that students can engage with, such as a pilot intervention with students with chronic illnesses transitioning to college, transcribing focus groups for parents of youth with sickle cell disease, and assisting with data collection at Levine Children's Hospital related to illness identity among children with cancer, chronic kidney disease, and cystic fibrosis.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Enhanced research writing skills through drafting literature reviews and reports

- Exposure to evidence-based self-management strategies for chronic illness

- Experience working in a collaborative environment alongside graduate students from the UNC Charlotte Health Psychology Clinical program

- Practical knowledge of conducting a systematic review, from data collection to analysis

- Insight into the field of pediatric and adult health psychology, specifically focusing on healthcare transitions for youth with chronic illnesses

- Hands-on experience with research technologies, such as electronic monitors for medication adherence

- Strengthened communication, organization, and participant interaction skills through active involvement in lab meetings, group facilitation, and recruitment efforts.

Training Description: - students will have weekly contact with Dr Smith and/or graduate students. They are

expected to complete CITI training for the IRB.

They will be trained in all study procedures in the first several weeks of the semester.

Training hours: 8

Mentoring plan: Dr. Smith will:

- meet with student(s) weekly during virtual or in person lab meetings, graduate students will also be present.

- meet individually as needed.

- answer questions by email within 24-48 business hours

-provide both an overall plan for the semester as well as weekly goals

I will also provide opportunities to discuss their research ideas and process in front of other lab members. The graduate students will help model this as they discuss their thesis and dissertation projects. While students are not required to do a presentation outside of the OUR Conference, Dr. Smith will gladly help guide them in the process for this project or other conferences they may show interest in.

Applicant Requirements: The ideal candidate is:

- Interested in health psychology

- has strong communication and teamwork skills

- able to maintain regular lab commitment throughout the semester

- Organized and detail-oriented in managing research tasks

- able to handle sensitive data with confidentiality and professionalism

Applicant Preferences: Additional characteristics that may make this an excellent fit:

- Completion of Research Methods and Stats courses.

- Interest in graduate school in psychology or a medical field.

- ability to/interest in committing to working in this lab beyond one semester.

Specific Time considerations/conflicts: N/A. Lab meetings will be scheduled after student(s) are matched.

App ID #: 829

Mentor: Wolek, Artur Email: awolek@charlotte.edu

Title: Assistant Professor

Department: Mechanical Engineering

Co-mentor: No

Community engaged research: No

Title: Under-water Robot Communication System Hardware and Software

Description: The ability to communicate is essential for multi-robot systems that aim to collaboratively perform tasks. There exist many technologies supporting robot communication above-water (WiFi, serial radio modems, etc.). However, communication between marine robots under-water is more difficult. Radio waves at common frequencies (e.g., 900 MHz-2.4GHz) are highly absorbed by water and can only penetrate a few feet at typical transmission powers. This research project will explore alternative mechanisms for low-bandwidth under-water communication. The system will research solutions that have a small SWaP (size, weight, and power) footprint. Example communication systems might include those based on acoustic, visual (light), magnetic, or specialized low-frequency radio signal transmission. The project aims to create two communication nodes that are water-tight and can reliably send data back and forth from submerged positions within a indoor 5,000 gallon water tank located in the BATT CAVE Research Building on campus. The communication (comms) unit will become a key component of a fleet of small miniature aquatic robots that are under development. The project will emphasize the electrical and software design of the system, component selection, fabrication, and testing. The student will develop or adapt an existing algorithm, deployed on a small computer system or controller (e.g., Raspberry Pi, Arduino, or Teensy) to encode and decode transmitted and received messages.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: The student will gain hands-on experience in the mechatronic design and practical testing of a robotic subsystem in a research setting. The student will also be exposed to the process of designing an experiment, collecting data, and interpreting results.

Training Description: Students will be onboarded by receiving an overview of the project from the project advisor and will be provided with related literature to review. A graduate student working on the project will train the student in required skills such as using the water tank facility, using the lab 3D printer, and soldering.

Training hours: 0

Mentoring plan: The student and advisor will develop a tentative week-by-week plan of steps to be accomplished and outline of major milestones for the summer. The student will meet with the advisor through regular lab group meetings and occasional one-on-one meetings. Additional guidance on a day-to-day basis will be provided by a graduate student mentor.

Applicant Requirements: - Expertise programming in C/C++ or python

- Expertise designing and testing circuits

- Strong problem solving skills, self-learning, detail-oriented

Applicant Preferences: Electrical engineering and computer science students are encouraged to apply. Other students with strong programming/circuits training are also encouraged to apply.

Specific Time considerations/conflicts: Lab meetings (Dates/times TBD)

Graduate student mentor meetings (Dates/times TBD)

App ID #: 830

Mentor: Wolek, Artur Email: awolek@charlotte.edu

Title: Assistant Professor

Department: Mechanical Engineering

Co-mentor: No

Community engaged research: No

Title: Design and Testing of a Swarm of Miniature Uncrewed Underwater Vehicles (miniUUVs)

Description: Swarms of miniature uncrewed underwater vehicles (UUVs) can be used for distributed sensing of aquatic environments and achieve greater robustness and efficient coverage than single-vehicle UUV systems. This project is part of a larger effort to establish an indoor testbed of miniUUVs within an indoor 5,000 gallon water tank located in the BATT CAVE Research Building on campus. In particular, the project will aim to produce a low-cost miniature robot that can move on the surface of the water and be deployed in large numbers (e.g., 6-12 robots at once). The student will investigate various means of propulsion including water jets, propellers, or flapping (biologically-inspired) designs. The system shall be highly miniaturized (e.g., 2-3 inches) and capable of basic forms of sensing the environment (e.g., light), and locomotion. The unit wil lay the foundation for future experimental research involving coordinated behaviors that allow 6-12 such robots to demonstrate various behaviors such as flocking. The project will involve mechanical CAD design, component selection, development of electrical schematics/wiring diagrams, assembly, micro-controller programming, and experimental testing. The student will design and execute an experiment to characterize the performance of the system.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: The student will gain hands-on experience in the mechatronic design and practical testing of a robotic subsystem in a research setting. The student will also be exposed to the process of designing an experiment, collecting data, and interpreting results.

Training Description: Students will be onboarded by receiving an overview of the project from the project advisor and will be provided with related literature to review. A graduate student working on the project will train the student in required skills such as using the water tank facility, using the lab 3D printer, and soldering.

Training hours: 0

Mentoring plan: The student and advisor will develop a tentative week-by-week plan of steps to be accomplished and outline of major milestones for the summer. The student will meet with the

advisor through regular lab group meetings and occasional one-on-one meetings. Additional guidance on a day-to-day basis will be provided by a graduate student mentor.

Applicant Requirements: - Working knowledge of CAD software and mechanical design concepts. Interest in fabricating a mechatronic system.

- Prior experience in electrical component integration, soldering, and Arduino programming highly desired.

Applicant Preferences: Mechanical engineering, electrical engineering, and computer science students are encouraged to apply.

Specific Time considerations/conflicts: Lab meetings (Dates/times TBD)

Graduate student mentor meetings (Dates/times TBD)

App ID #: 831

Mentor: Oh, Jaewon Email: jaewon.oh@charlotte.edu

Title: Assistant Professor

Department: Engineering Technology and Construction Management

Co-mentor: No

Community engaged research: No

Title: Performance evaluation of bifacial solar photovoltaic modules with various ground materials

Description: Solar photovoltaic (PV) energy has experienced rapid growth over the past decade in the United States (U.S.). Traditional solar PV panels are monofacial, meaning they only capture sunlight from the front side of the cells and modules. However, there is a new technology called bifacial solar panels that can capture sunlight from both the front and rear. These panels are becoming more common in the PV market, and it is expected that bifacial solar panels will make up a significant portion of the global solar market by 2030, potentially accounting for 40% to 60% of the market. This growth is driven by their ability to generate more energy per installed capacity compared to traditional monofacial solar panels, which in turn leads to a lower levelized cost of electricity (LCOE) and higher returns on investment. In this project, a student will investigate the performance of lab-scale bifacial solar panels when deployed on various ground materials, such as concrete, grass, gravel, and reflective coatings, on the rooftop of a commercial/academic building. Bifacial solar panels can capture sunlight from both their front and rear surfaces, potentially offering higher energy yields compared to traditional monofacial panels. The study aims to evaluate how different ground materials, which influence the albedo (reflectivity) of the surface, impact the overall energy production of these panels. Through outdoor field experiments and simulations, the project aims to identify optimal ground materials that maximize the efficiency and energy output of bifacial PV systems, providing valuable insights for enhancing the design and deployment of solar installations.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: A student will be able to:

- build lab-scale mini bifacial solar panels with the same structure as commercial bifacial solar panels.

- collect electrical measurement data using a data logger.

- analyze the effect of ground materials on the performance of bifacial solar PV systems.

- utilize PV system performance simulation software to compare simulations with experimental data.

Training Description: General lab safety training

Solar panel laminator training

Training hours: 2

Mentoring plan: There will be a weekly one-on-one project meeting to review progress and results. Students can contact me at any time while working on the project in the lab. If needed, a trained PhD student (my GRA) could help the undergraduate student build the project samples (lab-scale solar panel). Depending on the quality of the gathered data, research findings and results, conference papers will be submitted.

Applicant Requirements: - Hands-on lab experience

- Ability to use basic electrical and/or mechanical tools

- Experience with statistical software, such as Minitab, JMP, or MS Excel.

- Basic programming skill

Applicant Preferences: - Data analysis experience

- Being passionate about learning and research about solar energy

Specific Time considerations/conflicts: Weekly research meeting (every Friday, up to 1 hr)

App ID #: 833

Mentor: Chen, Xiang Email: xchen50@charlotte.edu

Title: Using atomistic simulations to explore the thermal and ionic transport in superlattice perovskite solar cells

Department: Mechanical Engineering and Engineering Science

Co-mentor: No

Community engaged research: No

Title: Using atomistic simulations to explore the thermal and ionic transport in superlattice perovskite solar cells

Description: Halide perovskite (HP)-based optoelectronics during the past few years have continued to be a trending topic that have attracted intensive research, yielding significant accomplishment. To further expand and boost up this field, the development of heterojunctions consisting of two different perovskite layers have shown to make far-reaching changes in the solar cell efficiency and stability. Even though temperature is well-recognized as the key factor in ionic conducting solids, the fundamental thermal transport mechanisms are surprisingly understudied even in the single material systems, not to mention the interaction between the heat carriers and the ion diffusion. This project aims to provide atomic study of the effect of multiple hetero-interfaces on thermal and ionic conductivity, for the design of new-generation solar cells. The student will participate in trainings conducted by the advisor and the graduate students. After the training, the undergraduate student will be able to use high-performance computing to conduct MD simulations. The student will use Molecular Dynamics (MD) simulations to investigate the thermal and ion transport in metal halide perovskite superlattices. The simulation results and the post-processing analysis provided by the student are expected to contribute as a part of a journal publication or conference presentation.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: Students will be able to learn the usage of high-performance computing and atomistic simulations. They will gain experience working in the cutting-edge interdisciplinary field of energy, material science, nanoscience, and mechanical engineering. They will develop skills in analyzing simulation results with tools such as MATLAB and OVITO. They will also have the chance to exercise their prior knowledge on heat transport and gain a new understanding of that from a microscopic perspective.

Training Description: Students will receive three two-hour trainings conducted by the advisor and assisted by the graduate students, with an access to the UNCC high-performance computing center. After the initial training, the students will get continuous training while working on the

project through group meetings and one-on-one meetings with the advisor and the graduate student mentor.

Training hours: 6

Mentoring plan: The student will receive hands-on trainings on accessing high-performance computing and conducting atomistic simulations. After the initial training, the student will meet with the advisor to develop weekly plan and major milestones to be accomplished, as well as the deliverables and research expectations. The student will have weekly in-person meetings with the advisor. The student will also participate in the regular lab group meeting to be exposed to a collaborative work environment and other cutting-edge research topics.

Applicant Requirements: Interest in nanoscience, physics, computer programing, and simulations.

Interest in reading cutting-edge research papers.

Applicant Preferences: Proficiency in MATLAB, Python, or a similar programming language.

Fundamental knowledge of material science such as crystal structures.

Specific Time considerations/conflicts: Weekly group meetings (Dates/times TBD).

App ID #: 845

Mentor: Fenwick, Abbey Email: afenwick@charlotte.edu

Title: Associate Professor

Department: APHCS

Co-mentor: Yes

Mike Turner, miturner@charlotte.edu, APHCS

Community engaged research: No

Title: Ultrasound evaluation of musculoskeletal changes in athletes

Description: From a physiological perspective, a great deal is understood about the effects of training on athletes. For example, it is understood how to periodize training relative to competitions and so that athletes perform at their best for as long as possible throughout the course of a season. However, little is known about the musculoskeletal adaptations that athletes experience during the season. This study aims to begin understanding how muscle, tendon, and cartilage adapt over the course of an athletic season in trained athletes. Season is defined as the time beginning with pre-season training, extending through the competitive season, and into any post-season period. Measures of muscle, tendon, and cartilage adaptation will occur via diagnostic ultrasound imaging at various upper and lower extremity locations. Changes from pre-season will be quantified and analyzed. The student(s) involved in this project would assist with the collection and processing of ultrasound images. Responsibilities include assisting with data collection, learning relevant human anatomy, managing spreadsheets, and performing basic statistical analyses. Training will be provided on all tasks.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Students will be able to describe the relevant anatomy observed on the screen during ultrasound imaging.

Students will be able to use image processing software to determine the size of the muscles, tendons, and cartilage examined.

Students will be able to independently collect ultrasound images using specialized software.

Students will be able to interpret a basic statistical evaluation comparing data across different time points.

Training Description: All students will be required to independently complete CITI training in accordance with IRB processes. All other training will be provided by the project faculty.

Training hours: 4

Mentoring plan: Students will work directly with the co-mentors for the project as well as post doctoral scholars and doctoral, and other undergraduate students in the lab on a daily basis and at monthly laboratory meetings. Faculty mentors will meet with students on a regular basis throughout the semester to ensure an understanding of the project requirements and to review relevant literature. These meetings will occur 2-3 times per month and can be called as needed by the student to discuss any issues that may arise. Students will spend the early portion of the semester with faculty mentors learning necessary hands-on skills for project success. Students will work with faculty to develop all required OUR materials (abstracts, presentations, etc.). By the end of the semester, students will have the opportunity to present their research to the lab group in a collegial setting and will be asked to present their research through OUR and the department experiential learning showcase.

Applicant Requirements: Students should have passed anatomy and physiology I and II (or equivalent).

Students should have effective communication skills and an ability to engage with members of the research team and participants during data collection sessions.

Applicant Preferences: Experience with spreadsheets (Microsoft Excel)

Completion of introductory statistics course

Specific Time considerations/conflicts: Specific days/times are not required, though students with a flexible schedule outside of class times are preferred.

App ID #: 847

Mentor: Eppes, Missy Email: meppes@charlotte.edu

Title: Professor of Earth Sciences

Department: Earth, Environmental and Geographical Sciences

Co-mentor: No

Community engaged research: No

Title: Data Mining Coding and GIS for Locating Earth Features - Exfoliation Domes

Description: Exfoliation domes (think Half Dome at Yosemite or Stone Mountain NC & GA) are charismatic geological landforms that provide valuable insights into Earth processes like weathering, erosion, and rock deformation. Despite advancements in remote sensing, LiDAR, crowdsourced data, and GIS, however, there is no current map showing the extent and location of these domes globally. Before we can learn the controls of these enigmatic landforms, we need to know where they are and their spatial relationships!

In this work, the student will write code to access geotagged or georeferenced data from passive crowdsourcing platforms like Twitter (X), Google Maps/Earth, Instagram, Flickr, and others. These data (acquired by the student) will then be used to populate a GIS-based map of exfoliation domes, either on a specific region, such as the Southeastern USA, or the entire country, depending on computational and time constraints. Depending on the success of the first task, an additional task could be to conduct some geospatial statistical analyses on the newly populated map in GIS. The ultimate goal is to determine the controls on the locations of domes.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: The student will gain hands-on experience with GIS, coding, and crowdsourced data, tackling real-world challenges in Earth sciences. They'll develop interdisciplinary skills, applying technology and data analysis to scientific problems. We anticipate that the project will deepen the understanding of GIS and coding while preparing them for future academic and professional opportunities applying those skills to various problems.

Training Description: The training process for a student participating in the research will involve familiarizing them with the dataset, including its details and specific requirements. This will ensure they have a clear understanding of the data they will be working with and the expectations for the project.

Training hours: 10

Mentoring plan: The student will work directly with me and INES PhD student, Faye Moser. To support the student's success in this research project, we will be available for questions and meetings as needed. We will begin with regular meetings, and then we will have an 'open door' for needed questions and guidance. Any additional meetings will be scheduled upon the student's request, ensuring they receive the support they need. There is no expectation for students to present at group meetings or conferences, allowing them to focus fully on their research and learning. If the student wishes to present at local or national conferences, we will help with any presentation practice and editing.

Applicant Requirements: Courses and/or demonstrated proficiency with coding and proficiency/potential for proficiency with GIS software is required. Students with strong computer sciences and coding background should be able to learn and use GIS software.

Applicant Preferences: We prefer an organized, independent worker with an eye for detail who is not afraid to seek help and ask questions and who is experienced in troubleshooting software and code. Experience in interfacing with crowdsourced platforms is ideal but not required.

Specific Time considerations/conflicts: There are no specific days or times that the student must be available. We are flexible with meeting times, accommodating the student's schedule as needed. Both remote and in-person meetings are options.

App ID #: 848

Mentor: Hammelman, Colleen Email: chammelm@charlotte.edu

Title: Associate Professor

Department: Earth, Environmental, and Geographical Sciences

Co-mentor: No

Community engaged research: No

Title: Placemaking narratives in food halls

Description: Increasingly, new food halls (such as Optimist Hall, Camp North End and 7th St Public Market in Charlotte) are popping up in cities worldwide to cultivate local food businesses, provide dynamic consumption opportunities, and re-use historic industrial sites. The stories food halls tell about themselves often attach meaning to their specific spaces and provide insights on both the history and the future aspirations of food systems and cities. This new project seeks to examine these place-making narratives used in creating and marketing food halls to better understand how they are contributing to building contemporary cities. The student researcher for this project will support with compiling information about existing food halls throughout the United States and reviewing existing literature about food halls.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: Students will gain experience in conducting literature reviews and obtaining and communicating secondary research. These foundations will be used by the faculty member in grant proposals and thus the students may also have an opportunity to learn skills in proposal development. Finally, the student would be supported in presenting about the content in food systems and urban geography obtained through this research.

Training Description: Students would receive training in completing literature reviews and how to identify and organize secondary research. This is a new project, so there is not yet an opportunity for primary data collection and analysis (although I hope that will become available in the future!).

Training hours: 1

Mentoring plan: I complete an Individual Development Plan with all student researchers that outlines their learning objectives, the research tasks expected, and steps toward accomplishing both. This is developed at the start of a project and reviewed regularly. I would expect to meet with the student at least every other week and to otherwise keep up regular communication via email. In each meeting we will discuss not only the research tasks completed, but how they fit within the larger research project and any relevant topics and resources that promote the student's professional development.

Applicant Requirements: An interest in food systems and experience reading academic journal articles.

Curiosity and willingness to dig deep to find needed information.

Strong written communication skills.

Applicant Preferences: Experience with conducting literature reviews, discourse course analysis, and/or storytelling.

Experience in geography and/or food systems research would be a plus but is not required.

A self-starter that is able to keep on track with independent work.

Specific Time considerations/conflicts: The student will need to be available to meet during normal operating hours at least once every other week. Otherwise, the faculty and student will work together to determine a schedule of independent work that aligns with the student's class and activity

App ID #: 849

Mentor: Sarkar, Kaustavi Email: ksarkar@charlotte.edu

Title: Assistant Professor

Department: Dance

Co-mentor: Yes

Marissa Nesbit, Marissa.Nesbit@charlotte.edu, Dance

Community engaged research: Yes

Title: Dance and Community Research Institute

Description: This application is for a community-engaged research project called “Dance and Community Research Institute,” (also known as dNc), which is an arts education, arts consultancy, and art entrepreneurial project bringing educators, artists, and scholars together for holistic development in the arts and systemic change. The research project has been funded by federal (National Endowment for the Arts), state (Ohio Arts Council), and city (Arts and Science Council in Charlotte) grants for multiple initiatives connected to dance pedagogy, assessment, and cultural empowerment of the diasporic Indian population in the United States.

In Spring 2025, dNc wants to conduct research in dance pedagogy in connection to a community outreach initiative conducted on a weekly basis by the Department of Dance. The Department of Dance offers weekly dance lessons in Odissi, an eastern Indian traditional art form. These classes are open to all irrespective of prior knowledge or affiliation. It is mostly attended by the diasporic Indian population. Youth as well as adult learners attend these classes every Sunday in Robinson Hall from 9 am to 12 pm. These classes have been offered since 2017 by Odissi soloist Dr. Kaustavi Sarkar, Assistant Professor in the Department of Dance. These lessons are offered as hybrid as students from Ohio, New Jersey, New York, Indiana, and Washington D.C. join. These lessons are offered on Zoom and are recorded on a weekly basis. The recordings are shared with the learning community.

The research project asks the following question: how does this model of community outreach engender changes in the teaching of classical dance? In this research design, the researchers will observe these weekly lessons over the course of the Spring semester. They will create focus groups of students to ask a set of questions. This will throw light on the experience of learning. The student population to be studied will be limited to in-person from the greater Charlotte community. Student researchers will be appointed to both observe as well as participate in the learning to experientially understand the movement form and its pedagogical impact.

The application seeks a student with experience in dance history, dance studies, practice as research, performance studies, and qualitative research. It seeks the following criteria:

Knowledge of dance studies methodology and relevant theoretical frameworks

Ability to engage with writing about movement: description, analysis, and critique

Keen interest in practice-based research

Understanding of performance as a body-mind phenomenon along with its aesthetic frameworks

Knowledge of qualitative research methods: ability to create interview protocol and engage with target populations of youth and adults

Minors on campus training certified (at least by the beginning of the project start date)

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes: The student will

Gain knowledge in a culturally specific art form and learn about its traditional and contemporary relevance and evolution

Critically gather and analyze information from a diverse range of methods: practice-based, community-engaged, interview protocol etc. to fully answer their research questions

Learn to communicate physically, verbally, and in writing over a range of diverse presentations in movement, conferences, and peer-reviewed journals

Work together with multiple adult and youth interns from dNc

Inspire fellow artists and students among the undergraduate student body as well as community to take up research related to arts education

Build trust with Indian diasporic communities as a leader and as an ally

Training Description: Students will need to obtain the Youth Protection Training, the CITI training, and basic training in Odissi dance (eastern Indian dance form).

Training hours: 10

Mentoring plan: This will be a hands-on mentoring involving direct teaching and learning, outside reading and research, conference presentation, performance, and writing. The student will be expected to meet at least 4-5 hours per week in studio practice. Outside that, the student will need 4-5 hours of weekly self-work outside of meeting times where the student will complete relavant

tasks (reading, research etc.) required for this project. The student will be required to perform at least in three festivals:

American College Dance Association Mid Atlantic Mar 6-9 2025 in University of Maryland

American College Dance Association Mid Atlantic May 2-4 2025 in Kennedy Center

Odissi Odyssey Conference Aug 9-11 2025

Applicant Requirements: The application seeks a student with experience in dance history, dance studies, practice as research, performance studies, and qualitative research. It seeks the following criteria:

Knowledge of dance studies methodology and relevant theoretical frameworks

Ability to engage with writing about movement: description, analysis, and critique

Keen interest in practice-based research

Understanding of performance as a body-mind phenomenon along with its aesthetic frameworks

Knowledge of qualitative research methods: ability to create interview protocol and engage with target populations of youth and adults

Minors on campus training certified (at least by the beginning of the project start date)

Applicant Preferences: The application seeks a student with experience in dance history, dance studies, practice as research, performance studies, and qualitative research. It seeks the following criteria:

Knowledge of dance studies methodology and relevant theoretical frameworks

Ability to engage with writing about movement: description, analysis, and critique

Keen interest in practice-based research

Understanding of performance as a body-mind phenomenon along with its aesthetic frameworks

Knowledge of qualitative research methods: ability to create interview protocol and engage with target populations of youth and adults

Minors on campus training certified (at least by the beginning of the project start date)

Specific Time considerations/conflicts: Student must be available from 9 am to 1 pm on Sunday mornings and 6 pm to 9 pm on Friday evenings.

App ID #: 850

Mentor: Makas, Emily Email: emakas@charlotte.edu

Title: Associate Professor

Department: School of Architecture

Co-mentor: Yes

Greg Snyder, gsnyder@charlotte.edu, School of Architecture

Community engaged research: Yes

Title: Freelon Exhibition

Description: An undergraduate research intern would participate in a multi-year research project and series of exhibitions exploring the architecture of the late North Carolina African American designer, Phil Freelon. Though widely publicized, surprisingly little scholarly attention has been paid to the Freelon's work, with the exception of the Smithsonian National Museum of the African American History and Culture. Our Charlotte team has created a traveling exhibition that examines that high-profile museum within the context of other Freelon Group designs exploring African American identity. These exhibitions explore the relationship between the container and the contained, that is, connections between the forms, materials, and meanings of Freelon\'s architecture and the histories and cultures exhibited within the museums, cultural centers, and commemorative landscapes he designed across the United States.

Evolving iterations of the exhibition have already been shown at three venues (Gantt Center in Charlotte, the NCMA in Raleigh, and FAMU in Tallahassee) and have included drawings, videos, and photographs borrowed from Freelon's firm with well researched interpretive panels, diagrams, and 3D printed models. The exhibition is thematically organized around three key design strategies – roots, ideas, and skins - that thread through Freelon's work at different scales and types. An updated and expanded version of the exhibition will be shown at the Auburn Avenue Research Library on African American Culture and History in Atlanta, GA. This building was extensively renovated by Freelon and his team.

Tasks for an undergraduate research intern the 2024-25 Academic Year include research and writing new content and wall panel layout and production as well as development of diagrams as 2D drawings, 3D-printed models, and video gifs - focused mostly on Freelon's projects for libraries and at Historically Black Colleges & Universities.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 3

Anticipated Student Learning Outcomes:

To improve understanding of the relationship between identity and the built environment.

To improve understanding of exhibition design and production.

To improve ability to conduct and organize research as well as to share research about the built environment with a public audience.

To improve ability to create threedimensional models and fly-through videos that diagrammatically convey information about the meaning of architecture.

Training Description: Interns will work with faculty and more experienced students on the project team to become familiar with the work of the Freelon Group, our exhibition design strategies and production processes, and the specific skills needed to produce diagrams, models, and gifs.

Training hours: 0

Mentoring plan: Student will meet regularly with the faculty mentor as well as with other members of the research team. Mentoring will happen formally from the faculty as well as informally by working with more experienced peers. Success is measured by engaged participation in the team, active contribution to moving the project forward, and student's own skill and knowledge growth.

Applicant Requirements: Good research and writing skills, ability to work reliably and independently as part of a team

Applicant Preferences: Familiarity with Adobe Creative Suite (especially Illustrator), Rhino, and/or 3D Printing.

Specific Time considerations/conflicts: We will plan meetings around the group schedule and most work is done independently so there are no specific time constraints.

App ID #: 852

Mentor: Tipton, Roger Email: rtipton2@charlotte.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor: No

Community engaged research: No

Title: Development of a Process for Extracting Nanocellulose Fibers from Plant Matter

Description: Overview: Join the cutting-edge research where you'll be part of a dynamic team developing innovative processes to extract nanocellulose fibers from plant matter. These fibers are a game-changer in the manufacturing of biocomposite materials, offering a sustainable and eco-friendly alternative to traditional composites.

Project Goals:

Develop an efficient and sustainable process for extracting nanocellulose fibers from various plant sources.

Analyze the properties of the extracted fibers to ensure they meet the standards required for biocomposite materials.

Integrate these fibers into biocomposite materials and evaluate their performance in real-world applications.

Student Contributions: As an undergraduate researcher, you'll play a crucial role in this project. Your contributions will include:

Literature Review: Conducting comprehensive reviews of existing research to understand current methods and identify potential improvements.

Experimental Design: Assisting in the design and setup of experiments to extract nanocellulose fibers from different plant materials.

Laboratory Work: Performing hands-on laboratory work, including the preparation of plant samples, chemical treatments, and fiber extraction processes.

Data Analysis: Analyzing experimental data to assess the efficiency and quality of the extraction process.

Material Testing: Testing the mechanical and physical properties of the extracted fibers and the resulting biocomposite materials.

Documentation and Reporting: Documenting your findings and preparing reports and presentations to share with the research team and broader academic community.

Why Join?

Hands-On Experience: Gain practical experience in cutting-edge research and laboratory techniques.

Interdisciplinary Learning: Work at the intersection of materials science, chemistry, and environmental engineering.

Professional Development: Enhance your research skills, critical thinking, and problem-solving abilities.

This project is an excellent opportunity to contribute to sustainable technology and make a real impact on the future of materials science. Join us and be part of the innovation!

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Participating in the nanocellulose fiber extraction research project offers students a multitude of benefits that span their education, training, and career development. Through this hands-on experience, students will acquire practical skills in advanced laboratory techniques, such as chemical treatments, fiber extraction, and material testing. These skills are essential for any scientific research and will provide a solid foundation for their future endeavors.

Educationally, students will gain a deep understanding of research methodology, including experimental design, data analysis, and comprehensive literature reviews. The interdisciplinary nature of the project will broaden their knowledge across materials science, chemistry, and environmental engineering, fostering a well-rounded understanding of these interconnected fields. This holistic approach will enhance their critical thinking and problem-solving abilities, which are highly valued in any career.

From a career perspective, students will significantly enhance their professional profiles. The project offers opportunities for networking with faculty, graduate students, and industry professionals, which can open doors for future career opportunities. Additionally, the chance to co-author research papers and present findings at conferences will be a notable achievement on their resumes. The focus on sustainability and eco-friendly materials will also appeal to employers and academic programs dedicated to green technologies, positioning students as forward-thinking candidates in their future endeavors.

Envisioning Students' Reflections: After participating in this project, students might say:

"This project was a game-changer for me. I learned so much about sustainable materials and got to work with some amazing people. It really opened my eyes to the possibilities in materials science."

"The hands-on experience I gained was invaluable. I feel much more confident in the lab now, and I know these skills will be crucial for my future career."

“Collaborating with a team on such an innovative project was incredibly rewarding. It taught me the importance of communication and teamwork in research.”

“Presenting our findings at a conference was a highlight. It was nerve-wracking but also exhilarating, and it definitely improved my public speaking skills.”

“This project has definitely made me more passionate about sustainability and green technologies. I can’t wait to see where this field goes next!”

Training Description: Welcome to the Team! Participating in the nanocellulose research project is an exciting opportunity, and we want to ensure you feel prepared and confident as you begin. Here’s an overview of the training and on-boarding process:

1. Orientation Session: Students will begin with an orientation session where they will be introduced to the project goals, team members, and the overall research plan. This session will provide a comprehensive overview of the project’s significance and the specific contributions expected from each student.

2. Safety Training: Given the laboratory setting, safety is a top priority. Students will undergo thorough safety training, covering laboratory protocols, proper handling of chemicals, and emergency procedures. This training ensures that all students are aware of and can adhere to safety standards.

3. Laboratory Techniques Training: Students will receive hands-on training in the specific laboratory techniques required for the project. This includes the preparation of plant samples, chemical treatments, and the extraction process for nanocellulose fibers.

4. Equipment Familiarization: Students will be introduced to the various pieces of equipment they will be using throughout the project. This includes training on how to operate, maintain, and troubleshoot laboratory instruments and machinery essential for the extraction process.

5. Research Methodology: To ensure a strong foundation in research practices, students will be trained in experimental design, data collection, and analysis. This will include guidance on how to conduct literature reviews, formulate hypotheses, and document their findings accurately.

6. Regular Check-Ins and Feedback: Throughout the project, students will have regular check-ins with their mentors to discuss progress, address any challenges, and receive feedback. These sessions will help students stay on track and continuously improve their skills.

7. Presentation Skills: To prepare students for presenting their research, they will receive training in effective communication and presentation techniques.

By following this comprehensive training and onboarding process, students will be well-equipped to contribute meaningfully to the research project and gain valuable skills and experience.

Training hours: 20

Mentoring plan: To ensure students' success in developing a process for extracting nanocellulose fibers from plant matter for biocomposite materials, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:

Direct Mentorship and Regular Contact: Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.

Collaborative Team Environment: Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Hands-On Training and Resources: I will ensure that students receive thorough training in laboratory techniques and the use of specialized equipment necessary for nanocellulose fiber extraction. They will have access to all required resources and materials, and I will be available to assist with any technical issues that arise.

Professional Development Opportunities: Students will be encouraged to present their research findings at group meetings and, if appropriate, at academic conferences. This will help them develop their presentation skills and gain confidence in communicating their research. I will provide guidance on preparing effective presentations and offer constructive feedback.

Commitment to Student Success: I am dedicated to creating an inclusive and supportive environment where students feel valued and empowered to succeed. This includes helping students set realistic goals, providing continuous feedback, and celebrating their achievements. I will also facilitate connections with industry professionals and academic contacts to support their career development.

Networking and Career Support: I will help students build a professional network by introducing them to industry experts and academic mentors. This networking will be invaluable for their future career paths, providing insights and opportunities for internships, job placements, or further academic pursuits.

By fostering a collaborative, supportive, and resource-rich environment, I aim to help students not only succeed in this research project but also develop the skills and confidence they need to excel in their future careers.

Applicant Requirements: Here are the key qualifications and characteristics we seek in an applicant:

1. Relevant Coursework:

Science and Engineering Background: Completion of foundational courses in chemistry, materials science, environmental science, or related fields.

Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.

2. Technical Skills:

Basic Lab Techniques: Proficiency in basic laboratory techniques and using common lab equipment.

Data Analysis: Familiarity with data analysis methods and software, such as Excel, MATLAB, or similar tools.

3. Research and Analytical Skills:

Literature Review: Ability to conduct thorough literature reviews, summarize findings, and identify gaps in existing research.

Critical Thinking: Strong analytical skills to interpret data, troubleshoot experiments, and draw meaningful conclusions.

We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: We are looking for enthusiastic and dedicated students who are eager to contribute to cutting-edge research in sustainable materials

1. Passion for Sustainability and Innovation:

Interest in Green Technologies: A genuine interest in sustainable materials and a desire to make a positive environmental impact.

Curiosity and Creativity: An inquisitive mindset and the ability to think creatively to solve complex problems.

5. Personal Characteristics:

Motivation and Initiative: Self-motivated with a strong work ethic and the ability to take initiative in driving the project forward.

Attention to Detail: Meticulous and detail-oriented, ensuring accuracy in experiments and data recording.

Adaptability: Flexibility to adapt to new challenges and learn new techniques as the project evolves.

6. Communication and Collaboration:

Team Player: Ability to work effectively in a collaborative team environment, sharing insights and supporting peers.

Effective Communication: Strong verbal and written communication skills to present findings clearly and concisely.

7. Commitment to Learning:

Willingness to Learn: Open to learning new skills and techniques, and receptive to feedback from mentors and peers.

Professionalism: Demonstrates professionalism in conduct, including punctuality, reliability, and adherence to safety protocols.

8. Enthusiasm for Research:

Curiosity-Driven: A natural curiosity and enthusiasm for scientific research and discovery.

Goal-Oriented: Focused on achieving research goals and contributing to the overall success of the project.

Specific Time considerations/conflicts: None

App ID #: 853

Mentor: Tipton, Roger Email: rtipton2@charlotte.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor: No

Community engaged research: No

Title: Wearable Flexible Sensors for Performance Management

Description: Overview: Join the innovative research team at the University of North Carolina at Charlotte (UNCC) and be part of a groundbreaking project developing wearable flexible sensors to monitor and evaluate the performance of workers and athletes. These sensors are designed to provide real-time data on physical activity, helping to optimize performance, prevent injuries, and enhance overall well-being.

Project Goals:

Design and develop flexible, wearable sensors that can accurately monitor various physiological parameters.

Test and validate the sensors' performance in real-world scenarios with both workers and athletes.

Analyze the collected data to provide actionable insights for improving performance and safety.

Student Contributions: As an undergraduate researcher, you will play a vital role in this project. Your contributions will include:

Literature Review: Conducting comprehensive reviews of existing research to understand current technologies and identify areas for improvement.

Sensor Design: Assisting in the design and development of flexible sensors, including selecting materials and optimizing sensor configurations.

Prototyping and Testing: Building prototypes of the sensors and conducting tests to evaluate their performance and reliability.

Data Collection and Analysis: Collecting data from the sensors during trials with workers and athletes, and analyzing the data to assess sensor accuracy and effectiveness.

Documentation and Reporting: Documenting your findings and preparing reports and presentations to share with the research team and broader academic community.

Why Join?

Hands-On Experience: Gain practical experience in cutting-edge research and technology development.

Interdisciplinary Learning: Work at the intersection of materials science, electronics, and biomechanics.

Professional Development: Enhance your research skills, critical thinking, and problem-solving abilities.

Networking Opportunities: Collaborate with faculty, graduate students, and industry professionals.

This project is an excellent opportunity to contribute to the development of innovative wearable technology and make a real impact on the fields of occupational health and sports science. Join us and be part of the future of performance monitoring!

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Participating in the wearable flexible sensors research project offers students a multitude of benefits that span their education, training, and career development. Through this hands-on experience, students will acquire practical skills in advanced sensor design, prototyping, and testing. They will gain proficiency in using cutting-edge technology and tools, which are essential for any scientific research and engineering career.

Educationally, students will deepen their understanding of interdisciplinary fields such as materials science, electronics, and biomechanics. They will learn how to conduct thorough literature reviews, design experiments, and analyze data, providing a solid foundation in research methodology. This holistic approach will enhance their critical thinking and problem-solving abilities, which are highly valued in any career.

From a career perspective, students will significantly enhance their professional profiles. The project offers opportunities for networking with faculty, graduate students, and industry professionals, which can open doors for future career opportunities. Additionally, the chance to co-author research papers and present findings at conferences will be a notable achievement on their resumes. The focus on developing innovative wearable technology will also appeal to employers and academic programs dedicated to health and sports sciences, positioning students as forward-thinking candidates in their future endeavors.

Envisioning Students' Reflections: After participating in this project, students might say:

"This project was transformative for my academic and professional growth, providing me with invaluable hands-on research experience."

"I gained practical skills and built confidence through direct involvement in cutting-edge sensor design and testing."

“Working on a project with real-world applications inspired me and reinforced my commitment to improving occupational health and sports performance.”

“The interdisciplinary nature of the research broadened my knowledge and significantly shaped my educational journey.”

“Participating in this project was a pivotal experience that opened doors for future career opportunities and solidified my career aspirations.”

Training Description: Welcome to the Team! Participating in the wearable flexible sensor project is an exciting opportunity, and we want to ensure you feel prepared and confident as you begin. Here’s an overview of the training and on-boarding process:

1. Orientation Session: Students will begin with an orientation session where they will be introduced to the project goals, team members, and the overall research plan. This session will provide a comprehensive overview of the project’s significance and the specific contributions expected from each student.

2. Safety Training: Given the laboratory setting, safety is a top priority. Students will undergo thorough safety training, covering laboratory protocols, proper handling of equipment, and emergency procedures. This training ensures that all students are aware of and can adhere to safety standards.

3. Laboratory Techniques Training: Students will receive hands-on training in the specific laboratory techniques required for the project. This includes sensor design, prototyping, and testing. Experienced team members will demonstrate these techniques and supervise initial practice sessions.

4. Equipment Familiarization: Students will be introduced to the various pieces of equipment they will be using throughout the project. This includes training on how to operate, maintain, and troubleshoot laboratory instruments and machinery essential for sensor development.

5. Research Methodology: To ensure a strong foundation in research practices, students will be trained in experimental design, data collection, and analysis. This will include guidance on how to conduct literature reviews, formulate hypotheses, and document their findings accurately.

6. Regular Check-Ins and Feedback: Throughout the project, students will have regular check-ins with their mentors to discuss progress, address any challenges, and receive feedback. These sessions will help students stay on track and continuously improve their skills.

7. Collaborative Workshops: Students will participate in collaborative workshops where they can share their experiences, discuss problems, and brainstorm solutions with their peers and mentors. These workshops foster a sense of community and encourage collaborative learning.

8. Presentation Skills: To prepare students for presenting their research, they will receive training in effective communication and presentation techniques. This includes how to create compelling presentations and how to confidently present their findings to different audiences.

By following this comprehensive training and onboarding process, students will be well-equipped to contribute meaningfully to the research project and gain valuable skills and experience.

Training hours: 20

Mentoring plan: To ensure students' success in developing wearable flexible sensors for performance monitoring, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:

Direct Mentorship and Regular Contact:

Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.

Collaborative Team Environment:

Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Hands-On Training and Resources:

I will ensure that students receive thorough training in laboratory techniques and the use of specialized equipment necessary for sensor development. They will have access to all required resources and materials, and I will be available to assist with any technical issues that arise.

Professional Development Opportunities:

Students will be encouraged to present their research findings at group meetings and, if appropriate, at academic conferences. This will help them develop their presentation skills and gain confidence in communicating their research. I will provide guidance on preparing effective presentations and offer constructive feedback.

Commitment to Student Success:

I am dedicated to creating an inclusive and supportive environment where students feel valued and empowered to succeed. This includes helping students set realistic goals, providing continuous feedback, and celebrating their achievements. I will also facilitate connections with industry professionals and academic contacts to support their career development.

Networking and Career Support:

I will help students build a professional network by introducing them to industry experts and academic mentors. This networking will be invaluable for their future career paths, providing insights and opportunities for internships, job placements, or further academic pursuits.

By fostering a collaborative, supportive, and resource-rich environment, I aim to help students not only succeed in this research project but also develop the skills and confidence they need to excel in their future careers.

Applicant Requirements: Here are the key qualifications and characteristics I value for this project:

1. Relevant Coursework:

Science and Engineering Background: Completion of foundational courses in chemistry, materials science, environmental science, or related fields.

Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.

2. Technical Skills:

Basic Lab Techniques: Proficiency in basic laboratory techniques, such as pipetting, measuring, and using common lab equipment.

Data Analysis: Familiarity with data analysis methods and software, such as Excel, MATLAB, or similar tools.

3. Research and Analytical Skills:

Literature Review: Ability to conduct thorough literature reviews, summarize findings, and identify gaps in existing research.

Critical Thinking: Strong analytical skills to interpret data, troubleshoot experiments, and draw meaningful conclusions.

We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: When selecting student applicants for the wearable flexible sensors research project, I am looking for individuals who demonstrate a strong passion for scientific research and a commitment to innovation.

1. Passion for Performance and Innovation:

Interest in Performance Technologies: A genuine interest in wearable technology, materials science, and performance monitoring. Students should be eager to learn and explore new concepts.

Curiosity and Creativity: An inquisitive mindset and the ability to think creatively to solve complex problems.

.2. Personal Characteristics:

Motivation and Initiative: Self-motivated with a strong work ethic and the ability to take initiative in driving the project forward.

Attention to Detail: Meticulous and detail-oriented, ensuring accuracy in experiments and data recording.

Adaptability: Flexibility to adapt to new challenges and learn new techniques as the project evolves.

3. Communication and Collaboration:

Team Player: Ability to work effectively in a collaborative team environment, sharing insights and supporting peers.

Effective Communication: Strong verbal and written communication skills to present findings clearly and concisely.

4. Commitment to Learning:

Willingness to Learn: Open to learning new skills and techniques, and receptive to feedback from mentors and peers.

Professionalism: Demonstrates professionalism in conduct, including punctuality, reliability, and adherence to safety protocols.

5. Enthusiasm for Research:

Curiosity-Driven: A natural curiosity and enthusiasm for scientific research and discovery.

Goal-Oriented: Focused on achieving research goals and contributing to the overall success of the project.

Specific Time considerations/conflicts: None

App ID #: 854

Mentor: Tipton, Roger Email: rtipton2@charlotte.edu

Title: Research Associate Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor: No

Community engaged research: No

Title: Hydrophobic and Oleophobic Coatings for Ceramic Substrates

Description: Overview: Join the innovative research team at the University of North Carolina at Charlotte (UNCC) and be part of an exciting project developing hydrophobic and oleophobic coatings for ceramic substrates. These coatings are designed to repel water and oil, making ceramic surfaces more durable and easier to clean. This project offers a unique opportunity to work on cutting-edge materials science and contribute to advancements in surface engineering.

Project Goals:

Develop and optimize hydrophobic and oleophobic coatings for various ceramic substrates.

Test and evaluate the performance of these coatings in repelling water and oil.

Analyze the durability and effectiveness of the coatings under different environmental conditions.

Student Contributions: As an undergraduate researcher, you will play a crucial role in this project. Your contributions will include:

Literature Review: Conducting comprehensive reviews of existing research to understand current coating technologies and identify potential improvements.

Coating Formulation: Assisting in the formulation and preparation of hydrophobic and oleophobic coatings using various chemical compounds.

Application Techniques: Learning and applying different techniques to coat ceramic substrates, such as dip-coating, spray-coating, and spin-coating.

Performance Testing: Conducting tests to evaluate the water and oil repellency of the coatings, including contact angle measurements and durability assessments.

Data Analysis: Analyzing experimental data to assess the effectiveness and longevity of the coatings.

Documentation and Reporting: Documenting your findings and preparing reports and presentations to share with the research team and broader academic community.

Why Join?

Hands-On Experience: Gain practical experience in advanced materials science and surface engineering techniques.

Interdisciplinary Learning: Work at the intersection of chemistry, materials science, and engineering.

Professional Development: Enhance your research skills, critical thinking, and problem-solving abilities.

Networking Opportunities: Collaborate with faculty, graduate students, and industry professionals.

This project is an excellent opportunity to contribute to the development of innovative coatings that have real-world applications in various industries. Join us and be part of the future of surface engineering!

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Participating in the hydrophobic and oleophobic coatings research project offers students a wealth of benefits that span their education, training, and career development. Through this hands-on experience, students will acquire practical skills in advanced materials science, including the formulation and application of specialized coatings. They will gain proficiency in using various coating techniques and testing methods, which are essential for any scientific research and engineering career.

Educationally, students will deepen their understanding of interdisciplinary fields such as chemistry, materials science, and surface engineering. They will learn how to conduct thorough literature reviews, design experiments, and analyze data, providing a solid foundation in research methodology. This holistic approach will enhance their critical thinking and problem-solving abilities, which are highly valued in any career.

From a career perspective, students will significantly enhance their professional profiles. The project offers opportunities for networking with faculty, graduate students, and industry professionals, which can open doors for future career opportunities. Additionally, the chance to co-author research papers and present findings at conferences will be a notable achievement on their resumes. The focus on developing innovative coatings will also appeal to employers and academic programs dedicated to materials science and engineering, positioning students as forward-thinking candidates in their future endeavors.

Envisioning Students' Reflections: After participating in this project, students might say:

"This project was transformative for my academic and professional growth, providing me with invaluable hands-on research experience."

"I gained practical skills and built confidence through direct involvement in cutting-edge sensor design and testing."

“Working on a project with real-world applications inspired me and reinforced my commitment to improving occupational health and sports performance.”

“The interdisciplinary nature of the research broadened my knowledge and significantly shaped my educational journey.”

“Participating in this project was a pivotal experience that opened doors for future career opportunities and solidified my career aspirations.”

Training Description: The training and onboarding process for students participating in the hydrophobic and oleophobic coatings research project is designed to ensure they are well-prepared and confident in their roles. Here’s an overview of what students can expect:

1. Orientation Session: Students will begin with an orientation session where they will be introduced to the project goals, team members, and the overall research plan. This session will provide a comprehensive overview of the project’s significance and the specific contributions expected from each student.

2. Safety Training: Given the laboratory setting, safety is a top priority. Students will undergo thorough safety training, covering laboratory protocols, proper handling of chemicals, and emergency procedures. This training ensures that all students are aware of and can adhere to safety standards.

3. Laboratory Techniques Training: Students will receive hands-on training in the specific laboratory techniques required for the project. This includes the formulation and application of hydrophobic and oleophobic coatings using various methods such as dip-coating, spray-coating, and spin-coating. Experienced team members will demonstrate these techniques and supervise initial practice sessions.

4. Equipment Familiarization: Students will be introduced to the various pieces of equipment they will be using throughout the project. This includes training on how to operate, maintain, and troubleshoot laboratory instruments and machinery essential for coating development.

5. Research Methodology: To ensure a strong foundation in research practices, students will be trained in experimental design, data collection, and analysis. This will include guidance on how to conduct literature reviews, formulate hypotheses, and document their findings accurately.

6. Regular Check-Ins and Feedback: Throughout the project, students will have regular check-ins with their mentors to discuss progress, address any challenges, and receive feedback. These sessions will help students stay on track and continuously improve their skills.

7. Collaborative Workshops: Students will participate in collaborative workshops where they can share their experiences, discuss problems, and brainstorm solutions with their peers and mentors. These workshops foster a sense of community and encourage collaborative learning.

8. Presentation Skills: To prepare students for presenting their research, they will receive training in effective communication and presentation techniques. This includes how to create compelling presentations and how to confidently present their findings to different audiences.

By following this comprehensive training and onboarding process, students will be well-equipped to contribute meaningfully to the research project and gain valuable skills and experience.

Training hours: 20

Mentoring plan: To ensure students' success in developing hydrophobic and oleophobic coatings for ceramic substrates, I am committed to providing comprehensive support and guidance throughout their research journey. Here's what students can expect from me during this experience:

Direct Mentorship and Regular Contact:

Students will work closely with me through regular one-on-one meetings where we will discuss their progress, address challenges, and set goals. These sessions will provide personalized feedback and guidance, ensuring that students feel supported and confident in their work.

Collaborative Team Environment:

Students will be part of a collaborative research team, working directly with faculty members, graduate students, and industry professionals. This team-based approach will foster a supportive and dynamic learning environment, encouraging the exchange of ideas and collaborative problem-solving.

Hands-On Training and Resources:

I will ensure that students receive thorough training in laboratory techniques and the use of specialized equipment necessary for sensor development. They will have access to all required resources and materials, and I will be available to assist with any technical issues that arise.

Professional Development Opportunities:

Students will be encouraged to present their research findings at group meetings and, if appropriate, at academic conferences. This will help them develop their presentation skills and gain confidence in communicating their research. I will provide guidance on preparing effective presentations and offer constructive feedback.

Commitment to Student Success:

I am dedicated to creating an inclusive and supportive environment where students feel valued and empowered to succeed. This includes helping students set realistic goals, providing continuous feedback, and celebrating their achievements. I will also facilitate connections with industry professionals and academic contacts to support their career development.

Networking and Career Support:

I will help students build a professional network by introducing them to industry experts and academic mentors. This networking will be invaluable for their future career paths, providing insights and opportunities for internships, job placements, or further academic pursuits.

By fostering a collaborative, supportive, and resource-rich environment, I aim to help students not only succeed in this research project but also develop the skills and confidence they need to excel in their future careers.

Applicant Requirements: Here are the key qualifications and characteristics:

1. Relevant Coursework:

Science and Engineering Background: Completion of foundational courses in chemistry, materials science, environmental science, or related fields.

Laboratory Experience: Prior coursework that includes lab components, providing basic lab skills and familiarity with scientific equipment.

2. Technical Skills:

Basic Lab Techniques: Proficiency in basic laboratory techniques, such as pipetting, measuring, and using common lab equipment.

Data Analysis: Familiarity with data analysis methods and software, such as Excel, MATLAB, or similar tools.

3. Research and Analytical Skills:

Literature Review: Ability to conduct thorough literature reviews, summarize findings, and identify gaps in existing research.

Critical Thinking: Strong analytical skills to interpret data, troubleshoot experiments, and draw meaningful conclusions.

We believe that with the right attitude and foundational skills, any dedicated student can succeed and make meaningful contributions to our team.

Applicant Preferences: When selecting student applicants for the hydrophobic and oleophobic coatings research project, I am looking for individuals who demonstrate a strong passion for scientific research and a commitment to innovation.

1. Passion for Performance and Innovation:

Interest in Performance Technologies: A genuine interest in wearable technology, materials science, and performance monitoring. Students should be eager to learn and explore new concepts.

Curiosity and Creativity: An inquisitive mindset and the ability to think creatively to solve complex problems.

2. Personal Characteristics:

Motivation and Initiative: Self-motivated with a strong work ethic and the ability to take initiative in driving the project forward.

Attention to Detail: Meticulous and detail-oriented, ensuring accuracy in experiments and data recording.

Adaptability: Flexibility to adapt to new challenges and learn new techniques as the project evolves.

3. Communication and Collaboration:

Team Player: Ability to work effectively in a collaborative team environment, sharing insights and supporting peers.

Effective Communication: Strong verbal and written communication skills to present findings clearly and concisely.

4. Commitment to Learning:

Willingness to Learn: Open to learning new skills and techniques, and receptive to feedback from mentors and peers.

Professionalism: Demonstrates professionalism in conduct, including punctuality, reliability, and adherence to safety protocols.

5. Enthusiasm for Research:

Curiosity-Driven: A natural curiosity and enthusiasm for scientific research and discovery.

Goal-Oriented: Focused on achieving research goals and contributing to the overall success of the project.

Specific Time considerations/conflicts: None

App ID #: 856

Mentor: Li, Lin Email: li.lin@charlotte.edu

Title: Assistant Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor: No

Community engaged research: No

Title: Reconstructing paleoclimate changes in the northern Tibetan Plateau

Description: Since the advent of industrial revolution, the earth climate has been influenced significantly by human activities, such as the burning of fossil fuels and discharge of exhaust gases. It has been shown that with the current speed of greenhouse gas emission, global temperature will increase several degrees by the end of the century. How will this temperature increase influence our living environment is crucial for policy making (e.g., mitigation plans), which however remains unknown. In the geological past, our Earth has also experienced excessive temperature increase, the study of which could provide analogues for the future.

This project focuses on the northern Tibetan Plateau within the Kunlun Mountains (mean elevation 5500 m). By the study of stable oxygen and carbon isotopes of lake carbonates, which were deposited ~15 and 5 million years ago (a period with higher-than-current temperatures), we aim to obtain a high-resolution record of paleoclimate and paleoecology in this part of the world. The results of this study can be compared with low-elevation records to derive a more complete picture of our Earth in a warm house condition.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes:

The samples for this project have been collected, the student will focus on laboratory analysis on campus, such as carbonate sample pretreatment (cutting, polishing, and powdering), and X-ray diffraction analysis.

The student has the opportunity to visit other universities for laboratory analysis, such as the LaserChron Center at the University of Arizona (travel expense will be covered).

The student will also learn basic theories of stable isotope geochemistry and be proficient to generate and interpret stable isotope data.

The student will have options to communicate research findings through an oral presentation or develop the work into a senior thesis.

Training Description: The students willl be trained in the lab for safety prior to the beginning of the project (~1 hour). During the mid-term of the project, the student will receive another safety training to use the X-ray diffraction instrument (~2-3 hours).

Training hours: 4

Mentoring plan:

The student and I will meet at the start of the project and discuss our expectations for the project.

I will meet with the student weekly to review the previous work and organize/discuss work for the upcoming week.

After the data are generated, I will meet with the student to discuss how to explain the data and prepare for an oral presentation.

If the student has the interest and intension, I will assist the student to expand on the data to write a senior thesis.

Applicant Requirements: Comfortable working in labs using different types of instruments, e.g., mortar and pestle, drilling machine, X-ray diffraction.

Applicant Preferences: Knowledge of stable isotopes and geology is preferred but not required.

Specific Time considerations/conflicts: No

App ID #: 857

Mentor: Alam, Minhaj Nur Email: malam8@charlotte.edu

Title: Assistant Professor

Department: Electrical and Computer Engineering

Co-mentor: No

Community engaged research: No

Title: AI Assisted Gait Restoration for Disabled Individuals

Description: Mobility impairments can significantly affect an individual's quality of life and limit their ability to perform daily activities. Current treatments for these impairments often rely on prosthetic devices or physical therapy, which can be costly, time-consuming, and limited in their effectiveness. Therefore, there is a pressing need for technological advancements that can enhance the efficacy of existing treatments or introduce innovative solutions. This project aims to develop an AI model that can predict the gait in a disabled or impaired patient.

State-of-the-art gait correction systems often rely on bodyworn sensors to track limb movements and provide corrective feedback to the user. However, these systems can be cumbersome and may not accurately capture the user's gait patterns. The system designed in this project aims to overcome these limitations by using advanced machine learning algorithms to analyze gait signals and predict EMG signals and muscle intensities for movement. By using computer vision, limb positions can be determined without requiring additional sensors, improving the system's ease of use and reducing the risk of errors.

A prototype of the AI-assisted gait correction system has exhibited promising outcomes during preliminary testing. The system demonstrates notable proficiency in predicting intended movements with a high degree of accuracy, ascertaining the precise position of the limbs, and transmitting suitable signals to rectify gait patterns in the opposing limb. This technological advancement holds tremendous potential for transforming the landscape of rehabilitation practices targeted at individuals with mobility impairments. By offering an efficient, personalized, and cost-effective solution, it stands to revolutionize the field. Subsequent endeavors will concentrate on further refining and optimizing the system while undertaking rigorous clinical trials to assess its effectiveness and usability.

Mobility impairments can significantly affect an individual's quality of life and limit their ability to perform daily activities. Current treatments for these impairments often rely on prosthetic devices or physical therapy, which can be costly, time-consuming, and limited in their effectiveness. Therefore, there is a pressing need for technological advancements that can enhance the efficacy of existing treatments or introduce innovative solutions. This project aims to develop an AI model that can predict the gait in a disabled or impaired patient.

State-of-the-art gait correction systems often rely on bodyworn sensors to track limb movements and provide corrective feedback to the user. However, these systems can be cumbersome and may

not accurately capture the user's gait patterns. The system designed in this project aims to overcome these limitations by using advanced machine learning algorithms to analyze gait signals and predict EMG signals and muscle intensities for movement. By using computer vision, limb positions can be determined without requiring additional sensors, improving the system's ease of use and reducing the risk of errors.

A prototype of the AI-assisted gait correction system has exhibited promising outcomes during preliminary testing. The system demonstrates notable proficiency in predicting intended movements with a high degree of accuracy, ascertaining the precise position of the limbs, and transmitting suitable signals to rectify gait patterns in the opposing limb. This technological advancement holds tremendous potential for transforming the landscape of rehabilitation practices targeted at individuals with mobility impairments. By offering an efficient, personalized, and cost-effective solution, it stands to revolutionize the field. Subsequent endeavors will concentrate on further refining and optimizing the system while undertaking rigorous clinical trials to assess its effectiveness and usability.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 3

Anticipated Student Learning Outcomes: 1. Research experience

2. Hands on experience on Machine Learning and developing a gait prediction model

3. Data collection at EMG machine

4. Learn python frameworks such as pytorch, tensorflow, and keras.

5. Presenting research work as a poster

6. Learn how to use SSH to connect to GPU server

Training Description: 1. 1:1 meeting with Dr. Alam

2. Training on how to use GPU server

3. Training non how to use EMG machine

Training hours: 3

Mentoring plan: Mentoring plan:

1.Orientation and Onboarding: This will include in-depth conversations between with Prof. Alam and his senior graduate students. The discussion topics will include, i) project goals, ii) lab culture and work habits, iii) training and skills required, and iv) documentation of the research methodologies so that the work can be continued by other students in the future.

2.Reporting: The students will report their progress to Dr. Alam weekly and the he will provide feedback to guide the student during their 1:1 meeting every week. Dr. Alam has an open door policy and welcome the students anytime to discuss any issues they are facing.

3.Career Counseling will be directed at providing the students with the skills, knowledge, and experience needed to excel in their chosen career path. In addition to guidance provided by Dr. Alam, the student will be encouraged to discuss career options with peer researchers at UNC Charlotte.

5.Publications and Presentations are expected to result from the work supported by the grant. These will be prepared under the direction of Dr. Alam. The students will receive guidance and training in the preparation of manuscripts for journals and presentations at conferences. PIs will work closely to make sure that all the required support is available depending on the prior training level. They will use cloud resources such as Overleaf and Google Doc to work collaboratively, where the student can work independently but can be supervised.

6.Instruction in Professional Practices: The students will be encouraged to present at least 2 poster or give seminars per year.

7.Evaluation of Mentoring Success: Dr. Alam will periodically hold review meetings with the students to monitor the progress towards the pre-set goals and provide all the necessary support to become successful in their research and further professional career.

Applicant Requirements: 1. Basic understanding of research

2. At least one programming/CE/ML related coursework

3. Proactive and good communication skills

Applicant Preferences: 1. Python experience

2. Prior research work

Specific Time considerations/conflicts: Friday 11 am - 12 pm - lab meetings

App ID #: 858

Mentor: Buchenau, Jurgen Email: jbuchena@uncc.edu

Title: Dowd Term Chair of Capitalism Studies

Department: History

Co-mentor: No

Community engaged research: No

Title: U.S.-Mexican relations in the Cold War

Description: This project is part of a multi-year effort to understand Mexico's leadership in the Global South during the Cold War (1946-1989). During this period, Mexico was a reliable partner of the United States in the conflict with the Soviet Union but often pursued divergent interests. Having studied in detail Mexican archival sources, I would like to involve a student with good research and digital skill to peruse sources pertaining to the U.S. perspective, including presidential libraries and archives, the National Security Archive, and records of the Department of State. Students will pick a specific topic and be mentored by someone deeply familiar with the topic.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes: --understanding and reconciling divergent perspectives

--developing critical thinking skills

--learning how to write analytically and present findings to a large audience

--learning intercultural sensitivity

--learning digital skills such as distinguishing between valid and invalid information

--understanding bias and opinion in online sources.

Training Description: Ongoing discussions with mentor prior to beginning the project (at least three meetings)

Training hours: 2

Mentoring plan: Regular contact, at least weekly (face-to-face or Zoom). I would hope that this experience will lead to a conference presentation. I commit to helping the student succeed in this project and beyond, and also to help them later on in their career as students.

Applicant Requirements: at least junior status, major in humanities or social sciences strongly preferred

Applicant Preferences: Prior experience with international issues. Strong writing skills. Knowledge of Spanish is a plus but not at all required.

Specific Time considerations/conflicts: none

App ID #: 888

Mentor: Vinson, David Email: dsvinson@uncc.edu

Title: Associate Professor

Department: Earth, Environmental & Geographical Sciences

Co-mentor: Yes

Sandra Clinton, sclinto1@uncc.edu, Department of Earth, Environmental & Geographical Sciences

Community engaged research: No

Title: Linking Piedmont streams and springs - degraded, protected, and restored

Description: Broadly, the overall project is a multi-year effort to understand the linkages between subsurface flows, stream water, and water quality in Piedmont streams. Streams are examined across a cycle from permanently preserved unimpacted sites to impaired urban streams and to restored sites. This work involves significant field and lab work to assess water availability and water quality. The OUR-supported student will gain experience making measurements and collecting samples of streams, springs, and groundwater. The student will also gain experience making water quality measurements and analysis in the lab. The OUR-supported student will work within an active group of student researchers to cross-train in hydrology and water quality while accomplishing a project based on the collection and presentation of results. Anticipated project areas in spring 2025 include: 1.) Intensive examination of Piedmont springs, which are permanent features that contribute water year-round to small streams, moving toward a conceptual understanding of how Piedmont springs work in light of hillslopes, hydrology, and geology. 2.) Post-monitoring of a completed stream restoration project (Reedy Creek in northeast Charlotte), where we are monitoring post-restoration groundwater levels in response to changes of the stream height. 3.) Water quality examination of small streams and groundwater draining a Piedmont upland site, with recently retired agricultural land use and a candidate for restoration.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes: The OUR-supported student will work collaboratively and independently to gain experience with taking field measurements of natural water (pH, temperature, dissolved oxygen) and collecting water samples according to established procedures. The OUR student will also participate in the lab analysis of water samples for water quality parameters such as ion concentrations, metal concentrations, nutrient concentrations, alkalinity, or dissolved organic carbon. The student will learn to follow established methods in the lab and to manage data collected during the project. The student will also prepare an original presentation of results for a research conference. This project will provide excellent experience for students interested in employment or graduate school in hydrology, stormwater, water quality, soils, or related fields.

Training Description: As part of the project, the student will do general lab work. General lab safety training will be provided before the student will do the in-lab portions of the project. Procedure-specific lab training will be provided for analysis procedures.

Training hours: 0

Mentoring plan: The project faculty advisor will work with the student to define goals and tasks that fit the student's interests and that build on the prior skill set (within the needs of the overall project). Students will build upon their skill set to gain confidence and experience in lab work, field work, data collection, and interpreting results. Within the student's core block of time on the project, the OUR-supported student will have progress meetings with the faculty advisor. The OUR-supported student will be trained by the faculty advisor and/or the lab manager. The student will participate in a small lab group setting in which students work collaboratively toward shared goals while also developing the confidence and skills to work independently toward individual goals. At many times, the OUR-supported student will work independently or alongside other students. All students working in the group are expected to support and mentor their student peers. The student will present at the Undergraduate Research Conference. Beyond this core requirement, other mentoring goals can be set according to the student's interests. For example, for students interested in applying to graduate school, the student's project can develop experiences to include in the student's graduate school application research statement.

Applicant Requirements: Interest in field work and/or in working a water quality analysis lab is a must. No specific experience is required; training will be provided. Applicants must be able to learn and follow established procedures. In addition, the student should have completed at least one semester of college-level chemistry before beginning the project. Students must also have the interest and ability to work within a team environment toward shared goals.

Applicant Preferences: Prior experience working in a laboratory setting; or previous coursework in hydrology, soils, water quality, geology, chemistry, or a related field; would be a plus.

Specific Time considerations/conflicts: The student will commit to a core block(s) of hours during weekdays to work on the project. Committing to a core block(s) of hours will be critical to the student's success. Additional flexible hours will be possible around the core committed time block(s

App ID #: 855

Mentor: Ghasemi, Amirhossein Email: AH.GHASEMI@UNCC.EDU

Title: Assistant Professor

Department: Mechanical Engineering

Co-mentor: No

Community engaged research: No

Title: Drone Testing Net Design and Setup

Description: We are seeking motivated and hands-on undergraduate students to assist in the design, construction, and testing of a drone testing net for lab-based research. This project offers a unique opportunity to gain experience in drone technology, structural design, and real-world testing environments.

Responsibilities:

Collaborate with a team to design a secure and functional structure for a drone testing net in the lab.

Source materials and construct the structure, ensuring safety and durability.

Set up and install the net in accordance with design specifications.

Conduct initial drone testing within the netted environment to ensure proper functionality and safety protocols.

Troubleshoot any issues with the structure or setup during testing.

Assist in documenting the design and testing process, including creating reports and making recommendations for improvements.

Qualifications:

Currently pursuing a degree in mechanical engineering, electrical engineering, or a related field.

Interest or background in drone technology, structural design, or fabrication.

Strong backgrounds in CAD design

Strong problem-solving skills and the ability to work independently as well as part of a team.

Hands-on experience with construction, assembly, or testing is preferred but not required.

Strong communication skills to document and present findings.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Gain practical experience in structural design and construction for drone testing environments.

Develop skills in drone operation and testing procedures.

Enhance teamwork and project management capabilities.

Build an understanding of safety considerations in drone and flight-related research.

Training Description: Safety Lab Training is needed.

Training hours: 1

Mentoring plan: This mentoring plan is designed to guide undergraduate students through the process of designing, constructing, and testing a drone containment enclosure. The goal is to develop their technical skills, foster independent problem-solving, and provide hands-on research experience while working collaboratively within the lab.

1. Initial Orientation & Project Overview

Objective: Introduce the project goals and expectations.

Actions:

Conduct an orientation session to explain the project's purpose, deliverables, and key milestones.

Provide technical background on drone containment structures and lab safety.

Clarify each student's role, responsibilities, and expected outcomes.

2. Structured Skill Development

Objective: Provide students with necessary skills in design, construction, and drone operation.

Actions:

Offer training on CAD software for designing the containment structure.

Teach material selection and safety protocols during the construction phase.

Provide an introduction to drone operation and safe handling within the containment area.

Train students on testing techniques, emphasizing troubleshooting and iterative design improvement.

3. Weekly Check-ins & Feedback

Objective: Ensure steady progress and address challenges as they arise.

Actions:

Hold weekly progress meetings to review student work and guide the next steps.

Provide constructive feedback on design proposals, construction efforts, and testing results.

Encourage open discussions to develop problem-solving skills and critical thinking.

4. Hands-on Guidance During Key Phases

Objective: Offer real-time mentoring during the project's critical phases.

Actions:

Design Phase: Assist students with the structural design, focusing on stability, safety, and functionality.

Construction Phase: Supervise the building process, ensuring correct use of materials and adherence to safety standards.

Testing Phase: Mentor students through the initial testing of drones in the enclosure, guiding them in documenting and analyzing results for future improvements.

5. Encouraging Independent Problem-Solving

Objective: Foster creativity, critical thinking, and student ownership of the project.

Actions:

Encourage students to research independently and propose solutions for design and construction challenges.

Support brainstorming sessions where students take the lead in troubleshooting issues.

Allow students to take calculated risks in their decision-making, intervening only when necessary.

6. Documentation & Reflection

Objective: Teach the importance of documenting the process and reflecting on their work.

Actions:

Have students maintain a project journal documenting design iterations, construction processes, and test results.

Conduct a reflection session at the end of the project where students discuss their learning experiences and improvements for future projects.

7. Final Project Review & Presentation

Objective: Provide students with an opportunity to showcase their work and receive feedback.

Actions:

Students will prepare and present a summary of the project, including design, construction, testing phases, and challenges.

Offer constructive feedback on their technical achievements and presentation skills.

Acknowledge their contributions and discuss potential future projects.

Applicant Requirements:

Educational Background:

Must be enrolled in an undergraduate program in mechanical engineering, electrical engineering, civil engineering, or a related field.

Have completed relevant coursework in areas like mechanics, structures, or basic electronics (preferred but not mandatory).

Technical Skills:

Basic knowledge of CAD software (such as SolidWorks or AutoCAD) for designing structures.

Familiarity with hand tools and construction materials is preferred.

Basic understanding of drones or UAV (Unmanned Aerial Vehicles) is a plus but not required; training will be provided.

Problem-Solving Abilities:

Ability to think critically and creatively to troubleshoot design and construction challenges.

Willingness to engage in iterative design processes and make improvements based on testing.

Teamwork and Communication:

Strong communication skills to work effectively with team members and mentors.

Willingness to collaborate, share ideas, and take responsibility for individual tasks.

Ability to document processes, keep records of the project stages, and report findings clearly.

Motivation and Enthusiasm:

High level of motivation to participate in hands-on research and design projects.

Eagerness to learn new skills and apply classroom knowledge to real-world challenges.

Time Commitment:

Must be able to commit to regular meetings and dedicated work time, with flexibility around academic schedules.

Willingness to meet weekly progress goals and deadlines for design, construction, and testing phases.

Safety Awareness:

Adherence to lab safety protocols, especially when working with drones and construction equipment.

Awareness of and commitment to ensuring a safe working environment during all phases of the project.

Applicant Preferences: CAD-related courses

Specific Time considerations/conflicts: none

App ID #: 859

Mentor: Joyee, Erina Email: ejoyee@charlotte.edu

Title: Assistant Professor

Department: MEES

Co-mentor: No

Community engaged research: No

Title: 3D printing of fully integrated flexible humidity sensor for long-term health monitoring

Description: Project Description:

Sensors are critical components for co-robotics and personalized medical devices. Extrusion based additive manufacturing (AM) processes provide an effective platform for fabricating high-performance polymer-nanoparticle composite sensors with interdigitated structures, where the inks are extruded through nozzles and deposited with high spatial control. Such fabrication technology can achieve high resolution manufacturing of polymer-nanocomposite structures with deterministic filler morphologies.

In this project, the student will i) prepare suspensions with Silicon carbide (SiC), magnetic particles(iron oxide) and matrix polymer with different volume ratios; ii) print interdigitated structures for sensor; iii) collect data of sensitivity by characterizing the resistance and capacitance of printed sensors.

Student Qualifications:

Prior experience with conducting experiments in a lab setting preferred (especially handling materials, have experience in fluid dynamics), strong communication skills preferred.

Students will learn effective skills in conducting research in a lab environment. They will learn how to design 3D structures and use a direct material deposition-based printer to print 3D structures. They will characterize the electrical property of the 3D printed part. They will also have experience with writing reports and presenting their work.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: Understand and apply the principles of extrusion-based 3D printing:

Students will be able to explain how extrusion-based 3D printing works, including material flow, layer deposition, and process parameters.

Students will demonstrate the ability to set up and operate an extrusion-based 3D printer to successfully print objects.

Develop research and data management skills:

Students will be able to conduct research by systematically gathering, analyzing, and interpreting experimental data related to 3D printing.

Students will organize and document research findings effectively, ensuring accurate data management and reporting.

Training Description: Training on:

1. How extrusion based 3D printing process works and how to use that to print objects.

2. How to conduct research, collect and organize data.

Training hours: 5

Mentoring plan: 1. Will meet with students twice 1:1 to mentor and talk about research progress.

2. Full training will be conducted by the mentor.

3. Will have regular communication personally or via online resources (email/zoom).

4. Will identify project goals with the student at the start of the term and evaluate them every 2 weeks.

5. Will identify specific tasks for the goals.

6. Will assist students in writing reports, and abstracts, and preparing poster for the annual symposium.

Applicant Requirements: Prior experience with conducting experiments in a lab setting preferred (especially handling materials, have experience in fluid dynamics), strong communication skills preferred.

Applicant Preferences: Prior experience with conducting experiments in a lab setting preferred (especially handling materials, have experience in fluid dynamics), strong communication skills preferred.

Specific Time considerations/conflicts: Flexible

App ID #: 860

Mentor: Brownell, Blaine Email: bbrowne3@charlotte.edu

Title: Professor and Director

Department: Architecture

Co-mentor: No

Community engaged research: No

Title: Visible Green: Innovative Material Strategies for Sustainable Architecture

Description: I am developing a manuscript for Visible Green, an architecture book project for the publisher Princeton Architectural Press. Despite recent progress in ecologically conscious architectural approaches, sustainable design remains a predominantly invisible practice. Visible Green provides a framework of strategies that communicate the inner workings of environmental performance, offering new means of expression for advanced sustainable architecture.

I invite an undergraduate student to facilitate collecting and organizing content for the book, including examples of architectural precedents, case studies, environmental datasets, and images and permissions. The publication deadline of the book is August 2025, so spring semester will be an ideal time to make progress.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: The primary student learning outcome pertains to hands-on experience working on the development of a book for publication with one of the most respected publishers in architecture and design. Specific topic-related outcomes include developing skills regarding architectural case study methodology, knowledge of historical and contemporary precedents, and comprehension of advanced building technology strategies. Skill-based learning outcomes include the management of qualitative and quantitative datasets, manuscript organizational methodologies, and content coordination with the architects and designers included in the book.

Training Description: N/A

Training hours: 0

Mentoring plan: The work plan will include weekly in-person or remote check-ins. In addition to providing the opportunity to review progress on the project, these meetings will function as a kind of directed study course with me about advanced sustainable material applications in architecture. Additional opportunities such as conference presentations or poster talks are possibilities, contingent on availability and student interest.

Applicant Requirements: Applicants should have a background and/or be majoring in architecture. Applicants should have strong organizational skills, writing skills, and design skills.

Applicant Preferences: Applicants who have taken an architectural materials and methods course are preferred. Applicants with skills in managing spreadsheets and databases are also preferred.

Specific Time considerations/conflicts: N/A

App ID #: 861

Mentor: Williams Colonnese, Madelyn Email: mcolonn1@charlotte.edu

Title: Associate Professor

Department: Reading and Elementary Education

Co-mentor: No

Community engaged research: Yes

Title: Analysis of Summer School Interventions

Description: The purpose of this project is to understand the relationship between a reading intervention and a mathematics intervention on elementary students' mathematical writing and reading comprehension (Rising 1 - Fifth Grade). All data was collected during a summer school program. The undergraduate student would be responsible for working with the faculty member to analyze students' writing and reading assessments. This would include analyzing components of the students' writing such as frequencies of words, quality of sentence structure, spelling, and vocabulary use. The undergraduate student would regularly meet with the faculty mentor to discuss findings and to be supported in their work with the data.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: This research project would be beneficial for undergraduate students interested in pursuing a teaching in education. The undergraduate student would have an opportunity to look closely at elementary students' writing to understand both the students' writing skills and understanding of the content area. Further, the undergraduate student would develop their qualitative analysis skills and deepen their understanding of both reading comprehension and mathematical writing.

Training Description: The student would need to complete their CITI training and be added to the existing IRB through an amendment.

Training hours: 2

Mentoring plan: I will meet weekly or bi-weekly with the student depending on the needs of the student and the kind of support needed with the data analysis. To accomplish these meetings we will set up a regular time to meet either in person or zoom depending on their preference. Depending on the students' interest, they will have an opportunity to present their research at UNC-Charlotte and an opportunity to present at mathematics or reading conferences. This will be discussed collaboratively so that I can support their personal interests.

Applicant Requirements: Students applying for this position should have an interest in qualitative research and analyzing student work. Students should be self-motivated and able to work on tasks independently and with the support of the faculty mentor. Students should be able to collaborate with another student and faculty mentor.

Applicant Preferences: Students applying for this position should have an interest in qualitative research and analyzing student work. Students should be self-motivated and able to work on tasks independently and with the support of the faculty mentor. Students should be able to collaborate with another student and faculty mentor.

Specific Time considerations/conflicts: There are no specific days/times.

App ID #: 862

Mentor: Makas, Emily Email: emakas@charlotte.edu

Title: Co-Director, Center for Community, Heritage, and the Arts

Department: College of Arts + Architecture

Co-mentor: Yes

Carlos Cruz, ccruzcas@charlotte.edu, College of Arts + Architecture

Community engaged research: Yes

Title: CHArt - Research Center for Community, Heritage, and the Arts

Description: An undergraduate research intern would join an interdisciplinary team of faculty and graduate students pursuing multiple research projects as part of the Center for Community, Heritage, and the Arts (CHArt).

Based on their skills and interests, OUR Interns will join projects in progress, which include engaging historic site through the performing arts - especially dance, music and theatre; digital storytelling to elevate community stories; the impact of the arts on social mobility; arts education; and research and exploration of neglected historic cemeteries across cultural communities, but especially of African-Americans.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes: To improve understanding of the relationship between the arts, heritage, and communities

To improve understanding of how interdisciplinary research teams work within the context of a collaborative, creative research center

To improve ability to conduct and organize research as well as to share research about the built environment with a public audience.

Training Description: Student interns will participate in wider research center team meetings as well as have an initial consultation with center co-directors to identify interests and match students with projects. Once assigned to a project, students will meet with faculty project mentors and their teams for orientation to their project and expected tasks. Interns will work with faculty and more experienced students in the CHArt Center to become familiar with the work in progress and methods.

Training hours: 0

Mentoring plan: Student will meet regularly with the faculty mentor as well as with other members of the research team depending on which specific project they are assigned. Success is measured by engaged participation in the team, active contribution to moving the project forward, and student's own skill and knowledge growth.

Applicant Requirements: Good research and writing skills, openness to collaborating with interdisciplinary teams, interest in community engagement and learning about heritage and the arts.

Applicant Preferences: Background in the arts, humanities, or social sciences.

Specific Time considerations/conflicts: no conflicts. team meetings will be determined based on team schedules once an intern is identified.

App ID #: 863

Mentor: Tunc, Lutfi Taner Email: ltunc@uncc.edu

Title: Associate Professor

Department: MEES

Co-mentor: No

Community engaged research: No

Title: Non-planar 5-axis printing of polymers: Effect of printing parameters on the mechanical behavior

Description: Non planar 5-axis printing is one of the recently developing additive manufacturing alternative for polymers. The part quality relies on process parameters such as printing temperature, direction and speed. In this project, it is aimed to experimentally analyze the effect of process parameters on the mechanical behavior of the printed geometry. The project will involve 3D drawing of the test samples, performing non-planar printing and mechanical testing of the specimens. An undergraduate student in this project would contribute to the below tasks - draw the sample geometries - prepare the non-planar printing tool path and process - perform the printing process - perform mechanical tests

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes: The students will benefit from the interdisciplinary research opportunity in (i) solid modelling (ii) additive manufacturing (iii) mechanical characterization/material testing. In this sense, they will be able to use CAD and additive manufacturing related software. They will develop coding skills to prepare the generated tool path for additive manufacturing. They will gather experience in mechanical testing of specimens. The student learning outcomes can be listed as follows

1) learning fused deposition modelling (FDM) processes for plastics

2) solid modelling by use of a professional CAD software, i.e. Siemens NX

3) tool path generation for additive manufacturing processes in Siemens NX

4) use of industrial robots for 3D printing applications

5) analysis of mechanical properties through standard tensile tests

6) preparing technical reports for the project outcomes

Training Description: Checking the competency of the students in 3D solid modelling, mechanical tests and additive manufacturing will be important. In this regard, according to their expertise level they will need to go through training of these.

Training hours: 10

Mentoring plan: I will organize weekly progress review meetings.

I will guide the students through the necessary online resources (technical videos on youtube channels etc).

I will provide them the necessary software for completion of the technical tasks.

I will help them in learning how to operate the robotic 3D printing system.

The students will be expected to present at group meetings, probably at the ASPE Graduate student meetings.

Depending on the results poster of conference attendance is possible.

Applicant Requirements: The students are advised to have the preliminary knowledge on

(1) 3D solid modelling expertise, (2) Understanding on mechanical behavior of the polymeric materials. (3) Standard mechanical tests.(4) Understanding of additive manufacturing.

In this regard, they are required to have taken courses in 3D solid modelling, additive manufacturing and / or manufacturing processes.

Applicant Preferences: The students are expected to enjoy computerized and hands-on style working. Also would be expected to have an interest for additive manufacturing and manufacturing systems, CAD/CAM software.

Specific Time considerations/conflicts: During Spring '25 I will be offering two courses. Thus, the course times may be conflicting. Other than this, there are no conflicts.

App ID #: 864

Mentor: Wei, Qiuming Email: qwei@charlotte.edu

Title: Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor: Yes

Jose Outeiro, jc.outeiro@charlotte.edu, Mechanical Engineering and Engineering Science

Community engaged research: No

Title: Design, Manufacturing, and Testing of a High-Speed Loading Device for Material Characterization

Description:

It is a well-known phenomenon that the response of a structure or material to external mechanical stimulus such as forces or moments strongly depends on how fast the stimulus is applied. Take paper-cut as an example. It happens when the paper moves against the finger fast. Paper-cut will not happen if the paper sheet was moved against the finger slowly. Likewise, a great martial-art master could kill his enemy with a bamboo leaf if he moved the bamboo leaf fast enough. As such, mechanical responses of materials at different loading rates are of paramount importance for many applications, including high-speed machining, impact due to foreign or extraterrestrial objects, personnel and vehicle armors, kinetic energy penetrators (KEP), and so on. It is also well-known that the mechanical response of a sample depends on the kind of mechanical stress. For example, tensile stresses are usually of much more concern than compressive stresses. In this context, testing materials under conditions of high speed loading (high strain rate) and tensile stress becomes crucial. Traditional hydroservo or electric motor driven systems such as MTS, Instron, etc., offer the capacity to test samples under tension and compression, at different temperatures and in different atmospheres, but the loading speed is limited due to the nature of load application via physical contact. For example, an MTS machine may reach a maximum strain rate up to 10/s, which is much below the strain rate experienced by a component during high-speed machining, impact, armor piercing, etc. Thanks to stress-wave loading, mechanical testing at strain rate beyond 1000/s has been developed since 1950s. This technique has been named after Hopkinson who first described the peculiar behavior of a specimen under stress wave loading, thus the Split-Hopkinson Pressure Bar (SHPB), or after Kolsky who greatly contributed to making the technique practical and provided the theoretical foundation and articulated the working principle of the technique. It was considered as one of the Landmarks of Historic Mechanical Engineering in 2006.

UNC-Charlotte is housing a compressive Kolsky bar system in the lab of Dr. Qiuming Wei, which has attracted research funding from US Army Research Lab (ARL) in the past two decades. Since the department is expanding its efforts in advanced manufacturing including additive manufacturing, advanced machining, etc., a tensile Kolsky bar system becomes necessary to investigate the mechanical behavior of the fabricated parts under conditions of high strain rate and tensile loading. To this end, we plan to modify the current compressive Kolsky bar system so that it allows us to test tensile specimens at high strain rate (~1000/s).

To build the tensile Kolsky bar system, we plan to recruit an undergraduate student, preferably a junior or senior, to help the faculty members on this effort. The major duties and qualifications of the student will be to design, manufacture the various parts, install the tensile bars, and to test the built system.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes:

The student will sharpen his/her machining skills using machine-tools available in the machine shop.

The student will learn the working principle and operation of the Kolsky bar system.

The student will learn to understand the effects of loading rates and stress states on the mechanical responses of specimens.

The student may have opportunities to attend international/national conferences to present the experimental results from the newly built Kolsky bar system.

Training Description: The faculty will spend time with the student educating him/her on the working principles of the Kolsky bar system, including specimen preparations, data analysis, interpretation and data presentation.

Training hours: 5

Mentoring plan: The faculty and student will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. Dr. Wei will educate the student in terms of the theories of Kolsky bar technique, and help the student understand the functions of the various parts of the system. Dr. Outeiro will provide help with

manufacturing of the parts and specimens. Both Dr. Wei and Dr. Outeiro will help the student in terms of data interpretation, analysis and dissimilation.

Applicant Requirements: he student should be a qualified machinist (with permit to operate the machines in the machine shop of Duke Hall). The student should have passed MEGR-3161 upon hiring.

Applicant Preferences: The student should be self-motivated, eager to learn, with certain hands-on experience in the machine shop, and knows how to read a drawing.

Specific Time considerations/conflicts: The student must work in the lab/machine shop as required, and be available to meet with faculty members as needed.

App ID #: 865

Mentor: Fenwick, Abbey Email: afenwick@charlotte.edu

Title: Associate Professor

Department: APHCS

Co-mentor: No

Community engaged research: No

Title: Ability of auditory biofeedback to improve jump landing variability

Description: Poor jump landing biomechanics are associated with an increased risk of knee injury, specifically anterior cruciate ligament (ACL) injury. Despite the existence of numerous injury risk reduction strategies, the incidence of ACL injuries continues to rise with over 200,000 happening every year. One reason injury risk reduction strategies are not successful is because they lack feedback on movement errors. Our research team has developed a novel feedback strategy using auditory feedback of movement errors so that individuals can correct faulty biomechanics associated with injury. Not only might auditory feedback induce meaningful changes in biomechanics, but it has also been associated with an increase in movement variability, which may also help reduce injury. Participants in this study are undergoing a 4-week movement retraining intervention while receiving auditory feedback of their errors. They are having their jump-landing biomechanics evaluated at baseline and 1- and 4-weeks after the intervention. Biomechanics are being evaluated using state-of-the-art 3D motion capture technology as well as using a more clinically relevant 2D video camera. The student working on this project would be responsible for taking data from the 2D videos and determining if there is a change in movement error variability from baseline to after the intervention. The majority of work will be done in Excel.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: Following completion of this project, the student will:

be able to explain the mechanism of non-contact ACL injury

be able to describe the movement errors that contribute to ACL injury as identified in the landing error scoring system

be able to explain why variability is beneficial to reducing musculoskeletal injury risk

be proficient in using Excel for data analysis

Training Description: Students will be responsible for completing CITI training. Students will then need to learn about the clinical tool used to evaluate jump-landing biomechanics that is known as the landing error scoring system. That will occur through readings and meetings with the mentor.

Training hours: 4

Mentoring plan: The student will have regular (weekly or bi-weekly) meetings with the mentor to ensure they understand the goals and objectives of the project. Meeting frequency will be determined by the student. The mentor will be available via email outside of regular meetings to provide feedback and monitor progress. The student will also have an opportunity to share their work with our laboratory group and department prior to presenting at the OUR meeting.

Applicant Requirements: Passed Anatomy and Physiology

Passed or currently enrolled in Biomechanics

Applicant Preferences: Experience with video editing software and Microsoft Excel

Specific Time considerations/conflicts: None

App ID #: 866

Mentor: Perry, Heather Email: hrperry@uncc.edu

Title: Dr.

Department: History

Co-mentor: No

Community engaged research: No

Title: WWI & the Re-Shaping of the Queen City

Description: How did the First World War impact women, children, and civilians in Charlotte and the surrounding areas? What was daily life like when the US Army opened Camp Greene the military training camp that existed in Charlotte from 1917-1919? How did the city's faith communities contribute to the US war effort? How the war impact schools and education? These are some of the questions that I am trying to answer in my current research project: WWI and the Re-Shaping of the Queen City

I am working on the History and Memory of U.S. culture and society during the First World War -- primarily in North & South Carolina. I am looking for students to help me with two kinds of research: 1) research in online databases (historical newspapers, magazines, and government documents); and 2) research in the Atkins Library Special Collections. Students will help in identifying and collecting materials on topics such as: Camp Greene (army training camp in Charlotte); the role of the Red Cross & YMCA during the war; the role of children's groups and educational institutions; and the roles of Charlotte's Jewish and Catholic communities. Students also have the opportunity to develop materials for the online Digital History website: Carolina in the Trenches.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Students have the opportunity to:

1) develop and refine research skills using newspaper and other content databases

2) develop their organizational skills via research analysis and organization

3) develop their professional communication skills via ongoing interaction and liaison with library and archive professionals in the Charlotte area

4) create website content via narrative story-telling programs

5) learn more about Public History and how historians work with museums and public facing projects

Training Description: Student will need to read closely 2-3 articles which offer background on what we are researching. They may also need to meet with the Atkins Library staff for training in specific database use (if they are not familiar with them already).

Training hours: 0

Mentoring plan: In past I set up weekly meetings with the OUR intern -- alternating between in person meetings and Zoom meetings. During these meetings I work with the student to outline what we are seeking with the historical materials and also how to record, analyze and preserve the significant information that we find. I also introduce the student to Zotero and we check in on how to organize the information and how to recognize when next steps are necessary (or not). I also set up meetings with Amanda BInder (History Librarian) and Randi Beem (Special Collections archivist) so that we can spend time working through the materials that still need cataloging or organizing.

Applicant Requirements: Students should have: 1) experience using Atkins Library online research databases; 2) familiarity with using GoogleDocs, GoogleSheets, and GoogleDrive; 3) excellent organizational skills; 4) excellent communication skills in person, in writing, and via email; 5) genuine curiosity and interest in how men, women, and children on the United States *homefront* experienced the war.

Bonus: Students who can read and understand German are encouraged to apply. However, German language knowledge is not necessary.

Applicant Preferences: I prefer HIST majors who have already completed HIST 2600 OR students who have completed a research methods course in another department.

I prefer students who can work independently and who pay close attention to spelling and other written details.

Specific Time considerations/conflicts: This research position is flexible in some ways; however, some of the work must be conducted in person and on campus. It is not possible to complete all of the research remotely. Special Collections is only open during week days and closes at 5 pm, so so

App ID #: 867

Mentor: Berman, Elise Email: eberman@charlotte.edu

Title: Associate Professor

Department: Anthropology

Co-mentor: No

Community engaged research: No

Title: Linguistic Inequity in Schools: Marshallese Student Language Practices and Educational Outcomes

Description: This project is a study of Native Pacific Islander American students in an elementary school in the U.S. south. The goal of the project is to document their linguistic and cultural practices, examine their school experiences, and analyze the presence or absence of culturally sustaining pedagogy in the school. At the current stage, there are two aspects of the project undergraduate students can work on: 1) analyzing the assessment data collected for a cohort of 14 students and comparing it to their English Learner status assignments; 2) Syntactic analysis of children's speech to analyze the presence or absense of non-standard forms.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes:

Gain skills in: qualitative or qualitative data analysis, linguistic data analysis, qualitative coding, researching literature reviews, language variation, children's culture, schooling in the U.S., discourse analysis, ethnographic analysis, transcription skills, ability to use qualitative software

Training Description: Citi training

Training hours: 4

Mentoring plan: I train my students in how to use qualitative software. I help students pick their own focus based on their interest within my large data set, and then train them on how to transcribe and/or code the data relevant to their interests. I also give them background reading and train students in how to find further relevant literature and make an annotated bibliography. I meet with students once a week, and both go over the work they did the last week, giving advice and suggesting changes, and then assigning new tasks for the next week.

Applicant Requirements: Students interested in (1) need to be proficient with excel and capable of researching the nature of educational assessments; students interested in (2) should have had at least one prior class in linguistics. Dr. Roeder's class on varieties of English is preferred, but not required.

Applicant Preferences: Students interested in (1) need to be proficient with excel and capable of researching the nature of educational assessments; students interested in (2) should have had at least one prior class in linguistics. Dr. Roeder's class on varieties of English is preferred, but not required.

Specific Time considerations/conflicts: Research team meetings will be on Tuesdays at 10:00. Students should be available at that time, in person.

App ID #: 868

Mentor: Martins do Outeiro, Jose Email: jc.outeiro@charlotte.edu

Title: Professor

Department: MEES

Co-mentor: No

Community engaged research: No

Title: Manufacturing Education and Training Using Immersive Digital Twins

Description: The education and training of manufacturing processes require students to acquire knowledge and skills in both fundamentals and technologies. Given the wide range and complexity of processes, understanding the underlying physics and gaining knowledge and hands-on experience with various technologies is challenging and time consuming, which can negatively affect students' motivation and success in learning these processes. To address this issue, Immersive Digital Twin (IDT) offers a transformative solution for teaching manufacturing processes. By creating highly interactive and visually immersive simulations of manufacturing processes, IDT enables students to acquire knowledge and skills more efficiently. IDT results from the combination of Digital Twins (DT) with Immersive Technologies (IT), also called Extended Reality (XR). DT is the creation of a digital representation of a real-world physical asset (system, process, or product), to enable management, simulation, and optimization. IT like Virtual Reality (VR) and Mixed Reality (MR) are advanced digital technologies that create or enhance a sense of presence in a simulated reality, allowing users to interact with digital environments as if they were part of them.

The objective of this project is to create interactive IDTs for education and training of machining processes. These IDT are developed using specific software (Unity, Creo Illustrate, Vuforia Studio and Reality Composer) and hardware (Oculus Rift, Microsoft HoloLens 2 and Apple Vision Pro).

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: At the end of this project the student should: 1) be able to conduct a literature review and collect valuable information required for research, 2) have knowledge in manufacturing processes, in particular machining fundamentals and technology, 3) understanding the principles behind IoT (sensors) and its applications in manufacturing, 4) have skills on developing digital models of machines and processes, 5) have skills on visualizing these models in MR and VR using specific software (Unity, Creo Illustrate, Vuforia Studio and Reality Composer) and hardware (Oculus Rift, Microsoft HoloLens 2 and Apple Vision Pro).

Training Description: The faculty will spend time with the student educating him/her on the topics related to the project, which includes: 1) machining process fundamentals and technology, and 2) fundamentals of Immersive Technologies (Augmented and virtual realities) and their applications in manufacturing. He/she will also learn about conducting machining experiments along with collecting data from sensors implemented in the process.

Training hours: 5

Mentoring plan: The faculty and student will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. He/She will get guidance on formulating research questions, developing AR experiences in manufacturing and testing them through teamwork and collaborative efforts.

The instructor will be lenient towards small mistakes made during the time and would make sure that the student learns from their mistakes so that they can be successful when it comes to launching their own project.

Applicant Requirements: This is a multidisciplinary project requiring skills in different engineering concentrations. For this reason, it is recommended to have at least two students from different engineering disciplines (including but not limited to Mechanical, Electrical and Computer).

1. 3D CAD modeling.

2. programming, mainly in Python and JavaScript.

Applicant Preferences: The student should be self-motivated, eager to learn.

1. Familiarity with sensor technologies.

2. Familiarity with machining technology.

Specific Time considerations/conflicts: The student must work in the lab as required and be available to meet with faculty members and PhD/Master students as needed.

App ID #: 869

Mentor: Li, Yao Email: yao.li@charlotte.edu

Title: Assistant Professor

Department: Department of Earth, Environmental and Geographical Sciences

Co-mentor: No

Community engaged research: No

Title: Developing an Integrated Geospatial Deep Learning Framework to Identify Potential Human-Vector Contact Zones for Malaria Transmission in Southern Africa

Description: Malaria remains a critical global health issue, affecting millions of people each year. Our project focuses on using remote sensing data and deep learning techniques to identify areas where humans are most likely to come into contact with malaria-carrying mosquitoes. By accurately mapping these zones, we can contribute to more effective malaria prevention and control strategies.

The undergraduate research assistant's responsibilities will include:

Acquire high-resolution satellite images from sources like Sentinel-1, Sentinel-2, and other platforms. This data is essential for analyzing land cover, human settlements, and environmental factors that influence malaria transmission.

Organize and preprocess large datasets to prepare them for analysis. This may involve tasks like cleaning data, correcting for atmospheric interference, and merging datasets from different sources.

Utilize Python scripts to process and analyze the remote sensing data. The student will work with libraries such as GDAL, Rasterio, and possibly machine learning frameworks like PyTorch.

Work closely with graduate students, and faculty members. The student will have the opportunity to contribute ideas, ask questions, and learn from experienced researchers in the fields of public health, geospatial analysis, and artificial intelligence.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes:

Gain hands-on experience with Geographic Information Systems (GIS) and remote sensing technologies, learning how to extract meaningful information from satellite images.

Enhance the student's programming skills, particularly in Python, and learn how to handle large datasets efficiently.

Understand how technology, data science, and public health intersect. The student will see firsthand how data-driven approaches can address complex global health challenges.

Develop skills in documenting student's work, preparing reports, and possibly co-authoring research papers or presenting findings at conferences.

Training Description: We will provide you with a comprehensive introduction to the project and team, followed by tailored training in Python programming, remote sensing, and GIS. You'll learn how to download and manage remote sensing data, run and modify Python scripts, and apply your skills to real-world tasks. An assigned mentor will guide you throughout the project, with regular check-ins to support your progress. You'll be integrated into the research community through team meetings and workshops, receiving ongoing feedback and career guidance to ensure your success.

Training hours: 6

Mentoring plan: • The student will work closely with a dedicated mentor and have regular check-ins with the faculty to guide the development. Expect weekly one-on-one meetings for progress discussions and open communication for any questions or challenges.

• The student will receive hands-on training in remote sensing, GIS, and Python programming tailored to learning objectives.

• The student will have opportunities to present the work at team meetings and potentially at conferences or in research publications. We provide constructive feedback and goal setting to foster the student's professional development and career guidance.

• We offer flexible scheduling to accommodate the student's coursework and commitments, supporting a healthy work-life balance.

• We will provide all necessary resources, software, and learning materials to perform the student's duties effectively. The student will be encouraged to think independently and creatively, with a strong emphasis on ethical conduct and data integrity.

Applicant Requirements: Basic Python programming skills and an interest in data science; eagerness to learn; no prior experience in remote sensing or GIS necessary.

Applicant Preferences:

Remote Sensing and GIS Knowledge; Python programming skills

Specific Time considerations/conflicts: No

App ID #: 870

Mentor: Martins do Outeiro, Jose Email: jc.outeiro@charlotte.edu

Title: Professor

Department: MEES

Co-mentor: No

Community engaged research: No

Title: Digital Twin of a Robot-Assisted Finishing System for Metal Additive Manufactured Components

Description: Immersive Digital Twin (IDT) results from the combination of Digital Twins (DT) with Immersive Technologies (IT), also called Extended Reality (XR). DT is the creation of a digital representation of a real-world physical asset (system, process, or product), to enable management, simulation, and optimization. IT like Virtual Reality (VR) and Mixed Reality (MR) are advanced digital technologies that create or enhance a sense of presence in a simulated reality, allowing users to interact with digital environments as if they were part of them. These technologies blur the line between the physical and virtual worlds, often making experiences more engaging and realistic. IDT of manufacturing processes is a promising teaching approach driving innovation in manufacturing education.

This project aims to developed and deploy a Digital Twin of a Robot-Assisted Finishing System for Metal Additive Manufactured (MAM) Components to enhance surface finishing. The students would contribute to developed and deploy this Digital Twin, which include the following tasks:

1) Learn about manufacturing processes and digital technologies relevant for the project through literature review and active training.

2) Develop a digital CAD model of the Robot-Assisted Finishing System.

3) Create a VR/MR experience of the Robot-Assisted Finishing System using the CAD model.

4) Collect the data from the real Robot-Assisted Finishing System and integrate it in VR/MR experiences.

5) Visualize the Digital Twin in VR/MR using headsets and tablets.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: By the end of this participation, students should:

1. General knowledge on finishing methods for metal additive manufactured (MAM) parts.

2. Gain experience in programming collaborative robots.
3. Develop skills in implementing sensors in manufacturing processes.
4. Acquire foundational knowledge and some experience on data analytics.
5. Gain hands-on experience in creating mixed/virtual reality (MR/VR) experiences.

Training Description: The faculty will spend time with the student educating him/her on the topics related to the project, including finishing methods of MAM parts, digital twins and VR/MR.

Training hours: 5

Mentoring plan: The faculty and students will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. They will receive guidance in formulating research questions, developing digital twins and mixed/virtual reality experiences for manufacturing, and implementing them through teamwork and collaboration.

Applicant Requirements: This is a multidisciplinary project requiring skills in different engineering concentrations. For this reason, it is recommended to have at least two students from different engineering disciplines (including but not limited to Mechanical, Electrical and Computer Science).

1. 3D CAD modeling.

2. programming, mainly in Python and C++.

Applicant Preferences: The student should be self-motivated, eager to learn.

1. Familiarity with sensor technologies.

2. Familiarity with manufacturing processes and technology.

3. Experience with Unity or Unreal Engine.

Specific Time considerations/conflicts: The student must work in the lab as required and be available to meet with faculty members and PhD/Master students as needed.

App ID #: 871

Mentor: Cross, Donald Email: dcross8@uncc.edu

Title: Assistant Professor of Translation

Department: Department of Languages, Cultures and Translation

Co-mentor: No

Community engaged research: No

Title: Translation Project: Literary Experience by Alfonso Reyes

Description: For this project, the OUR Scholars will help with manuscript preparations for the publication of an English translation of Alfonso Reyes's La experiencia literaria ("Literary Experience"). Although this book is very important for literary criticism and theory, it remains largely unknown in the English-speaking world because it has never been translated. The OUR Scholars will thus have a chance to help introduce an important book to the anglophone audiences throughout the world. In fact, very few of Reyes's works have been translated into English. So, by helping with this project, the OUR Scholars will also be helping to introduce this important Mexican philosopher and critic to the world.

This translation project is student-drive. I am working on the translation itself with a group of graduate students and advanced undergraduate students in the Department of Languages, Cultures and Translation. The OUR Scholars will have five principal tasks:

1. Help track down sources that Reyes quotes in the J. Murry Atkins Library or through online resources. Throughout Literary Experience, Reyes quotes numerous works from the history of literature and philosophy. Sometimes, these works are easy to find; sometimes, they are quite obscure and not widely available. Reyes often provides the author's name and a title, but he rarely provides information about the publisher. The majority of the OUR Scholars' task will consist in finding these sources to complete the bibliography for the book translation.

2. Once the OUR Scholars have located a source, they will help check the accuracy of Reyes's quotation. Are Reyes's quotations correct? Does he misquote? Reyes often quotes from memory, so it is important that the translation keep a record of any moments in which his quotations depart from the material that he is quoting.

3. Help search for English translations of the material that Reyes quotes. At times, Reyes quotes works in English, but the majority of his quotations are in Spanish, and a few are in French. The Undergraduate Research Assistant will help determine if there are English translations of the

different works that Reyes quotes. If an English translation does exist, the OUR Scholars will attempt to find and transcribe the passages that Reyes quotes in the English translation.

4. Proofread translation drafts.

5. Research secondary sources about Alfonso Reyes. By compiling interesting articles or books about Reyes's life and work, the OUR Scholars will help the translation team develop a better grasp of scholarship on Reyes's work. This background information will also help ensure a more accurate translation of Reyes into English.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: The translation of Reyes's Literary Experience will be published with a university press. Generally speaking, university presses are the most rigorous and the most prestigious. The OUR Scholars names will appear in the published book in acknowledgement of work they that they do throughout the semester.

The OUR Scholars will also be able to add their role as an assistant researcher in the translation project to their CV or résumés. Very few students at the undergraduate level – or even at the graduate level – have the opportunity to work on the publication of an academic book. This experience will be a wonderful advantage when applying for jobs or for a graduate program.

In addition to these professional considerations, the OUR Scholars will also develop invaluable research skills. These skills include but are not limited to:

1. Retracing references to original sources. While this skill might seem relatively straightforward, it lies at the heart of research in the humanities, and it is all the more important in today's age of the internet and misinformation. This sort of source work also develops a sort of critical thinking since it requires decisions concerning which references need to be retraced to their sources. References can take many forms (quotations, paraphrases, allusions, etc.), and not all of them need to be retraced. In the case of this translation project, some of these sources can be hundreds or even thousands of years old.

2. Navigating the industry of academic publishing. Even if the OUR Scholars do not intend to pursue a career with a relation to the publishing industry, the experience of helping with the publication of

an academic book is highly valued in all sectors. The very fact that the OUR Scholars participates in the publication of a academic book will serve future employers as proof of the quality of the Assistant's work ethic.

3. Developing an awareness of translation studies. Since the work carried out by the OUR Scholars assist in the publication of a book translation, they will gain firsthand experience of the vital role research plays in the practice of translation. They will also gain professional experience working with multilingual documents.

4. Identifying genres and trends in Latin American and world literature. Reyes has an encyclopedic knowledge of the history of Latin American literature, and he draws on numerous examples in his discussion of literature in Literary Experience. As the OUR Scholars retrace his references, we will also discuss his understanding of literary genres and movements.

Training Description: No formal training is required. At the beginning of the semester, I will meet with the OUR Scholars students for two hours to discuss the project, define expectations, and provide any materials necessary to get started. I will ensure the OUR Scholars are familiar with the various resources necessary to complete their tasks easily and successfully. In addition, I will arrange for them to meet with a librarian who can offer them further assistance as they begin their research.

Training hours: 2

Mentoring plan: The OUR Scholars and I will meet – either in person or on Zoom – once a week or at least twice a month in order to discuss progress. If issues arise that need immediate attention, we will schedule supplementary meetings. I also encourage OUR Scholars to keep in contact with me regularly by email as their research progresses.

In addition, OUR Scholars will have a unique opportunity to work with the graduate students involved in this translation project. OUR Scholars will be working with translations drafted by graduate students, so it is important that, when necessary, they keep in contact with the translators about their work.

OUR Scholars will also be invited to my meetings. These meetings will take place with graduate students working on the project and with the university press where the work will be published. These meetings will give OUR Scholars hands-on experience of both graduate studies and the publishing industry.

If the OUR Scholars wish to prepare any academic work on their experience, such as a conference paper, we will dedicate a portion of our regular meetings to talking about ways in which to transform their experience into a formal project. I will also help find a suitable conference at which they might present their work.

Finally, we will regularly discuss ways in which to narrativize and market their experience as an OUR Scholar. Having worked closely with the OUR Scholars, I will be in a good position to offer help for job applications or graduate school applications.

Applicant Requirements: The OUR Scholars will not undertake any actual translation, but their research will be part of a translation project, and many of the sources will be in Spanish. So, competency in Spanish is preferred.

In addition, the OUR Scholars should be self-motivated. I will meet with the OUR Scholars regularly, but much of the work will be carried out independently. At the same time, the OUR Scholars should be vocal about their needs and the difficulties they encounter. They should not hesitate to reach out to me whenever an issue arises concerning tasks, deadlines, meetings, or any other aspect of this project.

Applicant Preferences: The OUR Scholars will preferably have some interest in literature, Latin American culture, or Hispanic culture more broadly. Undergraduate students majoring or minoring in Spanish are a natural fit, but the position is open to anyone who meets the requirements listed above.

Specific Time considerations/conflicts: The OUR Scholars will have the freedom to create their own work schedule. We will arrange all necessary meetings at a day and a time that suit both the Scholars and myself.

App ID #: 872

Mentor: Da Costa Vieira, Rafael Felipe Email: rvieira@charlotte.edu

Title: Assistant Professor

Department: Epidemiology and Community Health

Co-mentor: No

Community engaged research: Yes

Title: TickBusters: Investigating tick-borne diseases in North Carolina and Brazil

Description: Tickborne diseases (TBDs) have been on the rise in recent decades, threatening public health. In the Northern Hemisphere, TBDs are well-known threats and represented >75% of all vector-borne disease cases reported in the USA from 2004 to 2016, with Lyme disease representing the majority of the cases (Rosenberg et al., 2018). However, Central and South American countries lack fundamental knowledge and awareness of ticks and the zoonotic pathogens they may transmit to humans (De La Fuente et al., 2023). In Brazil, Brazilian Spotted Fever (BSF) is the only TBD listed in the National Notifiable Diseases Surveillance System. Given the variations in etiological agents and clinicoepidemiological patterns of BSF, researchers urgently call for a reevaluation of strategies and tools for the surveillance of BSF and historically neglected or even unknown TBDs (Faccini-Martínez, 2021).

In North Carolina, data on TBDs have been historically limited to Lyme disease and Spotted Fever Rickettsiosis, and only recently ehrlichiosis (Iyamu et al., 2024; Mokashi et al., 2024). However, other tick-borne pathogens (TBPs) and the growing number of emerging tick-borne viruses are overall understudied and rarely considered by physicians and public health professionals in differential diagnoses when evaluating tick-related febrile illnesses in humans.

Habitat degradation is a major threat to animals, promoting cascading effects on species composition and influencing vector-host-pathogen interactions (Laurance et al., 2009). In northern California, a temperate region, wildfires have dramatically impacted vertebrate hosts and consequently the distribution of their associated western blacklegged tick, Ixodes pacificus Cooley & Kohls, 1943, and its associated TBPs, Anaplasma phagocytophilum and Borrelia burgdorferi(Pascoe et al., 2023; Young, et al., 2016). However, the impact of habitat degradation on the ecology of ticks and TBPs has never been assessed in Neotropics. Moreover, broader effects on the tick microbiome on degraded areas remain uncharacterized globally. Notably, non-pathogenic microorganisms may facilitate, limit, or block TBP transmission (Bonnet, et al., 2017), thus determining the microbiota of tick species of public health importance is critical.

On this pattern, the Charlotte metropolitan area has shown rapid urban growth and tree canopy loss, directly impacting animal and vector species composition, which may lead to an increase human exposure risk to tick bites. On the other hand, in the Neotropics, the Pantanal biome is one of the most fire-affected regions in the 21st century (van Wees et al., 2021). In this biome, habitat degradation from wildfires is among the main threats to medium and large mammals (Griffiths & Brook, 2014; Souza et al., 2023) which may directly influence vector-host-pathogen interactions.

Our long-term goal is to determine how the tick microbiome and TBPs shift in degraded areas and how this impactshuman exposure risk. Our overall objective herein is to provide fundamental knowledge on how the microbiome of ticks of public health importance respond to degradation comparing temperate and tropical climates. We also aim to detect and characterize other TBPs potentially transmitted by tick species in the Charlotte metropolitan area and in the Brazilian Pantanal biome. Our central hypothesis is that degradation affects the distribution of animals and consequently tick species that serves as a vector for various TBPs. Establishing their microbiome in natural and degraded environments comparing temperate and tropical regions would provide insights into their impact and role in TBPs epidemiology. Our rationale is that while we have identified novel TBPs in Brazil (Calchi et al., 2020; de Oliveira et al., 2022; Krawczak et al., 2023; Mongruel et al., 2022; Mongruel et al., 2024; Muraro et al., 2021; Santana et al., 2022; Vieira et al., 2022; Vieira et al., 2018), data on TBDs in the Charlotte metropolitan area is currently lacking. Moreover, migratory birds, illegal wildlife trafficking, and international ecotourism raise the risk of exposure to A. sculptum-infected ticks and global spread of unknown pathogens. Therefore, characterizing the microbiome of ticks across these regions is critical and globally relevant. With over 15 years of experience in studying ticks and describing novel TBPs, I am well-positioned to lead this project. I plan to attain the overall objective by pursuing the following two specific aims:

Aim 1. Characterize the microbiome and TBPs ticks in the Charlotte metropolitan area. Herein, we will collect ticks in two sites with high human activity: 1) Mallard Creek greenway in Charlotte, and 2) Hector H. Henry II greenway in Concord.

Aim 2. Characterize the microbiome and TBPs ticks in the Brazilian Pantanal biome. We collected questing ticks in preserved and degraded areas within the biome.

In both aims, we will:

Characterize the tick tissue-associated microbiota Using high-throughput sequencing considering species, biomes, and seasonality.

Screen questing ticks using previously validated PCR/qPCR assays and compare the occurrence of TBPs between sampled areas, considering tick stages and blood meal sources.

Quantify the genetic diversity of the detected TBPs by multi-locus analysis.

Perform network analysis to determine how the tick microbiome drives the occurrence of pathogens, considering tick stages and seasonality in degraded and natural areas.

This research aligns with the NIH TBD research plans and will have a positive impact, as other TBPs are rarely considered in differential diagnoses when evaluating tick-related febrile illnesses. Together, data will lay the foundation for future studies on TBDs, which may have been historically neglected or even unknown in humans.

References:

Bonnet, S. I., Binetruy, F., Hernández-Jarguín, A. M., & Duron, O. (2017). The Tick Microbiome: Why Non-pathogenic Microorganisms Matter in Tick Biology and Pathogen Transmission. Frontiers in cellular and infection microbiology, 7, 236.

Calchi, A. C., Vultão, J. G., Alves, M. H., Yogui, D. R., Desbiez, A. L. J., De Santi, M., et al. (2020). Ehrlichiaspp. and Anaplasma spp. in Xenarthra mammals from Brazil, with evidence of novel 'CandidatusAnaplasma spp.'. Scientific Reports, 10(1), 12615.

Cooley, R. A., & Kohls, G. M. (1943). Ixod. es californicus Banks, 1904, Ixodes pacificus n. sp., and Ixodes conepati n. sp.(Acariña: Ixodidae).

De La Fuente, J., Estrada-Peña, A., Rafael, M., Almazán, C., Bermúdez, S., Abdelbaset, A. E., et al. (2023). Perception of Ticks and Tick-Borne Diseases Worldwide. Pathogens, 12(10), 1258.

de Oliveira, L. B., Calchi, A. C., Vultão, J. G., Yogui, D. R., Kluyber, D., Alves, M. H., et al. (2022). Molecular investigation of haemotropic mycoplasmas and Coxiella burnetii in free-living Xenarthra mammals from Brazil, with evidence of new haemoplasma species. Transboundary and Emerging Diseases, 69(5), e1877-e1891.

Faccini-Martínez, Á., Krawczak, F. D. S., Oliveira, S. V., Labruna, M. B., & Angerami, R. N. (2021). Rickettsioses in Brazil: distinct diseases and new paradigms for epidemiological surveillance. Rev Soc Bras Med Trop, 54, e07322020.

Griffiths, A. D., & Brook, B. W. (2014). Effect of fire on small mammals: a systematic review. International Journal of Wildland Fire, 23(7), 1034-1043.

Iyamu, O., Ciccone, E. J., Schulz, A., Sung, J., Abernathy, H., Alejo, A., et al. (2024). Neurological manifestations of ehrlichiosis among a cohort of patients: prevalence and clinical symptoms. BMC Infect Dis, 24(1), 701.

Krawczak, F. D. S., Calchi, A. C., Neves, L. C., Dias, S. A., Da Silva, B. B. F., Paula, W. V. D. F., et al. (2023). Phylogenetic Inferences Based on Distinct Molecular Markers Confirm a Novel Babesia Species (Babesia goianiaensis nov. sp.) in Capybaras (Hydrochoerus hydrochaeris) and Associated Ticks. Microorganisms, 11(8), 2022.

Laurance, W. F., Goosem, M., & Laurance, S. G. (2009). Impacts of roads and linear clearings on tropical forests. Trends Ecol Evol, 24(12), 659-669.

Mokashi, N. V., Marusiak, A. B., Giandomenico, D., Barbarin, A. M., Williams, C., Seagle, S. W., et al. (2024). Spatiotemporal patterns of Lyme disease in North Carolina: 2010-2020. Lancet Reg Health Am, 35, 100792.

Mongruel, A. C. B., Medici, E. P., da Costa Canena, A., Calchi, A. C., Perles, L., Rodrigues, B. C. B., et al. (2022). Theileria terrestris nov. sp.: A Novel Theileria in Lowland Tapirs (Tapirus terrestris) from Two Different Biomes in Brazil. Microorganisms, 10(12).

Mongruel, A. C. B., Medici, E. P., Da Costa Canena, A., Machado, R. Z., Clay, K., Labruna, M. B., et al. (2024). First molecular detection of Borrelia sp. in tapirs (Tapirus terrestris). Veterinary Research Communications.

Muraro, L. S., Nogueira, M. F., Borges, A. M. C. M., Souza, A. O., Vieira, T. S. W. J., & de Aguiar, D. M. (2021). Detection of Ehrlichia sp. in Amblyomma sculptum parasitizing horses from Brazilian Pantanal wetland. Ticks and Tick Borne Diseases, 12(3), 101658.

Pascoe, E. L., Vaughn, C. E., Jones, M. I., Barrett, R. H., Foley, J. E., & Lane, R. S. (2023). Recovery of western black-legged tick and vertebrate populations after a destructive wildfire in an intensively-studied woodland in northern California. J Vector Ecol, 48(1), 19-36.

Rosenberg, R., Lindsey, N. P., Fischer, M., Gregory, C. J., Hinckley, A. F., Mead, P. S., et al. (2018). Vital Signs: Trends in Reported Vectorborne Disease Cases - United States and Territories, 2004-2016. MMWR Morb Mortal Wkly Rep, 67(17), 496-501.

Santana, M. S., Hoppe, E. G. L., Carraro, P. E., Calchi, A. C., de Oliveira, L. B., do Amaral, R. B., et al. (2022). Molecular detection of vector-borne agents in wild boars (Sus scrofa) and associated ticks from Brazil, with evidence of putative new genotypes of Ehrlichia, Anaplasma, and haemoplasmas. Transbound Emerg Dis, 69(5), e2808-e2831.

Souza, C. V., Lourenço, Á., & Vieira, E. M. (2023). Species-Specific Responses of Medium and Large Mammals to Fire Regime Attributes in a Fire-Prone Neotropical Savanna. Fire, 6(3), 110.

van Wees, D., van der Werf, G. R., Randerson, J. T., Andela, N., Chen, Y., & Morton, D. C. (2021). The role of fire in global forest loss dynamics. Glob Chang Biol, 27(11), 2377-2391.

Vieira, T. S. W. J., Collere, F. C. M., Ferrari, L. D. R., Baggio, R. A., Lange, R. R., Ferrari, M. V., et al. (2022). Novel Anaplasmataceae agents Candidatus Ehrlichia hydrochoerus and Anaplasma spp. Infecting Capybaras, Brazil. Emerging Infectious Diseases, 28(2), 480-482.

Vieira, T. S. W. J., Qurollo, B. A., Mongruel, A. C. B., Baggio, R. A., Vidotto, O., Breitschwerdt, E. B., et al. (2018). Potentially Same Novel Ehrlichia Species in Horses in Nicaragua and Brazil. Emerging Infectious Diseases, 24(5), 953-953.

Vieira, R. F. C., Muñoz-Leal, S., Faulkner, G., Şuleşco, T., André, M. R., & Pesapane, R. (2024). Chapter 9 - Global climate change impacts on vector ecology and vector-borne diseases. In S. J. N. McNabb, A. T. Shaikh & C. J. Haley (Eds.), Modernizing Global Health Security to Prevent, Detect, and Respond (pp. 155-173): Academic Press.

Young, H. S., McCauley, D. J., Galetti, M., & Dirzo, R. (2016). Patterns, Causes, and Consequences of Anthropocene Defaunation. Annual Review of Ecology, Evolution, and Systematics, 47, 333-358.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 5

Anticipated Student Learning Outcomes: Local capacity building and technical and scientific support to prepare future qualified acarologists with interdisciplinary expertise that are able to minimize tick-borne diseases (TBDs) in a sustainable manner by assisting with the prevention, diagnosis, and control TBDs and arthropod vectors is critically lacking (Vieira et al., 2024). For instance, most public health organizations have inadequate training or capacity to conduct tick

surveillance and identification. The limited access of acarologists to research facilities for more effective public health surveillance of ticks and the pathogens they transmit (e.g., molecular screening of field-collected ticks for pathogens), associated with the lack of multisectoral collaboration among professionals in entomology, acarology, public health, molecular methods, veterinary medicine, ecology, and zoonotic infectious disease at regional, national, and global scales, represents an important gap in our capacity to reduce vector-borne diseases (Vieira et al., 2024).

Herein, students will:

Receive training in methods for field collection and identification of ticks occurring in the Charlotte metropolitan area;

Receive training in the identification of ticks from the Brazilian Pantanal biome;

Receive training on how to storage and maintain ticks in the scientific collection at the Zoonotic and Vector-Borne Diseases Laboratory at the Center for Computation Intelligence to Predict Environment and Health Risks (CIPHER);

Receive training on how to send and receive tick specimens overseas;

Develop skills on DNA and RNA extraction of different tick stages and tissues;

Receive training on molecular methods to characterize the microbiome of ticks;

Receive training on molecular methods for the diagnosis and characterization of zoonotic pathogens transmitted by ticks;

In general, many vector-borne pathogens are extremely under surveilled. Ticks, fleas, lice, and mites are typically prioritized below mosquitoes by vector control programs, due to the real or perceived expectations of lower public health burden and often limited resources. Upon the successful completion of this program, students will have the necessary skills to work on surveillance and control programs for tick-borne diseases.

Training Description: I expect students to perform the following CITI training:

OSHA Bloodborne Pathogens

Shipping and Transport of Regulated Biological Materials

USDA Permits

Training hours: 2

Mentoring plan: I have a documented history of mentoring a very engaged and successful group of students from multiple backgrounds, ethnicities, and nationalities. I have already directly supervised two postdoctoral, seven Ph.D., 14 Masters, five Veterinary Residents, and several undergraduates.

In this project, I will directly lead theoretical and practical training and expeditions to the collection of ticks in the Charlotte metropolitan area. I will also provide theoretical and practical training on the identification of tick specimens. Postdoctoral and graduate students at the Zoonotic and Vector-Borne Diseases Laboratory (ZVBD Lab) will help with theoretical and practical training on DNA/RNA extraction, PCR and real-time PCR protocols for the detection of tick-borne pathogens, as well as sampling preparation for the characterization of the tick's microbiome.

Herein, students are expected to discuss and present at the ZVBD Lab weekly meetings, and at Conferences when funds are available.

I am committed to supporting students in their professional development and international experience, as the ZVBD Lab team includes graduate students from Brazil and Sub-Saharan Africa conducting One Health research. At the ZVBD Lab, students receive state-of-the-art training in One Health, as well as zoonotic and vector-borne disease studies.

Applicant Requirements: We are seeking motivated students who are eager to perform field activities and learn about ticks and the diseases they transmit, with the goal of advancing public health surveillance. Students with interests aligned with Public Health, Environment and Biological Sciences, Epidemiology and Bioinformatics are highly encouraged to apply.

Applicant Preferences: We are seeking motivated students who are eager to perform field activities and learn about ticks and the diseases they transmit, with the goal of advancing public health surveillance. Students with interests aligned with Public Health, Environment and Biological Sciences, Epidemiology and Bioinformatics are highly encouraged to apply.

Specific Time considerations/conflicts: Field collections are expected to occur on Tuesdays and Friday's morning. The Zoonotic and Vector-Borne Diseases Laboratory weekly meetings are either Monday OR Friday mornings.

App ID #: 873

Mentor: Clinton, Sandra Email: sclinto1@uncc.edu

Title: Associate Research Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor: No

Community engaged research: No

Title: Comparing Water Quality in Urban Stormwater and Beaver Ponds

Description: Cities across the United States are struggling with issues of stormwater because buildings and roads cannot soak up rain like soil. Instead, rain that falls on cities runs off the buildings and roads. Cities are spending billions of dollars to manage this extra water. They are investing in green infrastructure, which is infrastructure on the land that can soak up and hold rainwater. One of these green infrastructure approaches is stormwater ponds. However, across the southeastern U.S., beavers live in urban streams, and they build ponds, too. Beavers and their ponds, however, are understudied in the region and little is known about how they impact water quality in urban areas.

In this laboratory-based research project, the OUR scholar will quantify water quality (nutrients) in urban stormwater and beaver ponds. The student will learn to quantify anions and cations using ion chromatography. These data will be used to compare water quality across 3 stormwater and 3 beaver ponds. The scholar will be able to choose a parameter of interest (e.g. nitrogen) to further study and develop their research knowledge around.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes: SLO1: Be proficient in basic laboratory methods associated with water quality measurements.

SLO2: Be proficient in database entry and management.

SLO3: Be able to communicate the ecological role of beavers on the landscape.

SLO4: Be able to communicate the problems and solutions of urbanization on water quality.

Training Description: The OUR scholar will need to complete required EHS training prior to working in the laboratory.

Training hours: 3.5

Mentoring plan: The OUR scholar will be primarily mentored by a MS student (Emma Lacy) who is also working on this water quality project and secondarily mentored by Dr. Clinton. The student will

be expected to meet 1x per week with Dr. Clinton and if their schedule allows, attend lab meeting. The student is also welcome at other journal club meetings in the department (Urban Ecology, Critical Zones). I will ask the student to outline their goals for the semester. The student will have the opportunity to attend the Aquatic Sciences Meeting being held in Charlotte, NC during March 2025 with other water research focused students in my department. Given the short time-line, there is no expectation for the student to present at this meeting. There is also an opportunity for the student to continue this work and develop it as an honors thesis.

Applicant Requirements: Students should have a strong interest in the earth and environmental sciences and can be enrolled in Earth and Environmental Sciences, Geology, Biological Sciences, Chemistry, or Environmental Engineering undergraduate degrees. The student should be comfortable working in a laboratory and using standard lab equipment (pipets, flasks, etc). Preferably the student will have completed at least introductory chemistry and a working knowledge of MS Excel This is a laboratory focused project and will require both running samples using ion chromatography as well as the mundane (yet very important) tasks of washing dishes. The student should be highly organized and preferable have 2-3 hour blocks of time available.

Applicant Preferences: 1. Basic lab skills (pipetting, weighing)

2. Basic MS Excel skills for data entry

3. Attention to detail and organization

Specific Time considerations/conflicts: The OUR student will need to have at least one 2-3 hour block/week free to work in the water quality lab. Additional hours can be spaced throughout the week. All water quality hours need to be completed in the McEniry Hall water quality labs. Background r

App ID #: 874

Mentor: Clinton, Sandra Email: sclinto1@uncc.edu

Title: Associate Research Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor: Yes

Youngseob Eum, yeum@charlotte.edu, Earth, Environmental and Geographical Sciences

Community engaged research: Yes

Title: Mapping Trash: Improving the Environmental Quality in Mecklenburg County Through a Community Partnership

Description: Anthropogenic litter (AL), commonly known as trash or garbage, is common in all ecosystems in the world and especially prevalent in urban areas. While AL is a human-made problem, AL accumulation has significant impacts on human health as well as our terrestrial and aquatic ecosystems. Many cities implement volunteer-based clean-ups to decrease the amount of trash on the landscape; however, without an assessment of the amount of trash, organizations cannot assess the impacts of these programs.

We are working with University City Partners to: 1) quantify the amount and type of trash at 25 sites across the university area; 2) quantify trash before and after specific community events to determine the effectiveness of trash clean-up programs; 3) survey community members and businesses to determine how they view trash in the area; and 4) use GIS based tools to create maps and explore landscape characteristics to better understand where trash occurs. These data will be used to make recommendations on how to better understand trash in the university area and provide recommendations on how UCP can work with community partners to create a cleaner living and working environment.

The student(s) on this project will work in the field (university area) identify, characterizing, and picking up trash. The student will work on entering the data into an online database. Ideally, a student with some GIS background will also work to update our trash maps and summarize survey results.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: SLO: Communicate the issues surrounding urban trash from both a scientific and a community outreach perspective.

SLO2: Be proficient in methods associated with urban science and analytics.

SLO3: Be proficient in GIS based mapping and analysis tools.

Training Description: The student will need to complete EHS laboratory training and basic biosafety training.

Training hours: 4

Mentoring plan: The student(s) will primarily be mentored by MS student working on this project (Sophie Barnett) and secondarily mentored by Drs. Clinton and Eum. Dr. Clinton will mentor the student for skills associated with urban science and Dr. Eum will provide mentorship for skills associated with GIS. The student(s) will be expected to attend UCP staff meetings 1x per week and Clinton lab meetings 1x per week. There will be opportunities for the student(s) to attend and present at the UCP spring board meeting.

Applicant Requirements: We are looking for 2 students - the students could have all these skills or they can be split between the 2 students.

Student(s) must be willing to sample trash in the university area 1x/week. This may involve data recording on the types of trash as well as picking up trash (training and protection provided). Travel to the sites is provided by the project.

Students(s) are required to input data to our shared database.

Student(s) may work to improve their GIS skills by creating GIS based maps and analysis.

Applicant Preferences: 1. Willingness to characterize and pick up trash.

2. Proficiency using MS Excel

3. Interest in building their GIS skills. The student who is interested in working with the GIS deliverables should have take at least 1 course in GIS (e.g. Intro to GIS).

Specific Time considerations/conflicts: Student should have 3-4 hour block free 1x/week to characterize trash. Remainder of the time will be spent in the computer lab or can be completed independently once trained.

App ID #: 875

Mentor: Clinton, Sandra Email: sclinto1@uncc.edu

Title: Associate Research Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor: No

Community engaged research: No

Title: Comparison of Beaver Management and Policy in the Southeastern United States

Description: Beavers are often called "nature's engineers" due to their ability to build dams that create ponds and wetlands. These freshwater features are important for storing water, protecting against floods and drought, and increasing biodiversity. Beavers were almost hunted to extinction in the United States from the mid-1600-1800s to supply pelts to the fur trade. Beavers numbers however, are increasing again in the United States due to population expansion and reintroductions.

While it is well understood that beavers provide many benefits, beaver-human conflicts exist due to the flooding of landowner property as well as an overall negative association with this species. Many states are working to create beaver management plans with the goal of increasing beaver activity while decreasing conflicts. In the southeastern United States there is little information on beaver population numbers and distribution which impacts the development of beaver management plans from local to state levels. The goal of this project is to better understand the various policies governing beaver management in the southeastern United States. The student will research, summarize, and compare beaver policy for this region.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: SLO1: Communicate the benefits of beavers for climate resilience in the southeast.

SLO2: Research and summarize government documents.

SLO3: Become proficient in coding information from government documents.

Training Description: While this project involves reading document sources, the student will need to complete EHS training so they can have access to the computer space in my lab.

Training hours: 3.5

Mentoring plan: The student will meet with me 1x/week to set and evaluate weekly project goals. This project is part of a larger NSF funded study and the study will have the opportunity to join the

larger group zoom meetings involving researchers from Minnesota and Washington as well as a non-profit (Beaver Institute). The student will have an opportunity to attend the Aquatic Sciences Meeting being held in Charlotte, NC with my lab group (March 2025); however, is not expected to present. Depending on student interest, this project can be further developed to incorporate data analysis and GIS mapping of beaver populations and into an honors project.

Applicant Requirements: 1. Willingness to scour the internet for any document related to beaver policy in the southeast.

2. Independently write (or call) different agencies in the southeast to ask for documents.

3. Ability to read government reports and code them for specific information (training provided).

4. Ability to work independently.

Applicant Preferences: 1. Strong writing skills.

2. Attention to detail, especially when reading policy documents.

3. Independent work but mature enough to ask for help when needed.

Specific Time considerations/conflicts: The student must be able to meet 1x/week with me. Some of the project can be completed independently using web resources; however, the student will need to keep a log of progress and provide updates.

App ID #: 876

Mentor: Nesbit, Marissa Email: mnesbit4@uncc.edu

Title: Assistant Professor

Department: Dance

Co-mentor: Yes

Dr. Kaustavi Sarkar, ksarkar@uncc.edu, Dance

Community engaged research: Yes

Title: Qualitative Research: Intergenerational Community Dance

Description: Dance education takes place across many different settings and contexts. While typical dance classes group students by age and ability level, the intergenerational community dance context provides a unique opportunity for participants to interact with individuals from a variety of ages as they dance together.

In this study, we will observe, interview, and analyze data from participants in an intergenerational dance class focused on Indian classical dance to learn more about the unique experiences this context provides. We seek to understand how the pedagogy of an intergenerational class is experienced by participants to support the ongoing development of this program as well as the application to other dance teaching and learning contexts.

The undergraduate researcher will:

Complete online training in human subjects research (CITI modules) as required by IRB and complete all research tasks in accordance with IRB protocol.

Contribute to literature search to build background information through a bibliography of resources on community dance and intergenerational dance pedagogy.

Engage as a participant-observer in weekly intergenerational community Indian dance class (held on UNCC Campus, Sunday mornings).

Conduct focus group interviews with participants in collaboration with faculty researcher.

Analyze focus group interview data (coding data, writing memos, and discussing themes) in collaboration with faculty researcher.

Collaborate with the faculty member to prepare for dissemination of the research through presentation and/or publication.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: The student researcher will develop skills in qualitative research, including focus group interviewing and data analysis, as applied to a dance education setting. The student researcher will build understanding of the qualitative research process, including building rapport with participants, conducting interviews, and responding to emergent themes during the research process.

For an arts education student, this research experience can support the student in envisioning their own future research projects at the undergraduate or graduate level. This experience will also expand the student researcher's understanding of dance pedagogy by closely investigating the experiences of participants in a dance setting, including the experience of the educator who is leading, reflecting on, and adjusting their teaching throughout the process. Arts educators may apply this to their own pedagogy in future teaching projects across art forms and settings.

Training Description: The student will need to complete the IRB CITI module for human subjects research and will need to review the IRB protocol.

Training hours: 5

Mentoring plan: The undergraduate student researcher will work closely with Dr. Marissa Nesbit, who is leading the qualitative inquiry of the project and will be the primary mentor, and Dr. Kaustavi Sarkar who is teaching the intergenerational community dance class.

The student will have weekly contact with Dr. Nesbit and Dr. Sarkar when joining the classes held on Sunday mornings for observations. The student will also work closely with Dr. Nesbit to plan and conduct the focus group interviews together, which will take place in-person on select Sundays with the participants following their classes. The student and Dr. Nesbit will meet every two weeks online to discuss the project, review tasks, and plan for future tasks, including reviewing and analyzing interview data individually and collaboratively. While the student will work independently on some tasks, the work overall will be highly collaborative. We will prepare to disseminate the research through publication or presentation at a dance education conference. (While the actual publication or presentation will fall outside of the timeline of the OUR program, the student researcher will be welcome to participate as their schedule allows.)

Dr. Nesbit will support the student researcher by engaging them in all phases of the research project, providing insight into the research methods and encouraging them to contribute ideas and questions. Dr. Nesbit will provide timely feedback and encourage collaboration, and will also encourage the student researcher to pursue individual interests as they relate to the research and the student's skills (for example, identifying a specific theme in the data and writing about that theme; leading focus groups with children or with adults; or creating a poster presentation for a conference).

Applicant Requirements:

Background in arts or arts education

Ability to read and synthesize literature pertaining to arts education

Strong oral and written communication skills

Strong organization skills for planning and adhering to deadlines

Positive interpersonal skills, particularly in a cross-cultural context

Applicant Preferences:

Experience teaching in the arts or another subject; and/or completed or concurrent coursework in education, arts education, pedagogy, and/or teaching methods

Specific Time considerations/conflicts: • Sunday mornings (the community dance class is held in Robinson Hall on Sunday mornings)

App ID #: 877

Mentor: Shuster, Martin Email: mshuste2@charlotte.edu

Title: Professor of Philosophy and Isaac Swift Distinguished Professor of Jewish Studies

Department: Philosophy

Co-mentor: No

Community engaged research: No

Title: The Political Economy of Policing

Description: The Political Economy of Policing

This project is one of the projects in the Philosophy and Critical Theory Lab (https://pages.charlotte.edu/pact/) at UNC-Charlotte. The project will involve an inquiry into the political and economic basis of policing, especially around police misconduct settlements, police militarization, and police administration. This project will revolve around compiling data on police misconduct settlements in preparation for theoretical/philosophical analysis. Students will be involved in the first phase of data compilation. Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Students will:

- Learn how to navigate government agencies and bureaucracies
- Learn to gather quantitative and qualitative data from public sources
- Practice dealing with unexpected obstacles and problem solving in response to them
- Learn how to safeguard and collate data
- Develop written and oral communication skills
- Develop organizational skills
- Develop theoretical and analytical skills related to complex issues around policing

Training Description: Students will receive training in how the lab approaches this project and will be socialized into lab culture while learning technical aspects of our work.

Training hours: 2

Mentoring plan: This is a position that has well defined goals but offers a motivated students a lot of possibility for innovation and creative thinking with regard to problems that arise when gathering data from government agencies that may be resistant to providing that data. This requires good social skills and an ability not to be flustered by recalcitrant bureaucratic agent. The student can expect to have a mentor available to answer questions but will also be performing a lot of independent work. You will work directly with Dr. Shuster. We will generally have regular meetings. We are happy to have students participate at conferences but it is not required.

Applicant Requirements: Students are expected to have (1) superior organizational skills, (2) excellent communication skills, whether via phone, in person, or in writing (e-mail and/or print), (3) facility with computers, including the GoogleDocs, GoogleDrive, and entering data into spreadsheets, and (4) tenacity (they are liable to deal with a range of bureaucratic structures).

Applicant Preferences: Problem solving and ability to think outside of the box when possible are huge pluses.

Specific Time considerations/conflicts: N/A

App ID #: 881

Mentor: Ehlers, Maren Email: mehlers@charlotte.edu

Title: Associate Professor

Department: History

Co-mentor: No

Community engaged research: No

Title: The Colonization of Hokkaido in the 1850s and 1860s

Description: I am currently doing research for a single-authored book project about the early state-led colonization of Hokkaido (Japan) before the Meiji Restoration in the 1850s and 1860s. During that time, the Tokugawa shogunate was forced by western gunboat diplomacy to open ports for foreign trade and came under intense pressure to quickly reform its military, economy, and forms of government. I am investigating how the Japanese state, while still under shogunal rule, accelerated the settlement and development of Hokkaido and adjacent islands (such as the Kuril Islands and Sakhalin) to prevent the area's occupation by western powers, especially the Russian Empire. I seek to highlight the deep involvement of domain lords (daimyo), as well as wealthy peasants, merchants, and other Japanese commoners during a time period that has been left out of most narratives about the modern settlement of Hokkaido. One major case study is the domain of Ōno in Echizen province, but my research also touches upon other domain territories such as Saga, Aizu, and Awa Katsuyama, as well as the shogunate's own projects and developmental enterprises by commoners in Echigo and Awa provinces. As part of this research, we will be investigating subjects such as trade, fishing, whaling, rule and exploitation of the indigenous Ainu population, mining and the search for precious metals, and shipbuilding.

The student assistant working with me will help me analyze longer primary sources I have already translated into English (such as account books and population registers from a Japanese colony on Sakhalin, or journals by colonial officials), for example by mining them for quantitative and other information and processing that information into tables, maps, and other formats. The assistant will also help me survey secondary literature, for example by excerpting or summarizing content from English-language books related to the subject. I will also ask my assistant to help me proof-read and edit writings I will produce on the subject.

Looking for: Only 80 hours over an academic semester (~5h per week)

# of positions available: 1

Anticipated Student Learning Outcomes: The student researcher mentored by me will practice the following skills:

Reading and analyzing historical sources from a nonwestern context

Reading and excerpting academic literature

Collecting and processing data from historical documents

Understanding the research process in the historical discipline

The student will also acquire deeper knowledge of the history of Japan, especially with regard to Japanese modernization and nation-building in the nineteenth century.

Training Description: I will meet with my student assistant prior to assigning a new task to provide detailed instructions. For example, I will provide historical background and introductions to the sources I will ask the student to analyze. I will also give detailed instructions on the type of analysis I expect the student to perform in each case, including software and software functions needed to compile and process the information. Much of this work can be performed using Microsoft Office software such as Word and Excel, but I might consider using additional programs as my research progresses (and am open to suggestions). Either way, I will train the student assistant in the particular functions I expect them to use.

Training hours: 1

Mentoring plan: The student research assistant will be working with me directly and meet with me regularly (though not necessarily on a weekly basis) to discuss new assignments, ask questions, and present results (not in form of a formal presentation). Ideally, I am hoping to engage in an ongoing conversation about this research that will be beneficial to both of us.

Applicant Requirements: The student applicant must have a strong interest in the history of Japan and at least superficial familiarity with some key events such as the Meiji Restoration, but any deeper knowledge of Japanese history is not required.

The student applicant must have very good and reliable reading and writing skills and be able to pay close attention to detail.

The student applicant must have a basic working knowledge of Microsoft Word and ideally Excel, and be interested in learning or exploring new types of software.

The student applicant doesn't need to be able to speak or read Japanese, but should be curious about foreign languages and questions of translation.

Applicant Preferences: The student applicant doesn't need to be able to speak or read Japanese, though such knowledge would certainly be helpful. Knowledge of additional languages could be valuable as well, especially Russian. Experience with software that can be applied in the Digital Humanities could potentially be useful.

Specific Time considerations/conflicts: None

App ID #: 878

Mentor: Faklaris, Cori Email: cfaklari@charlotte.edu

Title: Assistant Professor

Department: CCI/Software and Information Systems

Co-mentor: No

Community engaged research: No

Title: AI and Social Technologies to Aid Educational Migrants from the Global South

Description: In this project, one student will work directly on a PhD student's project to design an AI and/or social technology to address the security and privacy needs among educational migrants from the Global South. The student will become certified in Human Subjects Research and familiar with the existing relevant human-AI interaction and usability research for the project. They will be expected to support the PhD student in literature review, design ideation, and/or prototyping. They will assist the PhD student in preparing publications.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes:

Understand how to conduct a literature review and to summarize prior work.

Become familiar with the basics of designing and building an app for research.

Summarize work in progress in a way that elicits helpful feedback.

Training Description: - CITI certification for Social-Behavioral Research (hours will be dedicated to this if the student is not already certified).

Training hours: 10

Mentoring plan: We will hold either a 2:1 or 1:1 meeting with the student each week. Additionally, they will be invited to join our group Slack workspace, our Google Drive folder for tracking study materials, and our weekly Human-Centered Computing Lab meetings.

Applicant Requirements: We prefer students who have taken Human-Centered Design and/or who have some knowledge about human-centered computing, design, or the social and behavioral sciences, plus a willingness to learn more about computing. Programming experience is not required.

Applicant Preferences: The ideal student will have some design experience (either work-related or course-related), plus some knowledge of social or behavioral sciences.

Specific Time considerations/conflicts: The student must be available for periodic on-campus meetings, but these will be arranged with their schedule in mind.

App ID #: 879

Mentor: Faklaris, Cori Email: cfaklari@charlotte.edu

Title: Assistant Professor

Department: CCI/Software and Information Systems

Co-mentor: No

Community engaged research: No

Title: Improving Users' Experiences with Security and Privacy Tasks on Mobile Devices

Description: Our Security and Privacy Experiences (SPEX) group wants to assist mobile phone users with dealing with their security and privacy concerns directly on their device. The selected student will work with a PhD student on one or both of the following projects: (a) mitigating people's vulnerability to SMS text scams and misinformation, aka "smishing"; and (b) providing AI-assisted question-answering and community for mobile users dealing with security and privacy concerns. The student will become certified in Human Subjects Research and familiar with the existing relevant cybersecurity and usability research for the project. They will help with tasks such as reviewing published literature on the subject, brainstorming ideas, recruiting and scheduling participants for an interview study, cleaning up transcripts, and analyzing collected data. They also may be asked to help refine a prototype mobile-friendly web app.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes:

Understand how to conduct a literature review and to summarize prior work.

Help with recruitment, data collection, and analysis for a research study.

Become familiar with the basics of designing and building a mobile-friendly web app.

Training Description: - CITI certification in Social-Behavioral Research (if not already certified, time will be allotted to gain the cert)

Training hours: 10

Mentoring plan: We will schedule a 2:1 or 1:1 meeting weekly. The student will be added to our Slack workspace, Google Drive, and invited to our weekly Human-Centered Computing Lab meetings.

Applicant Requirements: We are looking for a responsible student who has prior experience with or coursework in Human-Centered Design and/or usability or social-behavioral research, or who has coursework or prior experience in design, human-centered computing, web development, psychology, communication, sociology, or other social or behavioral sciences.

Applicant Preferences: - Someone with experience with basics of web development (HTML/CSS.JS)

- Someone with experience in prototyping for User Experience (UX) research and design

Specific Time considerations/conflicts: The student is required to attend some on-campus meetings, but these will be scheduled around their needs.

App ID #: 880

Mentor: Shaw, George Email: gshaw11@uncc.edu

Title: Assistant Professor

Department: Department of Health Management and Policy/School of Data Science

Co-mentor: Yes

Dr. Laurie Garo, lagaro@uncc.edu, Department of Earth, Environmental and Geographical Sciences

Community engaged research: Yes

Title: Empowering Youth Through Research Skills Development: Community Engagement in Youth Gun Violence Prevention

Description: This project is aimed at making a difference in the community and developing your research skills. Join our diverse team and gain hands-on experience in a project focused on gun violence prevention and public health in Charlotte-Mecklenburg County. This opportunity is perfect for undergraduate students who are eager to learn and contribute to meaningful research. As a participant, you will work closely with our project team for three months at the Southview Recreation Center (Charlotte, NC), engaging in weekly contact and collaborating on various aspects of the project. You will develop essential skills in qualitative research, including data collection, content analysis, and thematic analysis. Additionally, you will have the opportunity to mentor teenage youth, enhancing your leadership abilities while contributing positively to the community.

Students will also assist with presentations and data visualization projects, refining their communication skills and gaining experience in effectively presenting research findings. To support your success, you will receive several safety and risk mitigation training courses, training in time management and project management tools, helping you balance your responsibilities and develop strong organizational skills. Throughout the project, you will receive mentorship in health behavior research, particularly in the areas of gun violence prevention and conducting community focused research.

We are looking for students who are detailed-oriented, possess strong communication skills, and have a keen interest in qualitative research, public health, and working with youth. Proficiency in Microsoft Excel and familiarity with Learning Management Systems (like Canvas) are also desired. The student must have reliable transportation for regular participation in the project. This project is a unique opportunity to expand your skill set, build your professional network , and make a real impact. If you are ready to grow as a researcher and leader, we encourage you to apply and join us in this important work.

Looking for: Only 80 hours over an academic semester (~5h per week)

# of positions available: 1

Anticipated Student Learning Outcomes: Participating in this research project will provide students with a range of valuable benefits that will enhance both their educational and professional development. Students will develop critical skills in qualitative data collection and analysis, gaining hands-on experience that deepens their understanding of research methodologies. By mentoring youth in conducting research, they will also strengthen their leadership abilities and contribute positively to the community. Additionally, students will improve their communication skills, particularly through presentations and data visualization projects, allowing them to effectively convey complex information. The opportunity to collaborate with community partners in the Charlotte-Mecklenburg area will expand their social networks, creating connections that could be beneficial for their future careers. Overall, this project will equip students with practical skills, real-world experience, and valuable relationships, all of which will contribute to their growth as scholars and professionals.

Our project continues through August 2026, with numerous presentation opportunities for our youth researchers. The student would be welcome to attend and participate in these opportunities after completing the semester-long research project. Moreover, they may be a co-author or contributor to publications of this research.

Training Description: As part of their on-boarding, students will undergo several important training programs to ensure they are fully prepared for their role in the project. First, students will complete the CITI IRB training, which covers ethical guidelines and regulatory requirements for conducting research with human subjects. This training is crucial for understanding the principles of informed consent, data confidentiality, and the protection of participant rights, ensuring a strong foundation for ethical research practices.

Next, students will participate in the CSRSS (Community and Social Responsibility for Safety and Security) training. This training focuses on enhancing their awareness of safety protocols and community engagement strategies, equipping them with the skills to effectively navigate community settings and contribute to a safe research environment.

Last, students will complete the "Darkness to Light" training, which is designed to educate them about the prevention of child abuse and the importance of maintaining safe and supportive environments for youth. This training emphasizes the recognition of signs of abuse, appropriate responses, and proactive measures to protect the welfare of children and teenagers they will be working with. Together, these training sessions will prepare students for their responsibilities in the project, ensuring they conduct research ethically, safely, and with a strong sense of community responsibility. In addition to the trainings, the student will complete the background check with the Mecklenburg County Department of Parks and Recreation. This is a requirement for all staff to work with youth at Southview Recreation Center.

Training hours: 12

Mentoring plan: During this project, students will work closely with the project team 3x a month at the Southview Recreation Center, engaging in weekly contact to ensure ongoing collaboration and support. Drs. George Shaw, Jr. and Laurie Garo, and Ms. Shante Vines will provide direct supervision at the center, and guidance on the various project tasks during zoom meetings, canvas, and via email. Additional on-site direction will come from Mr. Phillip Gottlieb (Director, Southview Recreation Center), Ms. Aniyah Vines and Ms. Ebone' Lockett (both are project facilitators).

Dr. Shaw will provide students with access to the project canvas site. All other staff will have access to canvas as well and can interact with the students. Drs. Shaw and Garo, and Ms. Vines, will work closely with the students on regular tasks to ensure they are learning while contributing to the project. The students may be asked to provide updates at group meetings and may take part in youth researcher presentations on radio, podcast, and professional venues. All staff will contribute to student well-being and to learning the academic/research aspects of the project. As such, students can expect to assist with various aspects of the project, including presentations and data collection, while gaining hands-on experience with qualitative research techniques like content and thematic analysis. The hands-on experience that students will gain will take place as part of the project teams monthly huddle sessions and individuals meetings with the project team leaders.

To support their success, students will also receive guidance in time management, learning to use scheduling and project management tools to balance their responsibilities effectively. Our mentorship will be a key component of this experience, particularly in the areas of health behavior research with a focus on gun violence prevention. The on-board training and assistance during the Saturday sessions with students at the recreation center will involve direct mentorship in health behavior research. Through this mentorship, students will not only deepen their understanding of this critical field but also develop the skills and confidence needed for future professional endeavors.

Applicant Requirements: We are seeking student applicants who:

1) Demonstrate a strong interest in qualitative research and are eager to contribute to a meaningful project focused on gun violence prevention and public health.

2) Proficient in Microsoft Excel and Learning Management Systems like Canvas.

3) Have an enthusiasm for working with youth and teenagers in community settings.

4) Must have reliable transportation (essential for regular participation at the recreation center.)

5) Applicants should be detail-oriented, with excellent communication skills and strong leadership qualities, as these attributes are crucial for success in both research and collaboration.

6) An interest in public health research, gun violence prevention and health applications in Geographic Information Systems (GIS), is highly desired.

7) Passionate about making a positive impact through research

8) Ready to develop their professional skills in a supportive, dynamic environment

Applicant Preferences: We also prefer, although not required, to have the following skills or experiences:

1) Familiarity with ARCGIS and R

2) Experience as a camp counselor or youth program advisor

3) Experience working with a diverse population group

Specific Time considerations/conflicts: Participants in the project will be expected to commit to working three Saturdays a month from 10 AM to 2 PM. Additionally, there will be monthly project team meetings lasting three hours, where team members will discuss progress, collaborate on upcoming

App ID #: 882

Mentor: Syverson, Drew Email: dsyverso@charlotte.edu

Title: Research Assistant Professor

Department: Department of Earth, Environmental and Geographical Sciences

Co-mentor: No

Community engaged research: No

Title: Orange Hydrogen from Low Temperature Serpentinization

Description: For the first time in a lifetime, humankind is poised to harness an entirely new energy resource. Locked up within certain iron-rich silicate rocks in the Earth's crust is a chemical reactivity sufficient to produce hydrogen upon contact with water. Iron is released from the rock via a process known as serpentinization. The hydrogen (H2) generated this way, recently termed orange hydrogen to distinguish it from other sources [1], could provide carbon-free energy at scale so large as to enable a profound energy transition. Subsurface hydrogeomechanical engineering will unlock this resource by creating and injecting water into underground fractures, initiating self-sustaining reactions to produce hydrogen from rock. Commercially viable hydrogen production, however, will require mastering the hydrogen evolution reaction at low temperature because there is no commercial path for drilling into, or creating, high-temperature subsurface environments.

Achieving efficient hydrogen production at low temperatures is the only economic technology-to-market pathway even though the rates of hydrogen production are maximized at high temperature (200–350˚C) [2, 3]. Drilling to depths this hot is expensive and risky, at the limits of advanced geothermal technology. Heating shallower formations or injecting steam has a large energy penalty and energy cost. Even considering Washington state, which has among the cheapest industrial electricity in the US, the minimum heating cost is ~ 84 ¢ / kg H2 assuming 100% of iron is liberated by serpentinization and converted into hydrogen. Because the efficiency of fracture stimulation and hydrogen generation will be less than 100%, the cost for heating alone will easily exceed the economic target of $1/kg H2 at the well head. All other costs for establishing and operating a stimulated serpentinization site will worsen this outlook.

Low temperature serpentinization and hydrogen generation would avoid the energy and economic costs of heating but presents other challenges. Mineral-fluid reactions are often slow and may remain far from thermodynamic equilibrium. Nevertheless, important laboratory studies and field systems [4 - 7] provide evidence that the key reactions can be active at temperatures below 100˚C.

In this project we seek to discover and harness chemical approaches for accelerating and sustaining low temperature serpentinization. In particular, we will perform experimental methods in the laboratory that will enhance our understanding of the chemical controls dictating the rates of the key reactions controlling the rate of hydrogen generation during serpentinization at low temperatures.

The student will perform well-controlled laboratory serpentinization experiments that are designed to significantly increase hydrogen production. In particular, the generation of hydrogen during

serpentinization in natural environments is dependent on the chemistry of fluids reacting with ultramafic rock. Dissolved silica, $SiO_2(aq)$, has a fundamental control on the phase and composition of secondary minerals formed, the fate and oxidation of iron(II), and the amount of hydrogen generated during reaction between water and reactant silicate minerals. These experiments will also employ a novel 29Si isotope tracer technique to quantify the rate and amount of primary silicate mineral reaction in the experiments [8].

The student will gain experience in laboratory methods, analytical instrumentation, and will learn to examine and interpret how changes in fluid chemistry will control the serpentinization reaction and the generation of hydrogen. The overall goal of this project is to optimize the generation of molecular hydrogen during the serpentinization of ultramafic rock under moderate hydrothermal conditions (~80°C). Success could enable the development of geologic hydrogen as a new carbon-free energy resource. This blossoming field of orange hydrogen has a large potential for expansion in the near future and will provide abundant opportunities in academia and industry.

References

[1] Osselin, F., et al., Orange hydrogen is the new green. Nature Geoscience, 2022. 15(10): p. 765-769.

[2] McCollom, T.M., et al., Temperature trends for reaction rates, hydrogen generation, and partitioning of iron during experimental serpentinization of olivine. Geochimica et Cosmochimica Acta, 2016. 181: p. 175-200.

[3] Ely, T., et al., Huge variation in H2 generation during seawater alteration of ultramafic rocks. Geochemistry, Geophysics, Geosystems, 2023. 24(3): p. e2022GC010658.

[4] Mayhew, L.E., et al., Hydrogen generation from low-temperature water–rock reactions. Nature Geoscience, 2013. 6(6): p. 478-484.

[5] Ellison, E.T., et al., Low-temperature hydrogen formation during aqueous alteration of serpentinized peridotite in the Samail ophiolite. Journal of Geophysical Research: Solid Earth, 2021. 126(6): p. e2021JB021981.

[6] Morrill, P.L., et al., Geochemistry and geobiology of a present-day serpentinization site in California: The Cedars. Geochimica et Cosmochimica Acta, 2013. 109: p. 222-240.

[7] McCollom, T.M., et al., Hydrogen generation and iron partitioning during experimental serpentinization of an olivine–pyroxene mixture. Geochimica et Cosmochimica Acta, 2020. 282: p. 55-75.

[8] Syverson, D.D., et al., Nutrient Supply to Planetary Biospheres From Anoxic Weathering of Mafic Oceanic Crust. Geophysical Research Letters, 2021. 48: p. 1-8.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes:

The student will learn to independently perform literature reviews

The student will gain experience in:

Laboratory methods

Preparation of fluids and minerals used for reactants in the experiments

Design and setting up experiments

Sampling experiments and mineral product

Analytical instrumentation (all housed within the Department of Earth, Environmental, and Geographical Sciences at UNCC)

Inductively-coupled mass spectrometry (ICP-MS)

Gas chromatography (GC)

pH electrodes

Examine and interpret geochemical data produced from the experiments

The student will also gain independence in the laboratory environment and the ability to think critically of their experiments and outcomes of the proposed activities.

The student will present and disseminate the research results at the end of the OUR term through a poster or oral presentation at the OUR symposium. There is also potential to present research results in larger conferences more focused on this particular research field.

Training Description: The student will undergo laboratory and safety training. The student will work closely with a graduate student and the professor of the laboratory.

Training hours: 4

Mentoring plan:

The student will work directly with mentor Dr. Syverson and with a designated MS student on this project, such that the OUR experience is productive during the given amount of time the project is active.

The student will meet with Dr. Syverson once a week with regards to progress and discussion of the literature.

Dr. Syverson will also meet with the OUR student throughout each week in the laboratory to help the prepare and perform the experiments and during analysis of samples using a variety of analytical instrumentation.

Dr. Syverson will mentor the student throughout the interpretation of research results.

The student will produce and share research results with Dr. Syverson's research group and at the OUR symposium. Potentially, at a larger conference focused on the field of orange hydrogen.

Applicant Requirements:

Have taken general chemistry, mineralogy, and other relevant Earth science courses.

Has experience with wet-chemistry laboratory work, such as measuring pH and performing titrations.

Applicant Preferences:

Has an interest in solving Earth's on-going climate problem and is interested in going to graduate school.

The student has an interest in the development of orange hydrogen as a clean-energy alternative.

Specific Time considerations/conflicts: Research team meetings on a weekly basis.

App ID #: 883

Mentor: Kuemmerle, Christian Email: ckuemme1@charlotte.edu

Title: Assistant Professor

Department: Department of Computer Science

Co-mentor: No

Community engaged research: No

Title: Efficient State Space Models through the Convolutional Lens

Description: Recently, structured state-space models (SSMs) have emerged as a strong contender for sequence modeling in deep learning, mitigating semantic challenges of Transformer models induced by their limited window lengths. Recent such models have dominated certain benchmarks such as the Long Range Arena and have been especially successful in domains involving continuous signal data such as audio and vision, while also beating Transformers due to the linear or near-linear scaling of their computational complexity in sequence length.

While the scaling of state-of-the-art SSMs such as Mamba and Mamba-2 is near-linear in the sequence length, it is quadratic in the hidden state dimension, which is detriment towards the construction of scalable, expressive SSMs capturing complex state information.

In this project, we revisit a convolutional perspective on SSMs that additionally the leverage selection mechanism introduced by Mamba, and develop a variant of Mamba-2 type of model via a block-Toeplitz matrix perspective, which allows for a near-linear scaling in the hidden state dimension both for training and inference. Tasks in this project include the implementation and modification of SSM code bases, the training of SSM models, and the structuring and presentations of resulting computational experiments.

An experienced Ph.D. student will co-mentor the student working on this project.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes:

Familiarization with an important type of state-of-the-art machine learning model

Experience with the development of new deep learning models

Experience in contributing to ongoing AI/machine learning research

If successful, co-authorship in a conference publication at a top-tier AI/ML conference can arise from this project.

Training Description: No specific requirements, training takes places during the research project meetings and in discussions with the faculty and graduate student mentor.

Training hours: 0

Mentoring plan: The student will be guided through the research process in weekly meetings with the mentoring faculty as well as in communication with a Ph.D. student, who serves as a co-mentor. Communication will occur additionally asynchronously through a Slack channel, during which smaller questions can be addressed. If the research project turns out to be successful, mentoring in academic writing and the preparation of research manuscripts will be provided.

Applicant Requirements: Students with a good grasp of calculus, linear algebra and strong interest in machine learning and good coding skills (Python) is a a requirement of this project. Some familiarity and lower-level understanding of the training process of deep learning models is also required.

Applicant Preferences: A familiarity with the fast Fourier transform and structured state-space models is helpful, but can be acquired during the project.

Specific Time considerations/conflicts: Weekly availability on Wednesdays for project meetings is required.

App ID #: 884

Mentor: Subramanian, Kalpathi Email: krs@charlotte.edu

Title: Associate Professor

Department: Computer Science

Co-mentor: No

Community engaged research: No

Title: Buiidling Visualizations of Real World Datasets using D3JS

Description: The project will provide experience and benefits for building information visualizations of real world datasets using the D3JS Visualization toolkit, a Javascript based toolkit. The goal is to build complete applications that can demonstrate the significance and relevance of visualizations for datasets that are difficult to understand or very little is known about it. Possible applications would involve outputs of machine learning models, medical data statistics. Visualizations related to an existing educational research project would also be considered as part of the project.

Applicants should be strong programmers in high level languages so that they can work independently to complete assigned tasks. Experience with visualization tools and/or Web technologies is a plus.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Students will gain programming skills, independent project experience and also working together in a team

Training Description: Existing tutorials would be provided to ease the learning experience of tools used in the project.

Training hours: 0

Mentoring plan: Students will meet with mentor each week, either as part of a research group or individually

Applicant Requirements: Applicants should be strong programmers in high level languages so that they can work independently to complete assigned tasks. Experience with visualization tools and/or Web technologies is a plus. Student should preferably be a junior or senior.

Applicant Preferences: See above.

Specific Time considerations/conflicts: None.

App ID #: 885

Mentor: Hoover, Fushcia-Ann Email: fhoover3@charlotte.edu

Title: Assistant Professor

Department: Earth, Environmental and Geographical Sciences

Co-mentor: Yes

Nicole Roberts, nbarclay@charlotte.edu, Civil Engineering Technology and Construction Management

Community engaged research: Yes

Title: Identifying Emerging NC Water Conservation Strategies for a Climate Change Future

Description: As North Carolina's population continues to grow, so too does the need for maintaining and conserving safe and reliable water sources. The sustained population growth combined with increased intensity and damage of climate change driven storms, 100° F days, and existing social and economic inequities, further strain our aquatic ecosystems, and water quality and availability, negatively impacting human health [1]. Our goal is to develop water conservation case studies for North Carolina that include management and policy approaches based on future impacts to water quality and supply due to climate change. As a part of this goal, we will highlight the State's progress toward the "One Water" approach that includes drinking water, wastewater, and stormwater management. Our proposed research asks, 1) What are the water conservation and supply needs given future climate driven changes in rainfall and flooding patterns? 2) What current and emerging strategies are stakeholders using?, and, 3) How are utilities and conservation groups working together (if at all), to establish innovative approaches to climate preparedness for water quality and supply? This proposal addresses the WRRI Focus Area 2 on Drinking Water, Wastewater and Water Infrastructure; Climate Change Impacts on Water Resources & Water Conservation and Supply Strategy.

Subject areas: urban planning, water conservation, water supply, climate change

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes:

Students will gain substantial knowledge about water conservation and supply strategies across the State of NC, and the southeast.

Students will learn about different types of environmental planning and policy documents.

Skills that student(s) will develop include literature review search techniques, use of public data portal, research design, conducting research in a team setting, and methodological analysis of articles and planning documents.

This experience will benefit any student interested in pursuing research, conservation policy and planning, community engagement or participation, and introduce the student to an array of organizations across the state.

Training Description: No formal certification or safety training required for this position, but initial reading and summary work to assess reading and writing comprehension will be part of the on-boarding process.

Training hours: 8

Mentoring plan: Students who join the project will complete a mentoring compact and development plan with the Drs. Hoover and Roberts. This will cover expectations and goals for participating on the project, as well as Dr. Hoover and Dr. Roberts's expectations around work outputs, meetings, and mentoring. Student(s) on the project will meet weekly with Drs. Hoover and Roberts, and if available, are encouraged to attend Dr. Hoover's monthly research group meetings. There is additional mentoring and professional development that student(s) may receive through students and a postdoc across both faculty research groups.

Presenting at the spring OUR conference is expected, as well as maintaining and providing weekly updates through written and/or oral communication methods.

Applicant Requirements:

Strong reading comprehension, writing, and communication skills

Courses or familiarity with water systems and/or water conservation courses (volunteer experiences count)

Students should have proficiency with Microsoft Word and Excel, and strong organizational skills

Applicant Preferences: Ideally, student applicants will have experience searching for peer-reviewed/scholarly articles using Google Scholar, the UNCC library or similar databases. Ideally, they will also have prior technical and literature review writing experience, and be comfortable working independently and in teams.

Specific Time considerations/conflicts: Student(s) must have availability between 9am-12pm for a weekly 1-hr meeting.

App ID #: 886

Mentor: Akella, Srinivas Email: sakella@charlotte.edu

Title: Professor

Department: Computer Science

Co-mentor: No

Community engaged research: No

Title: Robotic Coverage and Informative Path Planning

Description: In this project, the undergraduate researcher will learn about state-of-the-art algorithms for robot coverage and informative path planning. The goal is to develop and implement new online approaches that incorporate sensor data. Applications include inspection of critical infrastructure (e.g., power lines, roads) and search and rescue (e.g., after disasters). Students will work on cutting edge research in robotics and learn about optimization and machine learning algorithms and ROS (robot operating system). The research will be conducted in the Robotics Laboratory in the Computer Science Department. In addition to validation of the algorithms in simulation, there will be opportunities to implement and demonstrate the algorithms on quadcopter drones and wheeled mobile robots.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes: The students would be exposed to cutting-edge research in robotics and have access to a wide variety of robots (mobile robots, drones, manipulator arms) in our active Robotics Lab. They would be exposed to current research in robotics and interact with graduate students. They would gain experience with ROS 2 (Robot Operating System).

Training Description: The students would work through ROS tutorials and read selected research papers as preparation.

Training hours: 20

Mentoring plan: The mentor will meet with the student on a regular basis (weekly or more frequent if needed). The student will also have the opportunity to interact with graduate students involved in robotics research. The student will receive guidance on their research and will be taught how to write research abstracts, posters, and present their research work.

Applicant Requirements: Familiarity with algorithms and data structures, and a proficiency in C++/Python is preferred. A good background in math (linear algebra, calculus) is desirable, and familiarity with ROS (Robot Operating System) is a plus.

Applicant Preferences: Coursework in Algorithms and Data Structures (ITSC 2214), Linear Algebra (MATH 2164), and Calculus III (MATH 2241). Experience in Robotics (ITCS 4150: Mobile Robotics or ITCS 4151: Intelligent Robotics) and/or Artificial Intelligence (ITCS 3153) will be a plus. Should be comfortable with programming in C++ and/or Python.

Specific Time considerations/conflicts: Student should be prepared to come to the lab between 9am and 5pm on weekdays. This will enable face-to-face communication in the lab and also the opportunity to attend research presentations.

App ID #: 887

Mentor: Kuemmerle, Christian Email: ckuemme1@uncc.edu

Title: Assistant Professor

Department: Department of Computer Science

Co-mentor: No

Community engaged research: No

Title: Parameter-Efficient Training through Efficient Joint Sparse and Low-Rank Adaptation

Description: With the advent of deep learning and large language models, which have delivered impressive results for a large number of machine learning tasks, models with hundred of millions, billions or more parameters have been become main stream. While the hardware and energy requirements of a full-training process prevent state-of-the-art deep learning models to be trained on consumer hardware, it is possible to "optimize" a pre-trained model to excel for a particular task on consumer hardware via Parameter-Efficient Fine-Tuning (PEFT).

Among the most popular techniques for PEFT, low-rank adaptation and sparse adaptation has merged in the last two years. The recent paper "RoSA: Accurate Parameter-Efficient Fine-Tuning via Robust Adaptation" (https://arxiv.org/pdf/2401.04679) has shown that the performance of methods that jointly optimize sparse and low-rank adapters outperform either of the two pure methods. In this projcet, we build on recent advances on low-rank fine-tuning and training within our research group based on quadratic differentiable rank regularizers and plan to develop algorithms for PEFT that obtain improved performance over RoSA and other PEFT methods given the same parameter budget.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes:

Familiarization with the state-of-the-art in finetuning of large machine learning models/ LLMs, which is an extremely popular technique in modern AI

Experience with the development of new deep learning models

Experience in contributing to ongoing AI/machine learning research

If successful, co-authorship in a conference publication at a top-tier AI/ML conference can arise from this project.

Training Description: No specific requirements, training takes places during the research project meetings and in discussions with the faculty and graduate student mentor.

Training hours: 0

Mentoring plan: The student will be guided through the research process in weekly meetings with the mentoring faculty as well as in communication with a Ph.D. student, who serves as a co-mentor. Communication will occur additionally asynchronously through a Slack channel, during which smaller questions can be addressed. If the research project turns out to be successful, mentoring in academic writing and the preparation of research manuscripts will be provided.

Applicant Requirements: A good grasp of calculus, linear algebra and a strong interest in machine learning together with good coding skills (Python) are a requirement of this project.

Furthermore, familiarity with one at least one of the following areas is required:

Continuous optimization algorithms

Sparse models in machine learning and/or statistics (e.g., Lasso, sparse logistic regression, etc.)

Low-rank models in machine learning and/or statistics (e.g., LoRA, (robust/sparse) principal component analysis, low-rank matrix completion, singular value decomposition)

Iteratively reweighted least squares algorithms

Applicant Preferences: Familiarity and knowledge with more than one of the areas listed under "Requirements" is preferred.

Specific Time considerations/conflicts: Availability on Wednesdays for weekly project meetings with faculty and Ph.D. student mentor.

App ID #: 890

Mentor: Markant, Doug Email: dmarkant@charlotte.edu

Title: Associate Professor

Department: Psychological Science

Co-mentor: No

Community engaged research: No

Title: Development of a game-based cognitive flexibility training application to improve mental health

Description: This project involves the creation of a game-based application to train cognitive abilities and emotion regulation in day-to-day life. Many people who seek mental health therapy struggle to apply new therapeutic strategies or skills in their everyday life, often falling back on rigid, undesired habits or thought patterns. For this project we are designing a game to train "cognitive flexibility," the ability to adapt one's thoughts and behavior to new circumstances. We will draw on research in applied game design to design an application that is fun, engaging and which encourages the transfer of new skills learned in the game to everyday behaviors in order to improve mental health.

We are seeking students with interests in game design to act as a programmer and/or an artist. Programmers will work on the code for the mobile application and gameplay. Artists will aid in designing the look and feel of the game and be responsible for creating digital assets. Students will also be part of an interdisciplinary workgroup that meets bi-weekly to discuss the application design. This work group is devised of the primary research team, community members, and professional experts in psychology and other interdisciplinary areas. The game itself will incorporate both challenge-based and combat-style gameplay, with the challenges designed to target key cognitive skills. Once a functional prototype of the game is developed, exploratory pilot testing will be conducted.

Some key activities will include:

Programmer:

- Write code in Godot for the functionality of the phone application
- Work with the research team to discuss gameplay and flow of the application
- Aid in testing and debugging of application for pilot study

Artist:

- Work with the research team to conceptualize the overall aesthetic of the application
- Design top-down/isometric characters and landscapes for the application
- Contribute to design of user interface for the application

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Through this project students will have the opportunity to work within an interdisciplinary research team and develop a cognitive training intervention. They will work closely with a team of researchers with expertise in health psychology, cognitive science, affective science, and game design. Through interactions with the interdisciplinary workgroup, students will learn about theories of human behavior from cognitive science and about patient-centered approaches to intervention development. They will also deepen their familiarity with technical skills relevant to their role (e.g., progamming, 2D game design) as well as general-purpose skills involved in project management, data management, and research skills. These skills are useful preparation for a broad range of career paths that involve research and design in areas related to behavioral science, health, and technology.

Training Description: Training will include:

- Familiarization with background research through reading research articles

- Ethics training (CITI training for behavioral science) if not already completed

- On-boarding meetings to develop mentoring plan and to become familiar with the research team and project structure

Training hours: 5

Mentoring plan: Students will work primarily with the principal investigators, Shaina Glass and Dr. Doug Markant. Supervisors will communicate meeting times, expectations, and work directly with students to develop goals and timelines for project tasks. Students will meet with a supervisor on a weekly basis to ensure steady progress toward the project's goals, which will include providing training materials needed to successfully carry out project tasks.

Students will also interact with other members of the interdisciplinary research team which includes students and faculty in psychology, cognitive science, game design, and public health. Students will attend bi-weekly meetings of the workgroup and will contribute directly to the planning and production of the application in collaboration with the research team.

Students will be advised by the supervisors on how to build on the experience on the project to further their professional goals, including providing guidance about graduate school and other professional career paths. Students will be encouraged to deliver presentations about the project at local academic conferences or other public-facing venues to showcase their work.

Applicant Requirements: Programmer: CS courses, experience coding with Javascript, Python, C## or C++

Artist: top-down/isometric art style, digital art courses, experience with 2D animation

Applicant Preferences: Programmer: Experience with Godot, game design courses or experience

Artist: Game design experience

Specific Time considerations/conflicts: N/A

App ID #: 891

Mentor: Kuemmerle, Christian Email: ckuemme1@uncc.edu

Title: Assistant Professor

Department: Department of Computer Science

Co-mentor: No

Community engaged research: No

Title: A Customizable Pathfinding Module for Lightning Network Clients

Description: Since its conception in the wake of the global financial crisis in late 2008 by its pseudonymous creator, the Bitcoin cryptocurrency network has gained a considerable amount of traction as the base layer of an alternative financial system with around 20% of American adults as owners. The Lightning network is a scaling solution in which payment channels backed by blockchain transactions allow to overcome any blockchain's inherent throughput limitations and furthermore, instantaneous payments. In order to send a payment within the network, a participant picks one or more suitable payment paths that satisfy their needs.

In this project, we design a software package that implements different pathfinding algorithms and underlying modelings to provide customized, user-friendly solutions for pathfinding problems faced by Lightning node operators. The software is meant to interface with as many different popular Lightning node implementations such as Rust-Lightning (https://github.com/lightningdevkit/rust-lightning) (in Rust), LND (https://github.com/lightningnetwork/lnd) (in Go), Core-Lightning (https://github.com/ElementsProject/lightning) (in C) and Eclair (https://github.com/ACINQ/eclair) (in Scala), as possible.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes:

Familiarization with the inner workings of payments in the Lightning network, which is the currently most popular scaling technology for the Bitcoin network

Acquiring competence in new programming languages

Learning about and contributing towards state-of-the-art models and algorithms for payments within the Lightning network

Contribution to an open-source project with visibility in the communities of Bitcoin and Lightning network developers and start-ups

Training Description: No specific requirements, training takes places during the research project meetings and in discussions with the faculty and graduate student mentor.

Training hours: 0

Mentoring plan: The student will be guided through the research process in weekly meetings with the mentoring faculty as well as in communication with a Ph.D. student, who serves as a co-mentor. Communication will occur additionally asynchronously through a Slack channel, during which smaller questions can be addressed. If the research project turns out to be successful, mentoring in academic writing and the preparation of research manuscripts will be provided.

Applicant Requirements: A good understanding of the basic design of the Lightning Network by the start of the project is required. Having successfully taken ITCS 4010/5010 Topics in Computer Science - Bitcoin: Programming the Future of Money is highly recommended, but not necessary. A familiarity with shortest-path algorithms (Dijkstra's algorithm, breadth-first search etc.) is also required, as well as the interest to work in at program in at least two of the following programming languages: Rust, Python, C, Go and Eclair.

Applicant Preferences: Familiarity or willingness to work with more than two of the programming languages mentioned in "Requirements".

Specific Time considerations/conflicts: Availability on Wednesdays or Thursdays for weekly project meetings with faculty and Ph.D. student mentor.

App ID #: 892

Mentor: McCormick, Liz Email: emccorm4@charlotte.edu

Title: Assistant Professor

Department: Architecture

Co-mentor: No

Community engaged research: Yes

Title: Early childhood development and community enrichment centers in underprivileged areas

Description: This project aims to support a nonprofit organization founded by a group of UNC Charlotte and Chapel Hill students. The organization focuses on early childhood development, following a model inspired by Habitat for Humanity and aims to establish curriculum enrichment and community centers in underprivileged areas. The first target location for this initiative is Fiji, where the project will demonstrate its model and impact.

The architecture team plays a crucial role in bringing the vision of these centers to life. The primary responsibility is to translate the educational and community goals of the project into tangible, functional spaces that are not only visually appealing but also culturally and environmentally responsive. In addition to the design aesthetics, the architecture team is tasked with ensuring the functionality and sustainability of the centers. This includes integrating sustainable design practices such as the use of local materials and energy-efficient systems, which will not only minimize the environmental impact but also reduce operational costs in the long term. The team will also focus on creating flexible spaces that can adapt to various activities, from structured learning to community gathering, reflecting the multifunctional nature of the centers.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 4

Anticipated Student Learning Outcomes: Students will have the opportunity to engage in hands-on learning that goes beyond traditional classroom education. They will gain an understanding of early childhood development principles and how these can be integrated into the design and functionality of physical spaces. This interdisciplinary approach, combining education, architecture, and community development, will broaden their perspective on how different fields can come together to address real-world challenges.

This project provides students with practical experience that can enhance their resumes and portfolios. For those pursuing careers in architecture, education, or nonprofit work, being part of a project that involves designing and implementing community centers in an international setting is a significant achievement. They will have the opportunity to see their work come to life, from initial design concepts to the construction and operational phases, providing a comprehensive understanding of the entire process.

Training Description: N/A

Training hours: 0

Mentoring plan: I am committed to providing students with a supportive and enriching environment throughout this research project. They can expect regular mentorship and guidance, including one-on-one meetings for personalized feedback on their work, particularly in areas like architectural design, community engagement, and project management. Students will gain hands-on experience by actively participating in all aspects of the project, from design to implementation, while collaborating with a multidisciplinary team. I will encourage them to present their work at group meetings and conferences to build their communication and presentation skills. Additionally, I am dedicated to supporting their professional development, helping them build strong portfolios, prepare for future careers, and expand their professional networks. My goal is to ensure students grow academically and professionally, contributing meaningfully to a project with a significant impact.

Applicant Requirements: In a student applicant for this research project, I am looking for individuals who demonstrate a strong passion for community development and a commitment to making a positive impact through their work. Key characteristics include creativity, curiosity, and an eagerness to engage in interdisciplinary learning. An ideal applicant is someone who is open-minded, adaptable, and willing to work collaboratively with people from diverse backgrounds, including community members, fellow students, and professionals.

From a skills perspective, students should have a foundational understanding of design principles and an interest in sustainable and culturally responsive architecture. Experience with design software, such as AutoCAD, SketchUp, or Revit, is desirable but not mandatory, as there will be opportunities for skill development throughout the project. Strong communication skills, both verbal and written, are important, as students will be involved in presenting their ideas and engaging with the community and project stakeholders.

Relevant coursework might include classes in architecture, design, urban planning, or community development, but students from other disciplines who have a strong interest in these areas are also encouraged to apply. Experience in community service, volunteer work, or previous involvement in projects that address social and environmental issues is a plus, as it reflects a student's dedication to working towards meaningful change.

Applicant Preferences: Students who are skilled in using design software such as AutoCAD, SketchUp, or Revit will be well-prepared to contribute effectively to the project. However, more than just technical ability, I value the capacity to tell a story through visuals—creating illustrations that are not only accurate and functional but also engaging and culturally sensitive. The ability to produce clear and expressive visual documentation, from conceptual sketches to detailed plans, is crucial in bringing our vision to life and fostering understanding and excitement among those we work with.

Specific Time considerations/conflicts: N/A

App ID #: 893

Mentor: Kuemmerle, Christian Email: ckuemme1@uncc.edu

Title: Assistant Professor

Department: Department of Computer Science

Co-mentor: No

Community engaged research: No

Title: Novel Solvers for Sparse Generalized Linear Models

Description: High-dimensional, sparse generalized linear models are widely used in statistics and machine learning. However, optimizing and fitting these models to data poses significant computational and algorithmic challenges for respective optimization algorithms.

The framework of iteratively reweighted least squares (IRLS) [Daubechies et al. 2010, https://doi.org/10.1002/cpa.20303; Peng et al. 2022 https://proceedings.neurips.cc/paper_files/paper/2022/file/ba3354bcfeae4f166a8bfe75443ac8f7-Paper-Conference.pdf] has been shown to be highly effective and efficient for several sparse regression models, but has been under-explored in the context of sparse _logistic_ regression, which is the backbone of many classification models in machine learning. In this project, we will develop a variant of IRLS that is specifically tailored for sparse logistic regression and benchmark it against other state-of-the-art methods within the "benchopt" benchmarking framework [Moreau et al. 2021, https://arxiv.org/pdf/2206.13424] and evaluate it on relevant datasets. If successful, this project will lead to a journal or conference publication.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes:

Familiarization with some of the most widely used machine learning models

Acquiring competence in structured, continuous optimization

Establishment of basic knowledge relevant for understanding the state-of-the-art in efficient deep learning models

Contribution to a top-tier research publication

Training Description: No specific requirements, training takes places during the research project meetings and in discussions with the faculty and graduate student mentor.

Training hours: 0

Mentoring plan: The student will be guided through the research process in weekly meetings with the mentoring faculty as well as in communication with a Ph.D. student, who serves as a co-mentor. Communication will occur additionally asynchronously through a Slack channel, during which smaller questions can be addressed. If the research project turns out to be successful, mentoring in academic writing and the preparation of research manuscripts will be provided.

Applicant Requirements: Students with a good grasp of calculus and linear algebra are best suited for this project. Coding skills in Python will be required.

Applicant Preferences: Familiarity with regression models, in particular involving sparse modeling, is a plus.

Specific Time considerations/conflicts: Availability on Wednesdays or Thursdays for weekly project meetings with faculty and Ph.D. student mentor.

App ID #: 895

Mentor: Watson, Sharon Email: swatso55@uncc.edu

Title: Assistant Professor

Department: Anthropology

Co-mentor: No

Community engaged research: Yes

Title: Community Development and Funding Dynamics

Description: Drawing on data from semi-structured interviews with NGO staff, we examine how structural discrimination influences funding dynamics within their organizations and community. The research assistant will collaborate on the analysis of a dataset that contains predominantly qualitative data from community-based organizations. They will learn how to use MAXQDA mixed method analysis software, conduct literature reviews, and identify quantitative data sets (local and national) that relate to the factors identified in the qualitative analysis. Through completion of these objectives, they will understand the issues faced by these organizations and develop their own questions for potential analysis. Using the analyzed data and the literature review conducted they will also collaborate on a co-authored manuscript. They will also assist in the creation of different public facing dissemination products of the research.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: They will learn how to use MAXQDA mixed method analysis software, conduct literature reviews, and identify quantitative data sets (local and national) that relate to the factors identified in the qualitative analysis. Through completion of these objectives, they will understand the issues faced by these organizations and develop their own questions for potential analysis. Using the analyzed data and the literature review conducted they will also collaborate on a co-authored manuscript and the creation of public facing dissemination products—gaining important skills in writing up research and communicating important findings.

Training Description: They will have to have a CITI Human Subjects research training certificate or will need to complete the course.

Training hours: 10

Mentoring plan: I will act as a mentor and advisor for how the students will conduct their projects. I will answer their questions, give advice for when they're stuck, and review their project to check for errors. We will meet regularly as a small group with other students working on similar community engaged projects as well as individually this may be weekly or biweekly. I expect the student to

present their findings to the community organization as well as at the OUR research symposium and if appropriate submit a poster proposal to the Society for Applied Anthropology conference.

Applicant Requirements: Experiences: With email, and microsoft and google software(Word, ppt, google doc, google slides)

Applicant Preferences: Characteristics: Strong willed, can take criticism, independent worker who can manage their time and project timelines

Skills: Quick thinker, hard worker, excellent communication skills

Courses: Any other applied anthropology courses, or cultural anthropology courses.

Experiences: Has conducted interviews and literature reviews.

Specific Time considerations/conflicts: NA

App ID #: 896

Mentor: Watson, Sharon Email: swatso55@uncc.edu

Title: Assistant Professor

Department: Anthropology

Co-mentor: No

Community engaged research: Yes

Title: Collaborative Community Health Equity

Description: This project is a collaborative research endeavor with various types of stakeholders with varying research duties in different stages of the project. You will be exposed to different steps in the research process depending on the overall collaborative research team's priorities. Your specific duties will depend on the project timeline and may include conducting a literature review, assisting in writing a grant proposal, conducting interviews, focus-groups or participant observations, learning and using MAXQDA qualitative software to transcribe and analyze data, and creating research dissemination products (such as a report, infographic, website information, brochure, social media material).

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 3

Anticipated Student Learning Outcomes: Experience working in a diverse stakeholder environment

Experience building a community partnership

Experience with qualitative research design–IRB process, guide design, implementing

Potentially gain practice in the qualitative research methods and rapid analysis

Exposure to MAXQDA data analysis software

They will know how to report back to stakeholders about research results in varying formats.

Training Description: They will have to have a CITI Human Subjects research training certificate or will need to complete the course. Students will need to either already know, or be open to learn about how to conduct ethnographic research. Such as focus groups, surveys, and interviews.

Training hours: 15

Mentoring plan: I will act as a mentor and advisor for how the students will conduct their projects. I will answer their questions, give advice for when they're stuck, and review their project to check for errors. We will meet regularly as a small group with other students working on similar community engaged projects as well as individually this may be weekly or biweekly. I expect the student to

present their findings to the community organization as well as at the OUR research symposium and if appropriate submit a poster proposal to the Society for Applied Anthropology conference.

Applicant Requirements: Required skills: Students who are comfortable interacting with community stakeholders and conducting interviews, use word or google docs, and use ppt presentation, or google slides.

Experiences: With email, and microsoft and google software(Word, ppt, google doc, google slides)

Applicant Preferences: Preferred courses (one): ANTH 2171, UrbanCore Community Engagement experience or certification, GIS, other applied anthropology courses, cultural anthropology courses, or classes that involved community interactions or discussion of ethics.

Experiences: Has conducted annotated bibliographies and literature reviews or willing to learn how to do this.

Characteristics: Strong willed, can take criticism, independent worker who can manage their time and project timelines

Skills: Quick thinker, hard worker, excellent communication skills, responsive to requests

Specific Time considerations/conflicts: NA

App ID #: 897

Mentor: Kelly, Scott Email: skelly52@uncc.edu

Title: Professor

Department: Mechanical Engineering and Engineering Science

Co-mentor: No

Community engaged research: No

Title: Reinforcement learning for mobile robots with nonlinear dynamics

Description: Animals that walk or swim or slither or fly exploit nonlinear dynamics in subtle ways to achieve agility and efficiency, but nonlinearity can be an obstacle to the systematic design of control laws for mobile robots that aspire to similar performance. Reinforcement learning provides an alternative to traditional analytical methods for control design, exploiting data and computation when appropriate theoretical tools are unavailable. This project concerns the development and testing of novel reinforcement learning algorithms for mobile robots with underactuated nonlinear dynamics, using both computational models and physical devices as learning platforms. The project is ongoing and can accommodate the participation of multiple undergraduate researchers.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 3

Anticipated Student Learning Outcomes: Participating students will learn the basics of reinforcement learning and will gain experience deploying learning algorithms in real or simulated physical environments. Participating students will also be exposed to mathematical ideas — particularly of a geometric nature — underpinning the disciplines of nonlinear dynamics, underactuated control, and symmetry in mechanics.

Training Description: There are no specific expectations of preparatory training, but the faculty mentor can provide tutorial material to familiarize a participating student with elements of reinforcement learning before work begins.

Training hours: 0

Mentoring plan: The student will meet at least weekly with the faculty mentor to report results and receive guidance. Some of these meetings are likely to be integrated into larger group discussions involving students and faculty — from both UNC Charlotte and Columbia University — with a common interest in reinforcement learning for robotics. These meetings will all be informal.

Applicant Requirements: Participating students should understand the basics of mechanics and differential equations and should have experience with scientific programming in a language like

Python or Julia. Students who want to perform physical experiments in the context of the project should also have experience interfacing such languages with mechanical sensors and actuators.

Applicant Preferences: In addition to satisfying the requirements above, the ideal participant will take pleasure in discussions of a conceptual nature and in brainstorming activities involving students and faculty pursuing related research.

Specific Time considerations/conflicts: The days and times at which participating students will be active are entirely negotiable.

App ID #: 898

Mentor: Bunescu, Razvan Email: rbunescu@uncc.edu

Title: Associate Professor

Department: Computer Science

Co-mentor: No

Community engaged research: No

Title: AI Models for Nonlinear Rewriting of Narratives

Description: Stories are often told in a non-linear fashion, in order to increase suspense, emotional involvement, engagement, and overall enjoyment. This is done across the various mediums used to tell the story, ranging from text (novels) to audio (radio, podcasts), to audio-visual (movies and TV series). However, the deadline-driven environment where creators need to generate new content at a very high pace leads to a non-linear storytelling that feels rushed, that detracts from understanding and enjoying the story as a whole, and that does not optimize the true potential of the non-linear technique. Additionally, readers and audiences enjoy different levels of non-linearity. In this context, we expect that a tool that can optimize non-linear story telling would have significant impact. However, for lack of access to the original linear version of a story, a pre-requisite task is that of taking as input a story and creating a linear version of it.

In this project, we propose to (1) develop LLM-based narrative linearization methods that take as input the text of a story and produce as output a linearized version of it. (2) models for nonlinear rewriting of narratives starting from their linear versions.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 1

Anticipated Student Learning Outcomes: A successful completion of this project would consist at a minimum in a dataset of manually linearized stories and a prototype system that is evaluated on this dataset. In terms of technical approaches, we plan to use LLMs provided through an MS Research Azure grant, in few-shot and possibly fine-tuning scenarios.

Upon successful completion of research, the student will have working knowledge of how to use and even fine tune LLMs through APIs, how to formulate a natural language processing problem, how to create a dataset with examples for fine-tuning and evaluation, how to run empirical comparisons between different models on the same task. These skills are highly sought after in both research and industry settings.

Training Description: No training required.

Training hours: 0

Mentoring plan: We will have weekly in-person meetings (faculty-student), with meeting reports submitted on https://cci-git.charlotte.edu/.

Outline of the tasks:

Literature search and documentation of existing approaches and state of the art.

Manual annotation of dataset of short stories or fragments from stories or TV show transcripts.

Annotation guidelines document and estimation of inter-annotator agreement.

Development of system prototype and comparison with baselines.

Writing of project report and potential paper for peer-review at an NLP conference.

Applicant Requirements: Student is expected to be comfortable with coding and have working knowledge of data structures and algorithms. Student needs to be self-motivated and have a passion for story telling / literature / narratives, which includes very good English / communication skills.

Applicant Preferences: Completion of (or registration into) a natural language processing course (e.g. ITCS 4101) or machine learning course (e.g. ITCS 3156) would be a significant plus.

Specific Time considerations/conflicts: No conflicts.

App ID #: 899

Mentor: Bunescu, Razvan Email: rbunescu@uncc.edu

Title: Associate Professor

Department: Computer Science

Co-mentor: No

Community engaged research: No

Title: The CS1 Compendium: Acquisition, Visualization, and Knowledge Tracing

Description: The overall aim of this project is to:

Extend a knowledge base of the coding concepts introduced in an introductory course in programming, e.g. coding in Python. This knowledge base, called the CS 1 Compendium (CS1C) will connect coding concepts (e.g. loops, assignments, variables, ...) through edges representing conceptual relationships, such as knowing concept A requires knowledge of concept B. The CS1C will also contain nodes for lectures, assignments, quizzes, questions, and answers, all interconnected.

We already have an initial, working version of this graph.

Store the CS1C in a non-relational database, such as neo4j.

Build a tool that visualizes the database, including capabilities for focusing on a particular part of the knowledge graph, for summarizing a large section of it, or for querying it using LLM-based capabilities.

Utilize the CS1C knowledge base to do knowledge tracing, i.e. trace the knowledge acquired by a simulated student (as well as their misconceptions) as they go through course materials.

We currently have an initial approach based on graph neural networks.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes: Depending on which part of the project the student contributes to, they will:

Develop skills for developing ontologies and representing knowledge into a graphical format.

Learn about storing data in non-relational databases and accessing and visualizing it through Python code.

Develop and evaluate machine learning (ML) models in PyTorch, using existing libraries.

The students will learn to conduct research in a collaborative setting; they will write weekly meeting reports; they will run empirical evaluations; they will write project reports and ideally contribute to the writing of a paper to be submitted for peer-review at a relevant venue.

Upon a successful completion of the project, the student will have developed skills in knowledge representation, databases, machine learning (PyTorch) and language processing (LLMs) that are highly valued in academic and industry settings.

Training Description: No training required.

Training hours: 0

Mentoring plan: We will have weekly faculty-student meetings, with weekly reports and code to be submitted on https://cci-git.charlotte.edu/.

The student will also interface with a PhD student who has already done initial work on the project. The student will be expected to also attend the bi-weekly group AI readings.

Applicant Requirements: Student is expected to be comfortable with coding and have working knowledge of data structures and algorithms. Student needs to be self-motivated and have a passion for education and an strong interest in natural language processing (NLP) and machine learning (ML).

Applicant Preferences: Completion of (or registration into) a natural language processing course (e.g. ITCS 4101) or machine learning course (e.g. ITCS 3156) would be a significant plus.

Specific Time considerations/conflicts: No conflicts.

App ID #: 900

Mentor: Diab, Kefaya Email: kdiab@charlotte.edu

Title: Assistant Professor

Department: Writing, Rhetoric, and Digital Studies

Co-mentor: No

Community engaged research: No

Title: The Tent and the Tank: On Affective Transformation into Happy Objects

Description: This project constitutes an ethnographic multimedia essay that applies a mixed methodology of rhetorical theory and rhetorical analysis on theorizing how the meanings of the tent and the tank transformed in the memory of the researcher from being harmful objects throughout Palestinians history of resistance (1948-2010), to becoming happy objects through the Egyptian revolution (2011). As an international scholar, and an Arab citizen of Palestinian origin, I draw on my own experiences, rhetorical theory, as well rhetorical analysis of iconic pictures of the tent and the tank (1948-2011) to track how the meaning of the tent and the tank transformed to me, and probably to other Arab and Palestinian citizens.

The undergraduate student will perform the following tasks:

Search for and locate secondary sources concerning the tent and the tank in Arabs history

Search for and locate iconic pictures and footage of the tent and the tanks in Arabs history (1948-2011)

Create a short video that combines audio, footage, text, and photos together using video-editing software

Looking for: Only 80 hours over an academic semester (~5h per week)

# of positions available: 1

Anticipated Student Learning Outcomes: The undergraduate student will acquire new skills of conducting secondary research, applying rhetorical analysis on photos and footage, and video-making. Furthermore, I will give the student research assistant credit, by listing their name and the duties they performed in assisting me with the project in my published multimedia article. The student will be able to list the project in their C.V and apply the skills they develop throughout the project on future projects in their other classes and future careers. Many jobs welcome graduates' hands-on skills in conducting research and video-making.

Training Description: I will train the undergraduate student to locate sources in Arabic and English that spoke of the tent and the tank in the history of Palestinian resistance.

I will also train them to locate iconic images of the tent and the tank to be included in the multimedia article that I plan to submit for publication at Kairos Journal.

Part of the multimedia essay will be a short video that combines texts, music, researcher narration, and photos and footage. Thus, I will train the undergraduate student to utilize digital research methods to make the video.

Training hours: 10

Mentoring plan: The student will be working directly with me, and I will meet with them weekly to discuss their progress and mento them throughout the research process. I might ask the student to provide a weekly short written report about their progress, challenges, and needs to keep me informed about their work and ready to assist them when needed. It would be up to the student whether to present with me at conferences. I will encourage them to do so, especially if they're planning on pursuing their graduate studies.

Applicant Requirements: I am looking for a student who:

is fluent in Arabic and English,

has a strong cultural background about Arabs cultures and political histories

has strong analytical skills.

is curious and willing to take initiative in learning new skills on their own

independent and eager to ask questions to better understand the subject of the research

Applicant Preferences: I would prefer a student with some experience in writing and video making. But I am ready to train the student in these 2 areas.

Specific Time considerations/conflicts: Preferably, I'd like the student to be available on Tuesdays and Thursdays afternoon, but I can also make space for them during other days of the week.

App ID #: 902

Mentor: Roberts, Nicole Email: nbarclay@charlotte.edu

Title: Assistant Professor

Department: Engineering Technology and Construction Management

Co-mentor: Yes

Michael Smith, Michael.Smith@charlotte.edu, Engineering Technology and Construction Management

Community engaged research: No

Title: Artificial Intelligence / Machine Learning Model Development and Evaluation for Water Utility Applications

Description: Artificial Intelligence (AI) involves the use of a machine (e.g., a computer) to perform cognitive functions (e.g., perceiving, reasoning, learning, and remembering), where AI is comparable to an intellectual process or program. AI methods, such as Machine Learning (ML), have been used successfully in numerous industrial applications to produce predictive models in support of data-driven decision making (e.g., healthcare, traffic flow, cyber security, power system, speech recognition, water demand, earthquake ground motion analysis, and pipeline monitoring and prediction). However, much work is still needed to expand use of AI/ML within the water sector, since these methods are not yet well understood in this industry.

Dr. Nicole Roberts and Dr. Michael Smith are jointly seeking to mentor a promising undergraduate researcher on their project to help address the critical problems that water utilities are facing (e.g., aging water infrastructure, which brings an increased risk of flooding and road washouts to municipalities constrained by tightened budgets and time). This project focuses on developing novel data-driven ML-based models for optimizing processes, improving performance, and predicting water quality parameters and infrastructure conditions to inform long-term planning for better outcomes. The student's duties will include gathering and sorting relevant peer reviewed literature on the topic, collecting and analyzing data, creating ML-models, writing summaries of their work, and collaboration with the research team through regular meetings, as directed.

Looking for: Only 160 hours over an academic semester (~10h/wk)

# of positions available: 2

Anticipated Student Learning Outcomes: The expected learning outcomes for the student(s) on this project include the following:

Critical Thinking development by gathering and analyzing information from a diverse set of sources to fully understand a problem.

Communication development by asking questions, seeking feedback, providing feedback appropriately to seek guidance and informing others of your needs and progress during the research process.

Professionalism development by prioritizing and completing tasks to accomplish goals within the broader research environment.

Training Description: The student will receive training on how to use Python as part of the research process.

Training hours: 5

Mentoring plan: We will have regular weekly project update meetings that are scheduled based on the team's availability during the period of performance for the project. The specified project tasks will be performed based on the project schedule. The student(s) will get the opportunity to practice their professional communication skills with weekly, in-person presentations based on aforementioned aspects to report on task completion updates, action items, and discuss questions.

Applicant Requirements: The student must be competent in Microsoft Excel, have strong communication skills (oral and written), and demonstrate keen data organization skills.

Applicant Preferences: Students with proficiency in programming and/or software applications such as Matlab, Python, and ArcGIS are desired and would be strongly considered. Training can be provided to students who are willing to learn.

Specific Time considerations/conflicts: The student must be available to meet in person for 1 hour per week for the research team meetings.

App ID #: 901

Mentor: Martins do Outeiro, Jose Email: jc.outeiro@charlotte.edu

Title: Professor

Department: MEES

Co-mentor: Yes

Ahmed El-Ghannam & Stuart Smith, arelgha@charlotte.edu, MEES

Community engaged research: No

Title: Additive Manufacturing and Machining of Silicon Carbide for Medical Implants

Description: Lumbar interbody fusion devices, commonly known as spinal cages, are extensively utilized to treat back pain resulting from degenerative disc disease. These spinal cages are implanted via minimally invasive procedures and are offered in various shapes and sizes to effectively accommodate the diverse needs of patients. Additive Manufacturing (AM) has demonstrated its ability to enhance value through enabling design flexibility and efficient production, circumventing certain constraints of traditional manufacturing methods. Spinal fusion cages are now crafted as single components, integrating mesh structures and novel geometries with diverse design elements. The surface finishing of the cages is essential for improving bone tissue integration and stabilizing the implant.

Porous structures such as those made on Silicon Carbide (SiC) offer numerous advantages in terms of implant growth, interlocking effects, and the generation of new tissue. Furthermore, porosity directly enhances the mechanical properties of the implant. By selecting optimized geometric parameters, an additively manufactured implant can emulate bone-like behavior. Various technologies, such as turning or milling, are commonly used to produce bone replacement implants. However, for complex structures such as porous or strut configurations, AM emerges as the preferred technique.

This project aims at AM printing samples in SiC, followed by machining to get the accurate geometry and surface quality of regions where it is necessary to ensure that the implant surface precisely conforms to where biological fusion occurs. Given that SiC is a highly abrasive and hard material, the primary challenge lies in selecting the appropriate machining process and its corresponding parameters. This will be the main focus of the project.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: At the end of this project the student should: 1) be able to conduct a literature review and collect valuable information required for research, 2) have knowledge in manufacturing processes, in particular additive manufacturing and machining, 3) know how to prepare a Design of Experiments, 4) know how to conduct manufacturing tests and

collect data, 5) apply data analysis techniques, including the use of Machine Learning, 6) know about machinability in the context of machining ceramic materials.

Training Description: The faculty will spend time with the student educating him/her on the topics related to the project, including ceramic materials, additive manufacturing, machining processes, data acquisition and analysis. The student will also be working alongside graduate students who can advise on a day to day basis.

Training hours: 5

Mentoring plan: The faculty and student will meet on a regular basis (weekly or as needed) to discuss the progression of the project, the challenges and difficulties, trouble shooting. Graduate students working on related projects will attend these meetings to provide input to project planning and details of resources available to the student. Dr. Ahmed El-Ghannam will educate the students in terms of ceramic materials and additive manufacturing of such materials. Dr. Jose Outeiro will educate the student on machining processes. Dr. Stuart Smith will educate the student on data acquisition and analyses.

Applicant Requirements: The student should hold a current workshop certification (with a permit to operate machines in the Duke Hall machine shop). The student should have passed MEGR 2156 upon hiring.

Applicant Preferences: The student should be self-motivated, eager to learn, with prior hands-on experience in the machine shop.

Specific Time considerations/conflicts: The student must work in the lab as required and be available to meet with faculty members and PhD/Master students as needed.

App ID #: 903

Mentor: Garahan, Katie Email: kgarahan@charlotte.edu

Title: Writing Resources Center Director

Department: Writing, Rhetoric & Digital Studies

Co-mentor: No

Community engaged research: No

Title: Understanding Multilingualism at UNC Charlotte: A Linguistic Ethnography

Description: This study collects qualitative and quantitative data to address the following questions:

What are the language backgrounds and experiences (i.e., the linguistic identities) of UNC Charlotte's students, faculty, and staff?

How do UNC Charlotte's multilingual students, faculty, and staff perceive the campus climate?

To what extent do UNC Charlotte's multilingual students, faculty, and staff feel a sense of wellbeing and belonging at UNC Charlotte?

Quantitative Data Collection

We will use a quantitative measure--The Education and Language Background Survey (ELB)--to gather linguistic identity data for UNC Charlotte's students, faculty, and staff. The ELB elicits information regarding an individual's immigration and language learning, educational history, and language use. The multiple choice questions use a five-point scale, which function as a monolingual to multilingual continuum:

Monolingual English Speaker

English Dominant

Balanced Bilingual

Non-English Dominant

English Language Learner

The ELB will allow us to obtain a composite score from 1 to 5 for each respondent. The ELB does not elicit information about dialects of English (e.g. Black English, Appalachian English, Standard American English, etc.). We will add a dialect section to the survey by drawing from current research on dialects. Undergraduate Scholars working on this project would contribute to this part of the project by collecting and reviewing secondary research related to collecting dialect identity data.

We will also include a survey asking participants to include contact information if they are willing to participate in a follow-up interview.

Qualitative Data Collection

We will collect qualitative data to examine multilingual speakers' perceptions of campus climate and to determine the extent to which they feel a sense of wellbeing and belonging at UNC Charlotte. Our qualitative research design will draw from linguistic ethnography methodologies, which seek to understand how and why language matters to individuals in their own terms. The mentor will train undergraduate scholars in ethnographic research methods, specifically observations and interviews.

Observations

Observation, particularly participant observation, is historically the most common method of ethnographic data collection. Ethnographic observations are considered open: the researcher takes detailed notes on what they experience with their own senses, and these ethnographic field notes constitute the research data. The mentor will train undergraduate researchers to conduct observations at public sites around campus (e.g. The Student Union, hallways, outdoor spaces, sporting events, and dining halls) and keep detailed field notes about how, where, and with whom UNC Charlotte community members inhabit their unique linguistic identities.

Ethnographic Interviews

Interviews are also one of the most important parts of ethnographic research as they give researchers in-depth insight into participants' perceptions. The mentor will train undergraduate scholars how to conduct ethnographic interviews. While the scholars will not conduct interviews on their own, they will observe and participate in interviews facilitated by the mentor.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 4

Anticipated Student Learning Outcomes:

Students will gain experience constructing survey questions based on secondary research.

Students will receive training in ethnographic field methods, including observations and interviews.

Students will learn the skill of taking detailed ethnographic field notes.

Students will gain experience using a mixed-methods approach to addressing research questions.

Students will engage in research centered on human subjects.

Students will learn about the Institutional Review Board (IRB).

Training Description: Student researchers will need to complete the CITI training to work with human subjects and then be added to the Institutional Review Board protocol for this project.

Training hours: 3

Mentoring plan: The students can expect to work directly with me each week. I will closely mentor them at the beginning of a task when they are just learning, and I will be easily reachable during 9am-5pm on weekdays. We will schedule weekly group meetings at which all project members will attend. Students will schedule OUR hours at regular times each week, so I can easily reach them. They will keep an excel time sheet to keep track of their tasks for each hour they work. This project will be highly collaborative, and I will be open to students' ideas and suggestions. Students can expect me to be collaborative, available, and energetic.

Applicant Requirements: I am looking for applicants who are excited to learn about languages and multilingualism. Applicants should also be interested in learning about ethnographic field research and working with human subjects. No specific courses or experiences are necessary.

Applicant Preferences: Students who have taken courses related to writing studies, writing centers, linguistics, and/or ethnographic methods are preferred.

Specific Time considerations/conflicts: Students will be expected to work during business hours (9am - 5pm M-F).

App ID #: 904

Mentor: Schmutz, Vaughn Email: vschmutz@charlotte.edu

Title: Associate Professor

Department: Sociology

Co-mentor: No

Community engaged research: Yes

Title: Assessing the impact of the arts in Charlotte

Description: This project is part of a longer-term line of research that explores the variety of arts-based programs in Charlotte that aim to make some type of social impact. In particular, this project will focus on 35 artists and arts organizations that were awarded Opportunity Fund grants for the 2024-2025 fiscal year by the city of Charlotte. We have partnered with the city to provide support for evaluation research projects and we are also exploring the goals, motivations, and beliefs of the grantees about their impact on the community. Therefore, we will be examining the impact of the programs on their goals and outcomes of interest as well as assessing overall progress on the priorities of the city's Arts & Culture plan. Surveys and interviews with providers and participants of arts-based programs will be some of the data sources used in the project.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: There are a number of benefits students can learn from this project. Some of them include:

1. Learning to communicate research findings to different audiences. Given that we will be working directly with community partners (i.e., arts-based programs in Charlotte), we will be reporting findings with practical usefulness to grantees and other stakeholders while also further academic research on the broader impacts of these activities in the community.

2. Data collection and analysis. I anticipate that students will get hands-on experience collecting survey and interview-based data as well as analyzing it. Therefore, students will gain skills in both quantitative and qualitative research methods and learn how to identify which methods are most appropriate for answering which questions.

3. Teamwork and collaboration. Any students that participate in this project through OUR will also join students that are being paid through our contract with the city. So, they will have the opportunity to join our arts research team and learn how to collaborate on shared projects and hopefully have co-authoring opportunities as a result.

Training Description: They will need to complete the CITI training for human subjects research. Other than that, I will help provide training in NVivo for qualitative analysis and will determine what quantitative training will be necessary (this will depend on the skills and software preferences of the students). The great thing is that we have students on the project that now assist with training and helping new students get up to speed on how to collect, manage, and analyze different types of data. If students are involved in conducting interviews, they will also get specific training in that as well.

Training hours: 6

Mentoring plan: As suggested above, the students will join a highly active arts research team. We have weekly team meetings, but we also have individual meetings as needed, typically every other week, to discuss individual projects. Depending on the student's personal goals and interests, they may have opportunities to collaborate on technical reports or academic papers, present at academic conferences, etc. I provide hands-on mentoring with regular check-ins.

Applicant Requirements: Willingness to work hard and work well as a team. Strong interpersonal skills and a willingness to collaborate with other students and communicate with the faculty mentor are also important skills.

Applicant Preferences: Ideally, a student will have completed a social science research methods course but this is not required. Any previous experience with data analysis (either qualitative or quantitative) is a plus, but not required.

Specific Time considerations/conflicts: N/A. We are able to accommodate the student schedule.

App ID #: 905

Mentor: Rauch, Alan Email: arauch@charlotte.edu

Title: Professor

Department: English

Co-mentor: No

Community engaged research: No

Title: WOMEN AND THE PRODUCTION OF 19TH CENTURY KNOWLEDGE

Description: The fact that women in the 19th century were dismissed as intellectual contributors to culture, is now generally accepted. But what is less appreciated is what most women themselves knew (then and now) is that they had been providing intellectual content to their own offspring for generations. At home, however, women were burdened with a feminine curriculum centered on "proper" female skills. Nevertheless "permissible" subjects included foreign languages and the sciences, which opened doors on other cultures and new genres. These female "mentors" translated new and unfamiliar worlds, in travel narratives, memoirs, and in science texts to educate eager young minds. Many of these women began their careers as translators of "foreign" texts into English, but they also acted as "conceptual" translators of complex ideas in science and culture. Despite obstacles, women found outlets for "translating" their own intellect by applying themselves to genres which had been deemed "acceptable" in a cultural milieu dominated by male authorship. Some of the best-known authors include Mary Somerville (1780-1872), Jane Marcet (1769-1858), Maria Hack (1775-1823), and Margaret Gatty (1808-1873), but they are by no means the only important and influential “knowledge-writers” of their time. The three genres that are most striking and most frequent in this context are: 1.) translation; 2.) works for children; and 3.) travel memoirs/narratives. Taken together, they all mediate knowledge in ways that rendered new and unfamiliar content accessible to a wide array of readers. In short, they are all "translations."

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: Students will learn the role that women played (and continue to play) in the construction and the dissemination of knowledge, particularly scientific knowledge. The approach to this research is archival, given that women's authorship, though important, was never foregrounded or well documented. The students who have worked on this project in the past have recognized that while the early stages of research are difficult, there is a scholarly transition that they find brilliant and illuminating. Each student will become an "expert" on the study subject they have chosen and will certainly become one of a few select scholars in either North America of the UK on the author they've chosen to explore. Ideally, a publication (perhaps an encyclopedia entry) will result from their work (as it has for past students) and, with additional support, they can present their findings at a scholarly conference. The work here goes beyond the traditional "papers" and "essays" in either history or literature. Rather, each student's work will be

pioneering and original. This is a wonderful springboard for a variety of careers because of the expertise the students will develop along with research skills. Some students will move on to graduate work, other to the law, and others to fields in advertising and marketing. (To name a few post-graduate careers.)

Training Description: In addition to reading a few scholarly papers by way of introduction, the students will have a couple of sessions (class length) to introduce them to the historical period they'll be facing, as well as some approaches in critical and historical theory. They will then begin to engage with 2-3 figures from the period to get a feel for the material. Generally the students then "drill down" on one figure by reading as much of her work as possible, as well as supporting historical (and often scientific) documents.

Training hours: 5

Mentoring plan: At the outset, we will meet 2-3 times in the first week. Following that, we will have 2-3 meeting per week for Q & A or to deal with problems or to share findings. Much of their work will be online or via email (contacting other scholars) or in the library. As we move forward, we will go through writing sessions to give them a sense of academic style and technique. Throughout the experience, I will be available to the student (or students) whenever needed. If there are two (or more students) our sessions will often be in agroup format given that they can learn a great deal from each other.

Applicant Requirements: Minimum Qualifications: Students should have an interest in archival research to explore the as yet undiscovered or at least unexamined texts by women motivated to write about science. Given the time period, late 18th to mid-nineteenth centuries, student should be historically engaged as well. If a student has language skills, say in French or German that would be useful, but not required.

Applicant Preferences: Curiosity, motivation, and an eagerness to conduct independent research are the foremost qualities that I will be looking for in students. Research like this is certainly not for the faint-hearted and so the best applicants will be those individuals who want to go beyond classroom learning to make their own discoveries in cultural history. Students ought to be ambitious but also recognize that the path of research is neither smooth no compliant. But, of course, that's what make research compelling and, again for the best students, energizing.

Specific Time considerations/conflicts: We will simply coordinate around their class times and my teaching schedule. We've never really had a problem making meeting times work for all participants.

App ID #: 906

Mentor: Wang, Miao Email: mwang25@uncc.edu

Title: Assistant Professor

Department: ECE department

Co-mentor: No

Community engaged research: No

Title: Mobile Electric Vehicle Charging in Integrated Transportation and Distribution Systems

Description: Due to the increasing environment concerns by petroleum combustion, an inevitable transition of the automobile system is the transportation electrification. To achieve this, electric vehicles (EVs), powered up by the electric batteries, will become the most important components in the future automobile systems, reducing the greenhouse gas emission in the transportation sectors. However, massive adoption of EVs is bottle-necked by limited charging facilities and lengthy charging time, thus high-power fast EV charging (e.g., charging within half an hour) with widely deployed EV charging facilities is indispensable. With that upcoming in the near future, significant challenges will be imposed over the power grid, particularly, the overload problems which may lead to considerable system instability issues in voltages and power supplies. Thanks to the integration of microgrids (MGs) which may include distributed generations (DGs), the instability issues of the power grid can be partially addressed. For instance, when the EV charging load demands increase, DGs can be used to supply the power to the power grid for maintaining the power balance. Another way to avoid the overload problem due to EV charging is to design the charging coordination among EVs. Better results are expected if we jointly consider temporal and spatial charging coordination for mobile EVs. For instance, to involve the spatial domain, vehicular mobility and traffic density analysis in transportation sector need to be considered, as vehicle traffic may impact the travel time and cost when vehicles are routed from their current locations to the desired charging stations.

In this project, to design the coordinated EV charging for mobile EVs in MGs, the simultaneous and integrated analysis of both transportation and power systems will be developed, referred to as cosimulations between transportation and distribution systems. The co-simulations can be used to both ease the integration of EV charging in the distribution system and evaluate the charging impacts on the stability of the power grid. Specifically, the transportation system will be simulated based the collected trace files in reality, to predict the charging demands of mobile EVs and the traffic distribution at charging stations. The transportation simulators then send the estimated EV charging demands and the predicted vehicle traffic distribution of the transportation sectors at each charging station for the next time step to the distributed system. Meanwhile, the distribution system is modeled based on the topology of IEEE 123-bus three phase unbalanced system, to conduct the simulations in OpenDSS. Our simulated power system model will be composed of numbers of MGs. These two simulation systems are interfaced and connected which assures that simulation time steps advance together and interfacing information is passed accordingly at each

time step. Then, based on the grid command sent by OpenDSS, a spatio-temporal coordinated EV charging strategy is then developed based on both the predicted vehicle traffic distribution and the simulator readings from the power system. The strategy aims to minimize the average tracking errors within an MG in a given horizon via optimizing the EV charging at different charging stations.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 2

Anticipated Student Learning Outcomes: This project will advance several engineering and technology fields to address driving and charging efficiency issues by developing methods that provide behavior-based new and effective feedback.

The students will learn the up-to-date technologies from this project in the areas of power grid and communication network.

The project will help the students to have a better understanding of the comprehensive solution for the future development and deployment of electric vehicles in the smart grid.

The proposed experiments represent an early attempt to develop scientifically validated, closed-loop, behaviors associated with different driving scenarios, which could serve as the foundational preliminary study and research experiences for students' future job hunting in the cyber physical system and/or power system fields.

Training Description: The student will learn how to use OpenDSS, and conduct the simulations based on the data from both power system and transportation system. The algorithm will be developed based on optimization.

Training hours: 0

Mentoring plan: The schedule for the OUR is as follows:

Over the 16 weeks for the project, the student and faculty member will do the following:

1. Meet on Monday of each week in the office to discuss the plan of the week

2. Student will spend weekdays working in the departmental research labs during the OUR 16 weeks.

3. Each week the student and the faculty will meet with other students in the faculty research group to discuss the project, and make the feasible plan and expected outcomes for the next week.

4. Quick questions on OpenDSS will be asked and answered, and interesting results would be shared for further discussion. Student will submit codes as they develop it as the software engineering practices.

The deliverables for this project:

1. Code and design files

2. A report describing the work: This report will be created after the research has been completed.

3. A poster presentation, to present the work to the larger UNCC Community.

4. A technical paper will be submitted., based on the results of this work.

Applicant Requirements: I am looking for the students who are interested in EV charging in smart grid. The students need to have the pre-knowledge of power grid technologies, optimization, and probability and random processes.

Applicant Preferences: The students who have experiences in using OpenDSS and optimization.

Specific Time considerations/conflicts: none

App ID #: 908

Mentor: Zhang, Ran Email: rzhang8@uncc.edu

Title: Assistant Professor

Department: Department of Electrical and Computer Engineering

Co-mentor: No

Community engaged research: No

Title: Building an autonomous multi-drone platform using fly4future drones

Description: Most existing drone swarm management platforms feature either centralized control by a ground base station or predefined synchronized action plans, e.g., the drone light show. A fully distributed yet coordinated multi-drone platform is still missing for realistic applications. Such applications need drones' own intelligence to make coordinated decisions in a real-time manner. To this end, this project exploits Fly4future programmable drones to build an autonomous drone platform where each drone makes decisions for their own movements via onboard intelligence while exchanging information with other drones for coordination. Student participants will explore the capabilities of the Fly4future drones, learn to interact the onboard unit (Intel NUC) with Lidar, UVDARs and cameras for situational awareness, and design distributed algorithms for different group tasks, e.g., coordinated target searching, coordinated woods passing-through, bird flock immitation, etc.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: 1. Grasp the skills of building drones from scratch

2. Know to use the realistic robotic simulator - Gazebo

3. Learn the algorithm design techniques for multi-agent reinforcement learning

Training Description: How to build a drone from scratch, how to program Intel NUC to interact with different sensors and control the drone flights, and how to use realistic drone simulator - Gazebo to simulate before actually flying.

Training hours: 10

Mentoring plan: 1. The mentor will hold weekly meetings with the mentee to discuss the accomplishments and tasks to be done.

2. The mentee will get trained on the project via working with existing undergraduate research assistants. The training includes how to build a drone from scratch, how to program Intel NUC to

interact with different sensors and control the drone flights, and how to use realistic drone simulator - Gazebo to simulate before actually flying.

3. The mentee will get trained with the mentor on distributed algorithm design under the reinforcement learning framework

4. The students may present to visitors to the lab to introduce the ongoing projects. They will also get involved in writing academic papers by providing simulation results from Gazebo.

5. Students will get trained and learn knowledge of microcontroller programming for robotic/drone control, realistic simulation using Gazebo for robotic planning, and design techniques and theories for distributed algorithms such as multi-agent reinforcement learning

Applicant Requirements: 1. Have considerable amount of microcontroller (Arduino UNO, raspberry Pi, Intel NUC, or Nvidia Jetson) programming experiences.

2. Be familiar with Python programming

Applicant Preferences: 1. Have considerable amount of microcontroller (Arduino UNO, raspberry Pi, Intel NUC, or Nvidia Jetson) programming experiences.

2. Be familiar with Python programming

Specific Time considerations/conflicts: N/A

App ID #: 909

Mentor: Zhang, Ran Email: rzhang8@uncc.edu

Title: Assistant Professor

Department: Department of Electrical and Computer Engineering

Co-mentor: No

Community engaged research: No

Title: Solar-Powered Self-Sustainable UAV Communication Networks with Fixed-Wing UAVs

Description: Unmanned Aerial Vehicle (UAV) based communication networks (UCNs) has been widely accepted as one of the key components in next generation mobile communication networks. UAVs can be equipped with wireless transceivers to provide highly on-demand services to ground and aerial users. However, the performance of UCNs are largely limited by the life of UAV batteries. Solar charging is a promising way to relieve the limitation. When the user service demand is low, some UAVs could temporally quit the network and elevate high for solar charging even if they are not in bad need. They can be later called back to replace other UAVs or meet the increased demand. By designing optimal solar charging profiles for UAVs, we can proactively control the change in the set of serving UAVs to achieve network sustainability. To this end, this project will study how to exploit fixed-wing UAVs to form a self-sustainable UCN by designing reinforcement learning algorithms to obtain UAV charging profiles.

Looking for: Either 5 hours or 10 hours per week are acceptable

# of positions available: 1

Anticipated Student Learning Outcomes: 1. Learn the state-of-the-art research in self-sustainable UAV networking

2. Learn how to model and formulate a realistic engineering problem

3. Learn how to design deep reinforcement learning algorithms to solve the proposed problem

4. Learn how to write academic papers

Training Description: 1. Reinforcement learning algorithms including Q learning, deep Q learning, DDPG, and PPO

2. Basic knowledge on wireless networking

3. Basic knowledge on UAV energy model and kinematics model

Training hours: 30

Mentoring plan: 1. Meet with the students weekly to discuss the achievements and tasks to be done

2. Train the students on different classical reinforcement learning algorithms

3. Guide the students through the entire procedure of writing an academic paper: problem formulation, algorithm design, simulation verification, and paper drafting

Applicant Requirements: 1. A considerable amount of knowledge on probability theories

2. Familiar with Python programming

Applicant Preferences: 1. A considerable amount of knowledge on probability theories

2. Familiar with Python programming

Specific Time considerations/conflicts: N/A